Regular Board Meeting
Monday, October 12, 2026 7:30 PM Eastern

Board Room of the Administration Building
800 Pine Street
Emmaus, PA 18049

Shonta Ford:	Present
Jeffrey Jankowski:	Present
Timothy Kelly:	Present
Gabrielle Klotz:	Present
Joshua Levinson:	Present
Rita Perez:	Present
Christine Price:	Present
Melissa Stiavelli:	Present
William Whitney:	Present

Present: 9.

1. **MEETING OPENING**
   - 1.A. Call to Order; Pledge of Allegiance
   - 1.B. Requests to Comment at Board Meeting
2. **MINUTES**
   - 2.A. Minutes of the September 28, 2026, Regular Board Meeting
3. **SUPERINTENDENT OF SCHOOLS**
   - 3.A. District Update — Dr. Kristen Campbell
4. **CURRICULUM**
   - 4.A. Course Curricula
   - 4.B. Emmaus High School 2027-2028 Program of Studies
   - 4.C. Instructional Resources
   - 4.D. Educational Conferences
5. **PERSONNEL**
   - 5.A. Personnel Items
6. **BUSINESS OPERATIONS**
   - 6.A. District Bills
   - 6.B. Treasurer's Report
   - 6.C. Contracts/Agreements

6.D. Vendor	6.E. Contract/Agreement	6.F. Amount
6.G. PPL Center	6.H. License Agreement 2027 Emmaus High School Graduation Ceremony	6.I. $22,000 - plus production related expenses

   - 6.J. Use of District Facilities — Group IV Organizations
   - 6.K. Budget Transfer - Student Supports Coordinator
   - 6.L. Student Activity Fund Advisors and Officers
7. **POLICY**

7.A. New Policy: 204.1 & Update of Current Policies: 102, 105, 105.2, 209, 246, 249, 704, 803, 805.2, & 822 - Second Reading

8. **OLD BUSINESS**
9. **NEW BUSINESS**

9.A. Policy discussion on Policy 006.1: Attendance at Meetings via Electronic means

9.B. Policy discussion on Policy 003-Functions.

10. **ANNOUNCEMENTS**

10.A. Executive Session -7:00PM

10.B. Regular Board Meeting: Monday, October 26, 2026; 7:30 PM

11. **ADJOURN**

BOARD OF SCHOOL DIRECTORS EAST PENN SCHOOL DISTRICT

MINUTES OF THE SEPTEMBER 28, 2026 REGULAR BOARD MEETING

Board Members Present:
Shonta Ford
Jeffrey Jankowski
Timothy Kelly
Gabrielle Klotz
Dr. Joshua Levinson
Christine Price
Melissa Stiavelli
Dr. William Whitney

Board Members Absent:
Dr. Rita Perez

Others Present:
Dr. Kristen Campbell, Superintendent
Miranda Ortiz, Board Secretary
Marc S. Fisher, Gross McGinley, LLP, Solicitor
Robert E. Saul, Treasurer

1. **MEETING OPENING**

1.A. Call to Order; Pledge of Allegiance

- Call to action at 7:38 PM followed by the Pledge of Allegiance

1.B. Requests to Comment at Board Meeting

- No requests for public comment

2. **MINUTES**

2.A. Minutes of the September 14, 2026 Regular Board Meeting
Motion that the Board of School Directors of East Penn SD approve the minutes of the September 14, 2026 Regular Board Meeting. This motion, made by Price and seconded by Jankowski, Resolved.
Rita Perez: Absent, Shonta Ford: Aye, Jeffrey Jankowski: Aye, Timothy Kelly: Aye, Gabrielle Klotz: Aye, Joshua Levinson: Aye, Christine Price: Aye, Melissa Stiavelli: Aye, William Whitney: Aye
Aye: 8, Nay: 0, Absent: 1

- Dr. Campbell clarified a statement made by Ms. Price at the September 14th Board meeting during discussion regarding the addition of Old Business/New Business as standing agenda items. During that discussion, Ms. Price stated that she had requested that an item be added to the April 27th, 2026 agenda to discuss a resolution advocating for increased State funding, and that the item was not included on the agenda. Dr. Campbell clarified that the resolution was subsequently brought forward for discussion at the April 27th meeting, introduced and led by Ms. Price, and expressed her appreciation for Ms. Price bringing the matter forward. At the following Board meeting on May 11th, 2026, an action item regarding the same resolution advocating

for increased State funding was presented and subsequently approved by the Board. Dr. Campbell noted that, prior to this meeting, she had communicated with Ms. Price regarding the chronology of these events and emphasized that she appreciated the intent of the example shared during the discussion. Dr. Campbell acknowledged that the comments were intended to highlight the lack of clarity regarding the process for Board members to request that items be added to an agenda, as well as the need for a clear process through which Board members receive responses to such requests. Dr. Campbell stated that her purpose in providing the clarification was to ensure that the chronology and records were accurately reflected, particularly as the statement had also been referenced by media outlets.

3. **SUPERINTENDENT OF SCHOOLS**

3.A. District Update — Dr. Kristen Campbell

- Dr. Campbell started her report by celebrating the wonderful turnout of the annual tailgate sponsored by East Penn Education Foundation, which was held on Friday, September 18th, 2026. During halftime of the football game that evening that followed the tailgate, the East Penn Education Foundation had the opportunity to recognize the five finalist for the 2026 EPSD Employee of the Year award. The top finalists were: Denise St. Pierre, Administrative Assistant at LMMS; Ross Kirk, Art teacher at Willow Lane ES; Beth Guarriello, Principal at EHS; Deb Muthard, Confidential Assistant in the Human Resources Department; and Cindy Snow, math teacher at Eyer MS. Prior to the start of the halftime show, the EPSD Education Foundation announced the 2026 Educator of the Year award recipient, Mrs. Beth Guarriello. Dr. Campbell credited Mrs. Guarriello for being an amazing leader, always being present, and celebrating the multitude of accomplishments of our students. The EPSD Education Foundation, as well as the entire East Penn Community were really excited to celebrate Mrs. "G". Dr. Campbell thanked the Education Foundation for supporting great events such as this one that bring the community together, and also for the great financial contributions that they make to support our students and our teachers.
    - Dr. Levinson & Ms. Ford noted the positive and electric atmosphere that was present at the EPSD Education Foundation tailgate. Dr. Levinson expressed his gratitude to the Foundation for making the effort to put this event together, and congratulated the top finalists, and Mrs. Guarriello as the recipient. Ms. Ford also mentioned how wonderful the event was, and how great it was to see other board members present, such as Dr. Levinson, Dr. Perez, and Mr. Kelly.
- The fall athletic teams are off to a phenomenal start. The current record for our golf team is 14-2. Congratulations to two students: Junior Ella Blozinsky, who finished 2nd in the EPC Tournament, and Senior Evan Walters, who finished 4th in the EPC Tournament. There will also be a District Qualifier Tournament scheduled for Tuesday, September 29, 2026. Football is currently 2-3, taking on Allentown Central Catholic on Thursday, October 1st, followed by the homecoming game held on Friday, October 9th vs Whitehall. Field Hockey is 11-0, possibly 12-0, as there was a game wrapping up at the board meeting began. Girl's Tennis is 17-0, with their final match against Parkland scheduled for later this week. Boys Soccer is 10-0 and 1, and about a week and a half ago, we celebrated boy's soccer coach, John Cari, as he became

the winningest soccer coach in the area, hitting the 365 win mark. Congratulations to John Cari on being an excellent coach, mentor and role model for our players! Girl's Soccer is 11-0, hosting their youth night against Pleasant Valley on Tuesday, September 29th. Boys and Girls Cross Country is 6-0, and Girl's Volleyball is 7-3, celebrating their Senior Night on Tuesday, September 29th.

- Dr. Campbell closed out her District Update by providing information about the upcoming Winter sports season. Students interested in participating in a winter sport should complete the registration information available on the Athletics page of the East Penn School District website. The registration deadline is October 20, 2026.

4. CURRICULUM

4.A. Educational Conferences
Motion that the Board of School Directors of East Penn SD approve the estimated expenses for the individual(s) attending educational conferences, as per Educational Conferences exhibit. Educational Conferences expensed through the general fund unless otherwise noted. This motion, made by Jankowski and seconded by Price, Resolved.
Rita Perez: Absent, Shonta Ford: Aye, Jeffrey Jankowski: Aye, Timothy Kelly: Aye, Gabrielle Klotz: Aye, Joshua Levinson: Aye, Christine Price: Aye, Melissa Stiavelli: Aye, William Whitney: Aye
Aye: 8, Nay: 0, Absent: 1

- Mr. Kelly asked if board members would be able to learn more about what the school counselors who will be presenting at an upcoming conference will be presenting about. Mr Kelly acknowledged that this is a great thing that they are doing.
    - Dr. Campbell responded, telling Mr. Kelly that once the counselors return from said conference(s), we will provide the board with an update.

5. PERSONNEL

5.A. Personnel Items
Motion that the Board of School Directors of East Penn SD approve the personnel items being recommended by the Superintendent, as per Personnel Agenda Items exhibit and corresponding exhibit(s). This motion, made by Levinson and seconded by Jankowski, Resolved.
Rita Perez: Absent, Shonta Ford: Aye, Jeffrey Jankowski: Aye, Timothy Kelly: Aye, Gabrielle Klotz: Aye, Joshua Levinson: Aye, Christine Price: Aye, Melissa Stiavelli: Aye, William Whitney: Aye
Aye: 8, Nay: 0, Absent: 1

- Ms. Ford made note of the clerical error under section III of the Personnel agenda: The effective start date for Kimberly Taskalos, is October 28, 2026, not September 29th as documented.

6. BUSINESS OPERATIONS

6.A. Contracts/Agreements

RESOLVED, That the Board of School Directors of East Penn SD approve the following contract(s)/ agreement(s), as per corresponding exhibits. This motion, made by Jankowski and seconded by Klotz, Resolved.

Motion was unanimously adopted by voice vote.

6.B. Use of District Facilities — Group IV Organizations
Motion that the Board of School Directors of East Penn SD grant permission for the following organizations to use district facilities. This motion, made by Jankowski and seconded by Klotz, Resolved.

Motion was unanimously adopted by voice vote.

7. **POLICY**

7.A. New Policy: 204.1 & Update of Current Policies: 102, 105, 105.2, 209, 246, 249, 704, 803, 805.2, & 822 - First Reading

- Dr. Doug Povilaitis, Assistant Superintendent, provided a general overview of the updates as recommended by and in consultation with PSBA, administration, and board solicitor.
    - Board members asked questions, and offered feedback. Administration will bring forward the updated policies to the board for a second reading at the next regularly scheduled board meeting.

8. **OLD BUSINESS**

- No Old Business to report on

9. **NEW BUSINESS**

- No New Business to report on

10. **OTHER EDUCATIONAL ENTITIES**

10.A. Lehigh Career & Technical Institute Report - Mr. Jeffrey Jankowski, Ms. Gabrielle Klotz, Dr. Joshua Levinson, and Dr. Rita Perez

- Dr. Levinson reported on the September 24th JOC meeting providing the following highlights:
    - Student representatives from Dieruff High School and from Parkland High school who are leaders of the Future Business Leaders of America (FBLA) Chapter at LCTI. These representatives spoke about their experiences and what they've learned over the years.

- Dr. Greenawalt, Executive Director, and team, delivered their administrative report which included the following:
    - LCTI Educator of the Year award recipient, Nikki Dinofrio, who will hold this title for a two-year term through mid-June 2028.
    - The auditors reported on the completed 2024-2025 audit. LCTI was given a clean opinion with financial highlights indicating a healthy balance sheet. Some areas of weakness from the prior years were identified as stemming from business office turnover and the difficulties in transitioning to a new software platform; both of which have been addressed and now put LCTI in a great position to return to a normal work submission cycle for the 2025-2026 school year and beyond.
    - Administration also presented the JOC seat calculation for 2027, which allocates the 21 seats among the nine sending districts that LCTI serves. EPSD will again have 4 seats and the existing members will remain.
    - LCTI's Professional Advisory Committee, composed of member district Superintendents participated in the strategic summit held on September 17th and 18th with a full itinerary for both days.
    - Dr. Matthew Link, Northern Lehigh SD Superintendent, was nominated and endorsed by the Professional Advisory Committee to be the LCTI Superintendent of Record for another two year term starting on July 1, 2027 through June 30, 2029. The JOC voted formally to approve this nomination.
    - Dr. Greenawalt discussed her participation in the PASA CTE caucus meeting held on September 14th, which focused on collaborative efforts to align on goals, legislative priorities, and more.
    - A group composed of administrators, teachers, and alumni were recently interviewed on Astound TV Network to discuss the value of career and technical education.
    - Lehigh Valley Business Organization published its list of 300 influential individuals and included Dr. Greenawalt.
    - The Occupational Advisory Council (OAC) that works to advise LCTI, is going to be meeting on October 7th, and are expecting around 400 attendees from the region all across various occupations and businesses in the region. The guest speaker will be Don Cunningham, President and CEO of the Lehigh Valley Economic Development Corporation (LVEDC). Also at this meeting, the LCTI Education Foundation will be formally introducing itself to the OAC.
    - LCTI will participate in the CTE expo at LCCC, which is sponsored by Senator Jarrett Coleman.
    - LCTI Fall Open House scheduled for November 12th and in parallel with that over the next few months are prospective student tours.
    - Data was presented on program retention rates and improved student satisfaction. This included charts that showed that drop requests are in decline year after year for the last several years which is an indication that LCTI has been more successful at placing students into their top program choices.

        - Lastly, the LCTI Facilities Director reviewed various projects taking place on campus. This included an overview of a recent issue with a water well failure and the subsequent water main break that followed in one of the buildings. The problem was caught early which resulted in the repair work being completed quickly.
    - At the completion of the admin report, regular business was conducted with their next scheduled meeting for October 28, 2026.

10.B. Carbon Lehigh Intermediate Unit Board Member Report - Dr. William Whitney

- Dr. Whitney reported on the September 21st CLIU Board of Directors meeting, providing the following highlights:
    - Departmental and program related presentations were presented. Dr. Whitney started his report on the Deaf and Hard of Hearing program presentation from the Deaf and Hard of Hearing supervisor, Katie Tully. Dr. Whitney mentioned the presentation was enlightening learning about the specific services of the Deaf and Hard of Hearing program and the specific needs for those students. Dr. Whitney also shared some statistics from the presentation, which include the 90/90 rule, which is referred as such due to the fact that approximately 90% of deaf and hard-of-hearing children have hearing parents, and of those, approximately 90% do not sign or learn sign language with their children. Another statistic was that if a child does not start attaining language skills by age 5, the window is essentially closed, which highlights the importance of the programs that the IU offers. Dr. Whitney also shared that there are four deaf and hard-of-hearing classrooms that are all located within Parkland SD. In addition to the classroom instruction, the program provides educational interpreting, audiology, and other itinerant services. In the last school year, the Deaf and Hard of Hearing program served 153 students, in which 26 of these students were EPSD students in either classroom-based or itinerant services. In addition, there are 21 students within the CLIU's footprint who received interpretive services, and 352 students who received audiology services.
    - The second presentation includes the CLIU Human Resources Department presentation, which consisted of four employees who outlined some of the services they provide, particularly, services provided to the 14 districts in the IU which include things like monthly HR get-togethers, quarterly payroll coordinator meetings, the guest teacher program, and assistance with research for district HR directs when needed. In addition, they oversee recruitment and hiring, employee retention and internal pathways for professional growth and development.
    - CLIU board voted to Decommission 12 CLIU vehicles as part of the ongoing fleet management replacement program.
    - Voted to approve a full-time outpatient behavioral health technician for things like therapy, medication management, etc.

11. **ANNOUNCEMENTS**

11.A. Executive Session:

- Special executive session held on September 22, 2026, to discuss personnel matters.

11.B. Executive Session:

- Executive session held at 7:15 PM to discuss matter of confidentiality.

11.C. Regular Board Meeting:

- Next regular board meeting scheduled for Monday, October 12th at 7:30 PM.

12. **ADJOURN**
There being no further business to come before the board. This motion, made by Price and seconded by Jankowski, Resolved.
Motion was unanimously adopted by voice vote. Meeting adjourned at 8:31 PM

Respectfully submitted,

Miranda Ortiz
Board Secretary
East Penn School District

Analyze the evidence found at a crime scene and help the medical examiner uncover clues left on a body to solve a mystery. Question, diagnose, and propose treatment and care for patients in a family medical practice. Track down the source of a mysterious outbreak at a local hospital. Access and stabilize a patient during an emergency and prepare for medical surge and mobile medical care. Collaborate with professionals in other fields to innovate and design solutions to local and global medical problems.

Whether seeking a career in medicine or healthcare or simply looking for the challenge of real-world problems, students in Principles of Biomedical Science will practice how to think creatively and critically to innovate in science and will gain practical experience with experimental design and the design process.

PLTW Principles of Biomedical Science (PBS) is a full-year high school course in the PLTW Biomedical Science pathway. This course serves to provide foundational knowledge and skills in fields such as biology, anatomy and physiology, genetics, microbiology, and epidemiology as well as to engage students in how this content can be applied to real-world situations, cases, and problems.

Through both individual and collaborative team activities, projects, and problems, students tackle real-world challenges faced by biomedical professionals in the field. They work with the same tools and equipment used in hospitals and labs as they engage in relevant hands-on work. Students develop skills in technical documentation to represent and communicate experimental findings and solutions to problems. In addition, students explore how connections to other disciplines such as computer science and engineering shape the future of medicine and practice collaboration techniques that will help them connect with professionals across any field.

Following is a summary of the units of study. Course content is designed with strong connections to multiple state and national standards. Activities, projects, and problems are provided to the teacher through an online delivery system, PLTW Courses.

The course requires a rigorous pace, and it is likely to contain more material than a skilled teacher new to the course will be able to complete in the first iteration. Building enthusiasm for and a real understanding of the role, impact, and practice of biomedical scientists is a primary goal of the course.

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PBS Unit Summary

Unit 1	Medical Investigation
Unit 2	Clinical Care
Unit 3	Outbreaks & Emergencies
Unit 4	Innovation, Inc.

Unit 1: Medical Investigation

In Unit 1, students engage in forensic science and medical examination investigations in order to: (a.) explore biological and forensic science careers; (b.) gain experience in experimental design and data analysis; (c.) learn about biomolecules and their role in determining identity; (d.) learn about human anatomy and physiology and causes of death; (e.) practice synthesizing multiple forms of data to draw conclusions; and (f.) work to develop professional communication skills.

Medical Investigation Lesson Summary

Lesson 1.1	Investigating the Scene
Lesson 1.2	Master the Morgue
Lesson 1.3	Open Investigation

Lesson 1.1 Investigating the Scene

In Lesson 1.1, students begin their training as medical investigators. Shadowing members of the forensic investigation team, they document and analyze the clues left at the scene of a woman's death. A video from the police commissioner emphasizes the severity of the situation, the need for more qualified professionals to help solve these types of cases, and the need for them to get to the bottom of the case ASAP. Students sketch the crime scene and document evidence, analyze trace evidence in the lab, analyze biometric data of interviewed suspects, and record a video check-in for the police commissioner chronicling what they have learned about the case in this lesson. Students are also introduced to experimental design as well as proper scientific documentation.

Lesson 1.2 Master the Morgue

In Lesson 1.2, students shadow the medical examiner to investigate what clues the body provides about the cause and manner of death. Students explore human body system structure and function as they investigate the composition of an autopsy. They explore the many pieces of evidence that go into determining time of death and complete toxicology testing to determine the presence of drugs or chemicals in the body of the decedent. Examining basic tissue types in the body, students zoom in to the microscopic level for clues that can't be seen with the naked eye. Students then explore gross anatomy as they complete an "autopsy" dissection of

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a preserved heart. Using what they have learned in this lesson and from the examination of evidence from the scene, students determine the cause, mechanism, and manner of death of the decedent.

Lesson 1.3 Open Investigation
Now that students have "graduated" from their training, they are tasked to solve a new case. They explore a virtual crime scene, gather evidence from the scene and persons of interest, complete laboratory testing, analyze evidence to deduce what happened, and complete an autopsy report using test and examination results. In preparation for court testimony, they must create an evidence board that illustrates the case to a judge or jury.

Unit 2: Clinical Care

Students assume the role of different medical professionals working through the schedule of patients in a family care clinic to: (a.) explore medical careers; (b.) practice professional communication; (c.) gain experience collecting, recording, and interpreting physiological data; (d.) learn how to perform routine medical tests and evaluate results; (e.) learn about cutting-edge technologies revolutionizing healthcare; (f.) understand the interconnectedness between body systems; and (g.) explore the various causations and inheritance of disease.

Clinical Care Lesson Summary

Lesson 2.1	Talk to Your Doc
Lesson 2.2	Decoding a Diagnosis
Lesson 2.3	New to the Practice

Lesson 2.1 Talk to Your Doc
Students begin their day at the PLTW Total Care Clinic. Each patient they see highlights key clinical skills and allows students to explore biological and physiological content. Students explore effective questioning techniques, learn about documentation of patient data and medical history in electronic medical records, and investigate issues related to patient privacy. They collect and analyze vital signs from a patient, investigating how each vital sign relates to the overall health and homeostasis of the body as well as how these vital signs can be used as part of clinical care and disease diagnosis. Students interpret the results of routine bloodwork and make recommendations on ways to improve overall health and limit disease risk. Students are also introduced to telehealth, wearable devices, and remote monitoring as they simulate a virtual visit with a diabetic patient. At the end of the lesson, students apply what they have learned to design a plan for a routine visit of a patient with a chronic health condition.

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Lesson 2.2 Decoding a Diagnosis
In this lesson, students explore the relationship between DNA, chromosomes, genes, and proteins as they work through the diagnosis of various patients in the practice. Students investigate the process of protein synthesis as they piece together how mutations are related to various health conditions. Students also explore how abnormalities with chromosomes can contribute to disease and overall health. At the end of the lesson, students use what they have learned to help a family interested in learning more about their genetic risk.

Lesson 2.3 New to the Practice
In the problem, students are tasked with helping a new patient at the PLTW Total Care Clinic. They need to evaluate all medical evidence, question the family, record vital signs, order and evaluate bloodwork and synthesize data to make a diagnosis.

Unit 3: Outbreaks & Emergencies

Working as public health officials and then as emergency responders, students are presented with a series of events they must address while exploring: (a.) careers in public health, epidemiology, microbiology, and emergency medicine; (b.) professional communication and presentation; (c.) data analysis; (d.) processes by which critical medical decisions are made and acted upon; and (e.) processes by which patients are diagnosed with a contagious disease and by which a causative agent is identified.

Outbreaks & Emergencies Lesson Summary

Lesson 3.1	Nosocomial Nightmare
Lesson 3.2	Emergency Response
Lesson 3.3	Information Sharing

Lesson 3.1 Nosocomial Nightmare
In this lesson, students are part of the PLTW Disease Defense Team and they have been called to the local hospital. There have been a number of hospital-acquired infections and the patients are not related or in the same ward. Students are challenged to investigate the case, determine why and how patients are getting sick, and design a strategy for resolving the outbreak (and preventing another one). Through their investigation, students investigate the chain of infection, agents of disease, and basic structure and function of the human immune system. In the lab, students work to identify the infectious agent that plagues the fictional hospital.

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Lesson 3.2 Emergency Response
Students now serve as part of an emergency medical response team, trained to respond when access to care is limited during accidents, natural disasters, and other mass casualty events. As they respond to an emergency in the field, students investigate assessment and stabilization of a patient, drug delivery and metabolism, techniques to stop bleeding, and communication between medical care providers. Students evaluate hospital protocol for medical surge during an event as well as design a mobile response facility to assist with patient triage and care.

Lesson 3.3 Information Sharing
Students apply what they have learned in the unit as they plan the design of an app to be used to trace outbreaks, respond to emergencies (local or global), increase response efficiency in emergencies, or provide another public health function. This app can be used by medical professionals or can be designed to be used by civilians in an emergency. Students create mock-ups of their app, modeling the interactivity, and peer review each other's designs.

Unit 4: Innovation, Inc.

Welcome to PLTW Innovation, Inc.—an incubator for innovation where some of the best minds in science and engineering endeavor to solve some of the world's most pressing biomedical challenges. Students tour Innovation, Inc. labs and engage in experiences designed to: (a.) build their engineering and experimental design process skills; (b.) challenge them to design solutions to current and emerging issues both on and off this world; (c.) tangibly highlight that solutions to biomedical science problems rely on collaboration between professions; (d.) build their computer science skills by using computer-aided design (CAD) and geographic information system (GIS) to innovate the future of medicine; and (e.) explore career fields on the forefront of medicine.

Innovation, Inc. Lesson Summary

Lesson 4.1	Designing the Future
Lesson 4.2	New Frontiers
Lesson 4.3	Invitation to Innovation

Lesson 4.1 Designing the Future
In Lesson 4.1, students tour labs in the company, each dedicated to a different area of research, innovation, and design. They investigate innovation in medical device development as they design model vessels for testing of cardiac stents. They explore how CAD can be used for modeling and prototyping in innovation. Students explore innovation in drug delivery as they design and test the formulation for a new drug. Focusing on large-scale efforts in disease prevention and health promotion, they then design a comprehensive initiative that could be implemented in communities around the country.

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Lesson 4.2 New Frontiers
In this lesson, students expand their exploration of innovation to new frontiers. They explore how the body reacts to travel to and life in space and design innovative improvements. They then dive under the sea as they locate and test marine organisms for bioactive compounds useful as therapeutics. In the project, students are tasked with identifying the next frontier for scientific exploration using GIS and designing an innovation for use in exploring, existing in, or adapting materials from this new frontier. Students summarize their research and present their proposal in an interactive story map.

Lesson 4.3 Invitation to Innovation
In the problem, students are tasked with competing for open lab space at PLTW Innovation, Inc. To make their case, students apply all they have learned in this unit (and course) to design a medical innovation.

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Course resumes showcase the technical skills students obtain in each PLTW course. Each resume outlines the computational skills, analytical skills, and knowledge acquired in the course. Course resumes also detail student experience with tools, software, lab work, and engineering design. The detailed skills listed within course resumes illustrate the immediate, applicable contributions that students can make within a workplace.

Laboratory Skills

- Aseptic technique
- Bacterial culturing, plating, and identification (Gram staining)
- Blood testing and typing
- Dissection
- DNA extraction
- DNA gel electrophoresis
- Fingerprint and hair analysis
- Karyotyping
- Applied math
- Micropipetting
- Microscopy
- Standard curve creation and utilization

Clinical Skills

- Bloodwork analysis
- Blood drawing
- Blood pressure measurement and analysis
- Clinical empathy
- Heart rate measurement and analysis
- HIPAA legislation and implications understanding
- Scientific terminology and abbreviation usage
- Patient questioning, record keeping and documentation
- Pedigree construction and analysis
- Controlled bleeding techniques
- Triage

Equipment and Software Proficiencies

- ArcGIS
- TinkerCAD
- Microsoft Office (Excel, Word, PowerPoint)
- Probes and sensors (temperature, respiration, heart rate)
- Data acquisition software (Graphical Analysis)
- Light microscope
- Gel electrophoresis
- Micropipettors
- Electronic balance

Scientific Experimentation Skills

- Design and conduct reliable scientific experiments
- Analyze and interpret laboratory data
- Construct graphs (by hand and using graphing software)
- Interpolate and extrapolate data from a graph
- Draw conclusions based on experimental data
- Thoroughly and clearly communicate results and conclusions both orally and in writing

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Design Process Skills

- Solve a problem using an iterative design process
- Work collaboratively on a design team to design a product or solve a problem
- Document in detail the design process used to solve a problem or design a product
- Develop a detailed and comprehensive design brief
- Brainstorm to generate creative ideas and potential solutions to a problem
- Carry out a plan to compare alternate solutions and select the best solution path
- Evaluate a design solution with respect to design criteria and constraints

Professional Skills

- Team collaboration
- Peer review and feedback
- Project management
- Problem-solving
- Oral communication and presentation
- Technical writing
- Ethical reasoning

Course Knowledge

- Bioethics
- Biomedical science careers
- Body systems (selected) anatomy and physiology
- Cancer biology
- Cell biology
- Crime scene investigation
- Disease treatment and prevention
- Drug design
- Emergency medicine and medical surge
- Forensic investigation, manner, mechanism and cause of death
- High throughput screening (HTS)
- Homeostasis and positive and negative feedback mechanisms
- Infectious disease transmission
- Inheritance
- Interrelationship between body systems, health, and disease
- Mitosis and meiosis
- Molecular biology
- Pathology of disease: infectious, hereditary, and physiological diseases
- Protein synthesis
- Punnett squares
- Relationship between DNA, mutations, protein structure, and disease or dysfunction
- Relationship between genes, chromosomes, and DNA
- Restriction fragment length polymorphisms (RFLP) analysis
- Structure of DNA

Engagement Experiences

- Laboratory investigations
- Case studies
- Instant challenges
- Simulations
- Role playing
- Digital design: podcasts, videos, etc.
- Thought experiments
- Design thinking

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PLTW Standards Connection
Principles of Biomedical Science

Connections to Standards in Biomedical Science

PLTW curriculum is designed to empower students to thrive in an evolving world. As a part of the design process when developing and updating our curriculum, we focus on connections to a variety of standards. PLTW Principles of Biomedical Science connects to standards in the following:

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Common Core State Standards for Mathematics Page 17

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Foundation Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Human Anatomy and Physiology

1.1.1 a

Identify basic levels of organization of the human body
a. Chemical
b. Cellular
c. Tissue
d. Organs
e. Systems
f. Organism

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Human Anatomy and Physiology - Identify basic structures and describe functions of human body systems.

1.1.2 a

Skeletal
- Structures of the skeletal system
  - Distinguish between axial and appendicular skeletons
  - Describe long bone anatomy
  - Identify joint types and movement
  - Name and classify all bones (206)
- Functions of the skeletal system
  - Structure and support
  - Muscle attachment and movement
  - Mineral storage
  - Hematopoiesis

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

1.1.2 b

Muscular
- Structures of the muscular system
  - Identify types of muscle tissue
  - Identify major muscle groups of neck, shoulder, chest, abdomen, back, arms, and legs
- Functions of the muscular system
  - Body movement
  - Posture
  - Protection

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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1.1.2 c

Integumentary

- Structures of the integumentary system
  - Identify integumentary components
  - Label the layers of skin
- Functions of the integumentary system
  - Vitamin D production
  - Sensory organ
  - Infection protection
  - Temperature regulation
  - UV light protection

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

1.1.2 d

Cardiovascular

- Structures of the cardiovascular system
  - Identify cardiovascular organs
  - Label the parts of the heart
  - Distinguish blood components
- Functions of the cardiovascular system
  - Blood flow through the heart and body
  - Transports nutrients, waste, antibodies, hormones, and gases
  - Cardiac conduction system

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

1.1.2 e

Lymphatic / Immune

- Structures of the lymphatic system
  - Identify lymphatic organs
- Functions of the lymphatic system
  - Provide protection against disease
  - Movement of lymph fluid

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

1.1.2 f

Respiratory

- Structures of the respiratory system
  - Identify respiratory organs
- Functions of the respiratory system
  - Gas exchange

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1.1.2 g

Structures of the nervous system
- Identify organs of the nervous system
- Identify structures of the special sense organs

- Functions of the nervous system
  - Sensation
  - Movement
  - Processing

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

1.1.2 h

Endocrine
- Structures of the endocrine system
  - Identify endocrine glands
- Functions of the endocrine system
  - Production of hormones
  - Regulation of body processes
  - Controls metabolism
  - Regulates growth, development, and maturation

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

1.1.2 i

Digestive
- Structures of the digestive system
  - Identify digestive organs in sequence
  - Differentiate between alimentary and accessory organs
- Functions of the digestive system
  - Chemical and mechanical digestion
  - Absorption of nutrients
  - Excretion of waste

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

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1.1.2 j

Urinary

- Structures of the urinary system
  - Identify urinary organs
  - Identify gross and microscopic anatomy of the kidney
- Functions of the urinary system
  - Process of urine formation
  - Urine composition
  - Homeostatic balance

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

1.1.2 k

Reproductive

- Structures of the reproductive system
  - Identify female reproductive organs
  - Identify male reproductive organs
- Functions of the reproductive system
  - Formation of gametes
  - Production of hormones

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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National Consortium for Health Science Education

Diseases and Disorders -

1.2.1

Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders, including, but not limited to the following:

- Arthritis
- Asthma
- Cancer
- Cataracts
- Concussion / Traumatic Brain Injury (TBI)
- Cystic fibrosis
- Diabetes mellitus
- Dementia
- Gastric ulcer
- Hepatitis
- Hypertension
- Melanoma
- Muscular Dystrophy
- Myocardial Infarction
- Sexually Transmitted Infection (STI)
- Stroke / Cardiovascular Accident (CVA)
- Tuberculosis
- Urinary Tract Infection (UTI)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.2.2

Describe biomedical therapies as they relate to the prevention, pathology, and treatment of disease.

- Gene testing
- Gene therapy
- Cloning
- Stem cell research

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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National Consortium for Health Science Education

Medical Mathematics - Demonstrate competency using basic math skills and mathematical conversions as they relate to healthcare.

1.3.1 b

Mathematical

- Average
- Ratios
- Fractions
- Percentages
- Addition / Subtraction
- Multiplication / Division

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.3.1 c

Conversions

- Height (inches/meters)
- Weight/mass (pounds/grams)
- Length (inches/meters)
- Volume (ml/cc)
- Temperature (F/C)
- Household measurements (Tbsp/tsp/cup/oz)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Medical Mathematics

1.3.2

Demonstrate the ability to analyze diagrams, charts, graphs, and tables to interpret healthcare results.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.3.3

Demonstrate use of the 24-hour clock/military time.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Human Anatomy and Physiology - Describe the organization of the human body and directional terms.

1.1.1 d

Use directional terms

- Anterior / Posterior
- Medial / Lateral
- Proximal / Distal
- Superficial /Deep
- Superior / Inferior
- Ventral / Dorsal

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

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1.1.1 e

Identify body cavities

- Abdominal
- Cranial
- Dorsal
- Pelvic
- Spinal
- Thoracic

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

Foundation Standard 2: Communications Demonstrate methods of delivering and obtaining information, while communicating effectively.

Concepts of Effective Communication

2.1.1

Model verbal and nonverbal therapeutic communication.

- Active listening
- Silence
- Summarizing
- Reflecting

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

Concepts of Effective Communication

2.1.4

Interpret elements of communication using sender-message-receiver feedback model.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

2.1.5

Modify communication to meet the needs of the patient/client and be appropriate to the situation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

2.1.6

Describe appropriate interactions with patients throughout various stages of psychosocial development.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

Medical Terminology

2.2.1

Use common roots, prefixes, and suffixes to communicate information.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

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2.2.2

Interpret common medical abbreviations to communicate information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Written Communication Skills

2.3.1

Use proper elements of written and electronic communication (spelling, grammar, and formatting).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

2.3.2

Prepare examples of technical and informative writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Foundation Standard 3: Systems Identify how key systems affect services performed and quality of care.

Healthcare Delivery Systems - Differentiate healthcare delivery systems and healthcare related agencies.

3.1.1 a

Types of practice settings
• Acute care
• Ambulatory care
• Behavioral and mental health services
• Home care
• Long-term care
• Medical and dental practices

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Healthcare Delivery Systems

3.1.2

Examine the healthcare consumer’s rights and responsibilities within the healthcare system.
• Self-advocacy
• Compliance
• Patient’s Bill of Rights

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

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Foundation Standard 4: Employability Skills Use employability skills to enhance employment opportunities and job satisfaction.

Personal Traits of the Health Professional

4.1.1

Identify personal traits and attitudes desirable in a career ready member of a health team.

- Acceptance of criticism
- Competence
- Dependability
- Discretion
- Empathy
- Enthusiasm
- Honesty
- Initiative
- Integrity
- Patience
- Positive Attitude
- Responsibility
- Self-motivation
- Tact
- Team player
- Willingness to learn

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

4.1.2

Summarize professional standards as they apply to hygiene, dress, language, confidentiality and behavior.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Career Decision-making

4.3.1

Research levels of education, credentialing requirements, and employment trends in health professions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

4.3.2

Distinguish differences among careers within a health science pathway.

- Biotechnology research and development
- Diagnostic services
- Health informatics
- Support services
- Therapeutic services

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Foundation Standard 5: Legal Responsibilities Describe legal responsibilities, limitations, and implications on healthcare worker actions.

Legal Practices

5.2.1

Apply standards for the safety, privacy and confidentiality of health information.
• HIPAA
• Privileged communication

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

5.2.3

Summarize the essential characteristics of a patient's basic rights within a healthcare setting.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Foundation Standard 6: Ethics Understand accepted ethical practices with respect to cultural, social, and ethnic differences within the healthcare environment.

Ethical Practice

6.1.1

Differentiate between ethical and legal issues impacting healthcare.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

6.1.2

Identify ethical issues and their implications related to healthcare.
• Ethics committee
• Euthanasia
• In vitro fertilization
• Organ donation
• Scope of practice

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

6.2.2

Demonstrate respectful and empathetic treatment of ALL patients/clients.
• Civility
• Customer service
• Patient satisfaction

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Foundation Standard 7: Safety Practices Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Infection Control - Explain principles of infection transmission.

7.1.1 a

Identify classifications of pathogens
- Bacteria
- Fungi
- Parasites
- Protozoa
- Viruses

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.1.1 b

Describe characteristics of microorganisms
- Aerobic
- Anaerobic
- Non-pathogenic
- Pathogenic

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.1.1 c

Recognize chain of infection

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.1.1 d

Describe mode of transmission
- Common vehicle (air, food, water)
- Direct
- Healthcare-associated infections (nosocomial)
- Indirect
- Opportunistic
- Vectors

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Infection Control - Differentiate methods of controlling the spread and growth of pathogens.

7.1.2 a

Asepsis
- Sanitization
- Antisepsis
- Disinfection
- Sterile technique
- Sterilization

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

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7.1.2 b

Standard precautions
• Handwashing
• Gloving
• Personal Protective Equipment (PPE)
• Environmental cleaning

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

7.1.2 c

Isolation precautions
• Transmission-based contact

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.1.2 d

Bloodborne pathogen precautions

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

7.1.2 e

Vaccinations

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Personal Safety

7.2.3

Demonstrate and apply the use of personal protective equipment (PPE).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Common Safety Hazards

7.4.1

Observe all safety standards related to the occupational exposure to hazardous chemicals standard (safety data sheets [SDS]).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

7.4.2

Comply with safety signs, symbols, and labels.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Foundation Standard 8: Teamwork Identify roles and responsibilities of individual members as part of the healthcare team.

Healthcare Teams

8.1.1

Evaluate roles and responsibilities of healthcare team members.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

8.1.2

Identify characteristics of effective teams.
- Defined roles
- Common purpose
- Effective communication
- Effective leadership
- Measurable processes and outcomes
- Mutual respect
- Shared goals

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Team Member Participation

8.2.1

Recognize methods for building positive team relationships.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Team Member Participation - Analyze attributes and attitudes of an effective leader.

8.2.2 a

Characteristics
- Focused and driven
- Interpersonal skills
- Motivates and inspires
- Organized and balanced

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

8.2.2 c

Roles
- Communicates vision
- Leads change
- Manages accountability

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Team Member Participation

8.2.4

Evaluate why teamwork is an important part of healthcare and how it improves patient care.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Foundation Standard 9: Health Maintenance Practices
Differentiate between wellness and disease. Promote disease prevention and model healthy behaviors.

Healthy Behaviors

9.1.1

Promote behaviors of health and wellness.
• Exercise
• Nutrition
• Relationships
• Sleep habits
• Stress management
• Weight control

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

9.1.2

Examine various aspects of behavioral health.
• Anxiety
• Depression
• Substance abuse
• Suicide

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

9.1.3

Describe strategies for prevention of disease.
• Community health education outreach programs
• Immunizations
• Medical, dental, and mental health screenings
• Routine physical exams
• Stress management

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Healthcare Across the Lifespan

9.2.1

Discuss physical, mental, social and behavioral development and its impact on healthcare.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Foundation Standard 10: Technical Skills
Apply and demonstrate technical skills and knowledge common to health career specialties.

Technical Skills

10.1.1

Demonstrate procedures for measuring and recording vital signs including the normal ranges.
- Blood pressure
- Temperature
- Oxygen saturation
- Pain
- Pulse
- Respirations

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Foundation Standard 11: Information Technology in Healthcare
Apply information technology practices common across health professions.

Key Principles, components and practices of Health Information Systems

11.1.1

Identify components of an electronic health record (EHR) and/or electronic medical record (EMR).
- Diagnostic tests
- History and physical
- Medications
- Patient demographics
- Progress notes
- Treatment Plan

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

11.1.2

Explore different types of health data collection tools.
- Medical wearable devices
- Patient monitoring equipment
- Phone application
- Telemedicine/telehealth

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

11.1.3

Create electronic documentation that reflects timeliness, completeness, and accuracy.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

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Common Core State Standards for Mathematics

Quantities

Reason Quantitatively and Use Units to Solve Problems

CCSS.MATH.CONTENT.HSN.Q.A.1

Use units as a way to understand problems and to guide the solution of multistep problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.MATH.CONTENT.HSN.Q.A.2

Define appropriate quantities for the purpose of descriptive modeling.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.MATH.CONTENT.HSN.Q.A.3

Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Seeing Structure in Expressions

Interpret the Structure of Expressions

CCSS.MATH.CONTENT.HSA.SSE.A.1

Interpret expressions that represent a quantity in terms of its context.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Creating Equations

Create Equations That Describe Numbers Or Relationships

CCSS.MATH.CONTENT.HSA.CED.A.1

Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.MATH.CONTENT.HSA.CED.A.4

Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm’s law V = IR to highlight resistance R.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

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Common Core State Standards for Mathematics

Reasoning with Equations and Inequalities

Understand Solving Equations as a Process of Reasoning and Explain the Reasoning

CCSS.MATH.CONTENT.HSA.REI.A.1

Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

Solve Equations and Inequalities in One Variable

CCSS.MATH.CONTENT.HSA.REI.B.3

Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Represent and Solve Equations and Inequalities Graphically

CCSS.MATH.CONTENT.HSA.REI.D.10

Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Linear, Quadratic, and Exponential Models

Construct and Compare Linear, Quadratic, and Exponential Models and Solve Problems

CCSS.MATH.CONTENT.HSF.LE.A.1.B

Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

Modeling with Geometry

Apply Geometric Concepts in Modeling Situations

CCSS.MATH.CONTENT.HSG.MG.A.3

Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

Interpreting Categorical and Quantitative Data

Summarize, Represent, and Interpret Data on a Single Count or Measurement Variable

CCSS.MATH.CONTENT.HSS.ID.A.1

Represent data with plots on the real number line (dot plots, histograms, and box plots).

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

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Common Core State Standards for Mathematics

Making Inferences and Justifying Conclusions

Make Inferences and Justify Conclusions From Sample Surveys, Experiments, and Observational Studies

CCSS.MATH.CONTENT.HSS.IC.B.6

Evaluate reports based on data.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Using Probability to Make Decisions

Use Probability to Evaluate Outcomes of Decisions

CCSS.MATH.CONTENT.HSS.MD.B.5.A

Find the expected payoff for a game of chance. For example, find the expected winnings from a state lottery ticket or a game at a fast- food restaurant.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

CCSS.MATH.CONTENT.HSS.MD.B.6

(+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

CCSS.MATH.CONTENT.HSS.MD.B.7

(+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Reading Informational Text

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.9-10.10

By the end of grade 9, read and comprehend literary nonfiction in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Writing

Text Types and Purpose

CCSS.ELA-LITERACY.W.9-10.1

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.1.E

Provide a concluding statement or section that follows from and supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.2.A

Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.2.D

Use precise language and domain-specific vocabulary to manage the complexity of the topic.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

CCSS.ELA-LITERACY.W.9-10.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.3.C

Use a variety of techniques to sequence events so that they build on one another to create a coherent whole.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.W.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.W.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.W.9-10.9.B

Apply grades 9–10 Reading standards to literary nonfiction (e.g., “Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning”).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.SL.9-10.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Presentation of Knowledge and Ideas

CCSS.ELA-LITERACY.SL.9-10.4

Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.5

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.6

Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.9-10.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.L.9-10.1.B

Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to convey specific meanings and add variety and interest to writing or presentations.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.9-10.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.9-10.2.C

Spell correctly.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.9-10.4.A

Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Reading History/Social Studies

Key Ideas and Details

CCSS.ELA-LITERACY.RH.9-10.1

Cite specific textual evidence to support analysis of primary and secondary sources, attending to such features as the date and origin of the information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RH.9-10.7

Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Reading Science and Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.9-10.2

Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.RST.9-10.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RST.9-10.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.9-10.5

Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RST.9-10.7

Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RST.9-10.10

By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Writing History/Social Studies, Science, and Technical

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.9-10.1

Write arguments focused on discipline-specific content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.WHST.9-10.1.E

Provide a concluding statement or section that follows from or supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.A

Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.D

Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.WHST.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Research to Build and Present Knowledge

CCSS.ELA-LITERACY.WHST.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.9

Draw evidence from informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Reading Informational Text

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.11-12.7

Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RI.11-12.10

By the end of grade 11, read and comprehend literary nonfiction in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Writing

Text Types and Purpose

CCSS.ELA-LITERACY.W.11-12.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.1.E

Provide a concluding statement or section that follows from and supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.W.11-12.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.D

Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.W.11-12.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.W.11-12.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.W.11-12.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.SL.11-12.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.B

Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.C

Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.D

Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.2

Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Presentation of Knowledge and Ideas

CCSS.ELA-LITERACY.SL.11-12.4

Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.SL.11-12.5

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.6

Adapt speech to a variety of contexts and tasks, demonstrating a command of formal English when indicated or appropriate.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.11-12.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.11-12.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.11-12.2.B

Spell correctly.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.11-12.4.A

Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Reading History/Social Studies

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RH.11-12.7

Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Reading Science and Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.11-12.1

Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RST.11-12.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RST.11-12.7

Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.8

Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.9

Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RST.11-12.10

By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Writing History/Social Studies, Science, and Technical

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.11-12.1

Write arguments focused on discipline-specific content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.1.E

Provide a concluding statement or section that follows from or supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.A

Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.E

Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.WHST.11-12.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.WHST.11-12.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.9

Draw evidence from informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Next Generation Science Standards

From Molecules to Organisms: Structures and Processes

HS.LS1.1

Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

HS.LS1.2

Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

HS.LS1.3

Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

HS.LS1.4

Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

HS.LS1.6

Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

Ecosystems: Interactions, Energy, and Dynamics

HS.LS2.5

Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

HS.LS2.8

Evaluate the evidence for the role of group behavior on an individual's and species' chances to survive and reproduce.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

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Next Generation Science Standards

Heredity: Inheritance and Variation of Traits

HS.LS3.1

Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

HS.LS3.2

Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

HS.LS3.3

Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Biological Evolution: Unity and Diversity

HS.LS4.3

Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Earth and Human Activity

HS.ESS3.4

Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

Engineering Design

HS.ETS1.1

Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

HS.ETS1.2

Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

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Next Generation Science Standards

HS.ETS1.3

Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

HS.ETS1.4

Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Disciplinary core ideas

PS1.A Matter and Its Interactions - Structure and Properties of Matter

• Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons. (HS-PS1-1)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

• The periodic table orders elements horizontally by the number of protons in the atom’s nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. (HS-PS1-1)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

• A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy in order to take the molecule apart. (HS-PS1-4)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

PS3.A Energy - Definitions of Energy

• Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system’s total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms. (HSPS3-1), (HS-PS3-2)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

• At the macroscopic scale, energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy . (HSPS3-2), (HS-PS3-3)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

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Next Generation Science Standards

PS3.B Energy - Conservation of Energy and Energy Transfer

- Energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems. (HS-PS3-1), (HS-PS3-4)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

- The availability of energy limits that can occur in any system. (HS-PS3-1)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

- Uncontrolled systems always evolve toward more stable states— that is, toward more uniform energy distribution (e.g., water flows downhill, objects hotter than their surrounding environment cool down). (HS-PS3-4)

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

ETS1.A Engineering Design - Defining and Delimiting Engineering Problems

- Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. (secondary to HS-PS2-3)

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities. (HS-ETS1-1)

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

ETS1.B Engineering Design - Developing Possible Solutions

- When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (HS-ETS1-3)

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

- Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed. (secondary to HS-PS1-6)

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

LS1.A From Molecules to Organisms: Structures and Processes - Structure and Function

- Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1), (Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

LS1.B From Molecules to Organisms: Structures and Processes - Growth and Development of Organisms

- In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4)

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

LS1.C From Molecules to Organisms: Structures and Processes - Organization for Matter and Energy Flow in Organisms

- The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells. (HS-LS1-6)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

- As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products. (HS-LS1-6), (HS-LS1-7)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

- As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment. (HS-LS1-7)

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LS2.B Ecosystems: Interactions, Energy, and Dynamics - Cycles of Matter and Energy Transfer in Ecosystems

• Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes. (HS-LS2-3)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

LS2.C Ecosystems: Interactions, Energy, and Dynamics - Ecosystem Dynamics, Functioning, and Resilience

• Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species. (HS-LS2-7)

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

LS3.A Heredity: Inheritance and Variation of Traits - Inheritance of Traits

• Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA . All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function. (HS-LS3-1)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

• In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. (HS-LS3-2)

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

• Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. (HS-LS3-2), (HS-LS3-3)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

LS4.A Biological Evolution: Unity and Diversity - Evidence of Common Ancestry and Diversity

• Genetic information provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence. (HS-LS4-1)

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Next Generation Science Standards

LS4.B Biological Evolution: Unity and Diversity - Natural Selection

- Natural selection occurs only if there is both (1) variation in the genetic information between organisms in a population and (2) variation in the expression of that genetic information—that is, trait variation—that leads to differences in performance among individuals. (HS-LS4-2) (HS-LS4-3)

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- The traits that positively affect survival are more likely to be reproduced, and thus are more common in the population. (HS-LS4-3)

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

LS4.D Biological Evolution: Unity and Diversity - Biodiversity and Humans

- Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary to HS-LS2-7), (Note: This Disciplinary Core Idea is also addressed by HS-LS4-6.)

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

ESS3.C Earth and Human Activity - Human Impacts on Earth Systems

- Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. (HS-ESS3-4)

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

Science and Engineering Practice

Practice 1 - Asking questions and defining problems in 9-12 builds on K-8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.

- Ask questions
  - that arise from careful observation of phenomena, or unexpected results, to clarify and/or seek additional information.
  - that arise from examining models or a theory, to clarify and/or seek additional information and relationships.
  - to determine relationships, including quantitative relationships, between independent and dependent variables.
  - to clarify and refine a model, an explanation, or an engineering problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Evaluate a question to determine if it is testable and relevant.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

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- Ask questions that can be investigated within the scope of the school laboratory, research facilities, or field (e.g., outdoor environment) with available resources and, when appropriate, frame a hypothesis based on a model or theory.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Ask and/or evaluate questions that challenge the premise(s) of an argument, the interpretation of a data set, or the suitability of a design.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Define a design problem that involves the development of a process or system with interacting components and criteria and constraints that may include social, technical, and/or environmental considerations.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

Practice 2 Developing and Using Models
Modeling in 9-12 builds on K-8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.

- Evaluate merits and limitations of two different models of the same proposed tool, process, mechanism or system in order to select or revise a model that best fits the evidence or design criteria.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

- Design a test of a model to ascertain its reliability.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

- Develop, revise, and/or use a model based on evidence to illustrate and/or predict the relationships between systems or between components of a system.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

- Develop a complex model that allows for manipulation and testing of a proposed process or system.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

- Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.

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Next Generation Science Standards

Practice 3 Planning and Carrying Out Investigations
Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.

- Plan an investigation or test a design individually and collaboratively to produce data to serve as the basis for evidence as part of building and revising models, supporting explanations for phenomena, or testing solutions to problems. Consider possible confounding variables or effects and evaluate the investigation's design to ensure variables are controlled.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Plan and conduct an investigation or test a design solution in a safe and ethical manner including considerations of environmental, social, and personal impacts.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Select appropriate tools to collect, record, analyze, and evaluate data. Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Practice 4 Analyzing and Interpreting Data
Analyzing data in 9-12 builds on K-8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.

- Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Consider limitations of data analysis (e.g., measurement error, sample selection) when analyzing and interpreting data.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Compare and contrast various types of data sets (e.g., self-generated, archival) to examine consistency of measurements and observations.

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- Evaluate the impact of new data on a working explanation and/or model of a proposed process or system.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Analyze data to identify design features or characteristics of the components of a proposed process or system to optimize it relative to criteria for success.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Practice 5 Using Mathematics and Computational Thinking
Mathematical and computational thinking in 9- 12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.

- Create and/or revise a computational model or simulation of a phenomenon, designed device, process, or system.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

- Use mathematical, computational, and/or algorithmic representations of phenomena or design solutions to describe and/or support claims and/or explanations.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Apply techniques of algebra and functions to represent and solve scientific and engineering problems.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Apply ratios, rates, percentages, and unit conversions in the context of complicated measurement problems involving quantities with derived or compound units (such as mg/mL, kg/m3, acre-feet, etc.)

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Practice 6 Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 9-12 builds on K-8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.

- Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

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- Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Apply scientific ideas, principles, and/or evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Apply scientific reasoning, theory, and/or models to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

Practice 7 Engaging in Argument from Evidence

- Compare and evaluate competing arguments or design solutions in light of currently accepted explanations, new evidence, limitations (e.g., trade-offs), constraints, and ethical issues.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

- Evaluate the claims, evidence, and/or reasoning behind currently accepted explanations or solutions to determine the merits of arguments.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

- Respectfully provide and/or receive critiques on scientific arguments by probing reasoning and evidence, challenging ideas and conclusions, responding thoughtfully to diverse perspectives, and determining additional information required to resolve contradictions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Construct, use, and/or present an oral and written argument or counterarguments based on data and evidence.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Make and defend a claim based on evidence about the natural world or the effectiveness of a design solution that reflects scientific knowledge and student-generated evidence.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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• Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and/or logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations).

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

Practice 8 Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in 9-12 builds on K-8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.

• Critically read scientific literature adapted for classroom use to determine the central ideas or conclusions and/or to obtain scientific and/or technical information to summarize complex evidence, concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Compare, integrate and evaluate sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a scientific question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Evaluate the validity and reliability of and/or synthesize multiple claims, methods, and/or designs that appear in scientific and technical texts or media reports, verifying the data when possible.
Communicate scientific and/or technical information or ideas (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (i.e., orally, graphically, textually, mathematically).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Crosscutting Concepts

Patterns

• Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Mathematical representations are needed to identify some patterns.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Empirical evidence is needed to identify patterns.

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Cause and Effect: Mechanism and Prediction

- Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.

  ☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

  ☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.

  ☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Systems can be designed to cause a desired effect.

  ☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

- Changes in systems may have various causes that may not have equal effects.

  ☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Scale, Proportion, and Quantity

- In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change.

  ☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs.

  ☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth).

  ☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Systems and System Models

- A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.

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- Systems can be designed to do specific tasks.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

- When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Models can be used to predict the behavior of a system, but these predictions have limited precision and reliability due to the assumptions and approximations inherent in models.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Structure and Function

- The way an object is shaped or structured determines many of its properties and functions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Stability and Change

- Much of science deals with constructing explanations of how things change and how they remain stable.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Feedback (negative or positive) can stabilize or destabilize a system.

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Join a team of physical therapists and other medical professionals to diagnose and provide treatment and rehabilitation to patients at an outpatient center. Work as an intern in a research center and design a comprehensive laboratory investigation using a model organism. Keep clients safe and healthy on adventure trips in remote locations. Showcase a medical story or mystery at an interactive exhibit about the human body. Solve mini-cases and medical challenges at the Quick Clinic!

Whether seeking a career in medicine or healthcare or just looking for the challenge of solving real-world problems, students in Human Body Systems will practice how to think creatively and critically to innovate in science while gaining practical experience with clinical medicine and experimental design.

PLTW Human Body Systems (HBS) is a full-year high school course designed to follow Principles of Biomedical Science (PBS) in the PLTW Biomedical Science pathway. The HBS course provides foundational knowledge and skills in anatomy and physiology, clinical medicine, and laboratory research. The course engages students in how this content can be applied to real-world situations, cases, and problems. The HBS course includes interviews, challenges, and testimonials from biomedical professionals in a variety of settings—clinical, research, and public health.

Through both individual and collaborative team activities, projects, and problems, students tackle real-world challenges that biomedical professionals face in the field. Students work with the same tools and equipment used in hospitals and labs as they engage in relevant hands-on work. They explore BioDigital™ 3D interactive models, simulations, and assessments to visualize human anatomy and physiology. Students develop skills in technical documentation to represent and communicate experimental findings and solutions to problems, as well as skills in ethical reasoning and clinical empathy.

Following is a summary of the units of study. Course content is designed with strong connections to multiple state and national standards. Activities, projects, and problems are provided to the teacher and students through an online delivery system, PLTW Courses.

The HBS course requires a rigorous pace and contains more material than a skilled teacher new to the course will be able to complete in their first experience. However, building enthusiasm for and a real understanding of the role, impact, and practice of biomedical scientists is a primary goal of the course.

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HBS Unit Summary

Unit 1	Road to Rehabilitation
Unit 2	Research Ready
Unit 3	Adventure Awaits
Unit 4	Patient Perspectives

Unit 1: Road to Rehabilitation

In this unit, students join a dynamic team of biomedical professionals dedicated to helping patients with illness or injury progress through rehabilitation, getting them back to doing what they love. Students explore the human skeletal and muscular systems as they gain the knowledge and skills they need to design a solution for their assigned patient—involving physical rehabilitation, assistive devices, and overall strategies for physical and mental well-being. Throughout the unit, students gather medical evidence and information about their patient and use what they learn along the way to help them develop a comprehensive health and wellness plan for the patient.

Road to Rehabilitation Lesson Summary

Lesson 1.1	Beginning with Bones	(16 days)
Lesson 1.2	Muscles and Motion	(22 days)
Lesson 1.3	Relief Within Reach	(5 days)

Lesson 1.1 Beginning with Bones

In Lesson 1.1, students meet five patients with medical conditions or injuries that need physical therapy or rehabilitative care. As they explore the medical history of each patient, students practice the language of anatomy, using directional and regional terms and terms for body cavities and planes, to reference the patient's injury or condition. Students investigate tissues of the human body, focusing on the structure and function of bones. They use their knowledge of the skeletal system to analyze a patient's fracture and explore biomechanical engineering solutions to repair the fracture.

Lesson 1.2 Muscles and Motion

In Lesson 1.2, students model the physiology of muscle contraction as they assist a patient suffering from chronic muscle cramps. They build muscles on a Maniken® skeletal model, demonstrating how the orientation of a muscle relates to the role the muscle plays in the body and how a patient's muscles are impacted in injury or illness. They use physiology sensors and probes to monitor muscle strength and design an experiment to test muscle fatigue. To help a

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patient with a knee injury, students measure and analyze range of motion of the joints, perform diagnostic tests on a dynamic knee model, and practice kinesiology taping techniques guided by an athletic trainer.

Lesson 1.3 Relief Within Reach
Now that students have studied the skeletal and muscular system, they are ready to design a comprehensive solution for their patient in the outpatient center. To create a personalized care and rehabilitation plan to give to the patient, their caregivers, and future healthcare providers, students analyze the patient's medical data available in a patient medical portal along with the data they have collected in the unit. Students consider and demonstrate the importance of empathy and respect in patient care as they design a plan to help the patient manage their condition, progress forward, and maintain the activities and lifestyle they love.

Unit 2: Research Ready

In this unit, students have accepted an internship at the Development and Aging Research Center at a local university. The researchers in this lab are especially interested in exploring how the brain and other parts of the nervous system change as a person ages and how the endocrine system controls how a person's body carries out various processes. The research findings of this lab will inform innovations, treatments, and strategies to improve the quality of life and longevity for people around the world.

Students explore the various labs at the research center through a virtual gaming environment. They gather advice from career professionals and design experiments and research projects. Students are tasked to acquire the knowledge and skills they need to gain access to the main research laboratory, which is dedicated to solving problems that help unlock the mysteries of the communication network in the body—the nervous and endocrine systems.

Research Ready Lesson Summary

Lesson 2.1	Getting Nervous	(22 days)
Lesson 2.2	Everything Endocrine	(16 days)
Lesson 2.3	Challenge Accepted	(6 days)

Lesson 2.1 Getting Nervous
Students begin their first day as interns at the Development and Aging Research Center. Over the course of the lesson, students tour the facility through a 3D gaming environment, dissect a sheep brain to visualize the connection between structure and function, complete a virtual lab to evaluate the impact of specific drugs on signaling of neurons, and use physiological sensors to compare reflex and reaction time. At the end of the lesson, students participate in a Lab Leads Challenge where they apply what they have learned to diagnose a patient and model how their condition is linked to the function of the nervous system.

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Lesson 2.2 Everything Endocrine
In this lesson, students enter the Endocrinology Lab to research the role the endocrine system plays in the development of the human body. To examine feedback loops and how the endocrine system helps the body maintain homeostasis, students stimulate hormone action in a role-playing game. This game uses blood sugar and insulin as the models for hormone regulation, which students map on a graphic organizer.

Students then work in the lab with a model organism, C. elegans, designing and running experiments to explore the impact of neurotransmitters and hormones on body function. Students explore scientific literature as they assist a colleague in preparing a poster presentation related to reproductive regulation. At the end of the lesson, they meet a new set of patients, analyze their conditions, and decide what laboratory testing each patient needs to help support a final diagnosis.

Lesson 2.3 Challenge Accepted
In the problem, students complete an open-ended research experiment with the model organism, C. elegans, to see how heavy metals affect the nervous and endocrine systems. They design an investigation of their choosing, run the experiment with their team, and analyze data to make conclusions.

Unit 3: Adventure Awaits

In this unit, students join a team of expedition leaders who escort adventure travelers through a series of activities and events in extreme or remote environments. They are tasked with ensuring the health and wellness of their group—focusing on the cardiovascular, respiratory, and immune systems—as they identify and address health risks or challenges travelers may encounter in these environments.

They investigate pathogens native to an assigned environment and interventions to prevent and treat those pathogens. Students use what they have learned to work together to respond to an emergency medical incident that happens on an adventure trip, presented in an interactive simulation.

Adventure Awaits Lesson Summary

Lesson 3.1	Cardiopulmonary Connection	(20 days)
Lesson 3.2	Body Guards	(12 days)
Lesson 3.3	Adventure Medicine	(5 days)

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Lesson 3.1 Cardiopulmonary Connection
Lesson 3.1 introduces students to their new role as adventure guides for an expedition company. Through the engaging lens of adventure medicine, students investigate the cardiovascular and respiratory systems. Students explore the movement of blood to organs and tissues, build the heart and major blood vessels on their Maniken model, perform cardiovascular measurements and calculations, and learn how to record and interpret EKGs.

They investigate the connection between the cardiovascular and respiratory systems through a sheep pluck dissection, diagnose a fictional patient with respiratory issues, and use spirometry to measure lung volumes and flow rates. Finally, students apply all they've learned to analyze the cardiovascular and respiratory data of fictional clients and then make a recommendation as to whether they should be cleared for a climbing expedition.

Lesson 3.2 Body Guards
Students continue their work with the expedition company as they explore the systems, structures, and cells that function to protect the body from illness and injury. They investigate agents of disease and how the human body works to fight against invaders. Students complete a plaque assay in the lab to evaluate the effectiveness of antiviral medicines. They dissect a cow eye to investigate conditions of the eye that can be an issue on adventure expeditions.

Lesson 3.3 Adventure Medicine
In the problem, students use an interactive to design an expedition, choosing the destinations and activities, and then prepare a guide to help keep travelers healthy on this journey. Their guide must address the impacts of their assigned environment on human physiology—specifically the cardiovascular, respiratory, and immune systems. They must identify and address health risks of the extreme environment, as well as the risks related to pathogens native to the chosen location.

Through an interactive experience, student teams are faced with an emergency on their trip. Using the guide they created, they work together to apply what they have learned to help their clients through the emergency and maintain the health and well-being of all adventurers on the expedition.

Unit 4: Patient Perspectives

In this unit, students are biomedical science advisors working on the development of an interactive exhibit. Ins and Outs of the Body: Patient Perspectives will combine art and storytelling into an immersive experience that spotlights the stories of real patients to investigate the structure and function of the urinary and digestive systems.

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Patient Perspectives Lesson Summary

Lesson 4.1	Keeping It Renal	(19 days)
Lesson 4.2	It Takes Guts	(12 days)
Lesson 4.3	Engage in the Exhibit	(5 days)

Lesson 4.1 Keeping It Renal

In Lesson 4.1, students hear from a kidney donor and a kidney recipient as they explore how the body filters the blood and processes liquid waste. They dissect both normal and abnormal kidneys to map filtration and determine impacts of cysts on overall kidney function. They build a 3D model nephron and complete a laboratory experiment to model kidney function. Students gain an appreciation for how changes in clinical algorithms and medical evaluation criteria highlight the push for equitable care to all patients. Students use gel electrophoresis to explore the genetics and inheritance of polycystic kidney disease. Finally, students complete simulated urinalysis, allowing them to see that clues in the urine may signal problems in other human body systems. They tell the stories of these patients while creating a unique patient perspective asset for the exhibit.

Lesson 4.2 It Takes Guts

In this lesson, students experience the story of a young woman who has had a full digestive system transplant. As they follow her case and hear about her journey, students model the digestive system on their Maniken model and explore microscopic images of digestive tissue. They investigate gut health—how microbes play a role in healthy digestion—and how diagnostic tests are used to detect disease. In the project, students complete laboratory tests to investigate how enzymes function in the breakdown of food and relate the results of these experiments to digestive conditions.

Lesson 4.3 Engage in the Exhibit

In the problem, student teams are challenged to design and storyboard an interactive element for the exhibit that allows visitors to apply their knowledge of biomedical science to investigate a medical story. They are tasked with providing a new patient perspective to showcase key science and using art and media to engage their audience.

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Course resumes showcase the technical skills students obtain in each PLTW course. Each resume outlines the computational skills, analytical skills, and knowledge acquired in the course. Course resumes also detail student experience with tools, software, lab work, and design and innovation. The detailed skills listed within course resumes illustrate the immediate, applicable contributions that students can make within a workplace.

Laboratory Skills

- Micropipetting
- DNA gel electrophoresis
- Restriction digestion
- Dissection
- Aseptic technique
- Plaque assay

Clinical Medicine

- EKG analysis
- Spirometry
- Urinalysis
- Evaluation of circulation — ankle brachial index (ABI)
- EMG analysis
- Taking and interpreting vital signs
- Diagnostic image analysis
- Kinesiology evaluation and taping
- Fracture repair techniques
- Tissue histology
- Physical therapy

Equipment and Software Proficiencies

- Vernier physiology sensors and probes
- Data acquisition software (Vernier® Graphical Analysis® 4)
- Microscope
- Goniometer

Scientific Experimentation Skills

- Locating, reading, and summarizing research presented in scientific journals
- Scientific experiment design and facilitation
- Laboratory data analysis and interpretation
- Graphing (by hand and using online tools)
- Analysis of experimental data to draw conclusions
- Communication of results and conclusions orally and in writing
- Error analysis

Professional Skills

- Teamwork, group collaboration, and conflict resolution
- Project management
- Problem solving
- Technical writing
- Verbal and written communication
- Critical and creative thinking
- Ethical reasoning

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Course Knowledge

- Biomedical science careers
- Structure and function of all human body systems
- Language of anatomy—regional and directional terminology
- Maintenance of homeostasis and feedback regulation
- Exercise physiology
- Mechanisms of pharmacologic action
- Movement at joints
- Muscle contraction
- Cardiac cycle and gas exchange
- Reflex and voluntary action
- Action potential and signal transduction
- Eye anatomy and physiology
- Human immunity and pathogen defense
- Hormonal regulation
- Enzyme action in digestion
- Nephron action
- Gut microbes and health
- Inheritance of genetic disease

Engagement Experiences

- Laboratory investigations
- Case studies
- Instant challenges and Quick Clinics
- Simulations
- Role play
- Gaming
- Design challenges

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PLTW Standards Connection
Human Body Systems

Connections to Standards in Biomedical Science

PLTW curriculum is designed to empower students to thrive in an evolving world. As a part of the design process when developing and updating our curriculum, we focus on connections to a variety of standards. PLTW Human Body Systems connects to standards in the following:

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Common Core State Standards for Mathematics

Quantities

Reason Quantitatively and Use Units to Solve Problems

CCSS.MATH.CONTENT.HSN.Q.A.1

Use units as a way to understand problems and to guide the solution of multistep problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.MATH.CONTENT.HSN.Q.A.2

Define appropriate quantities for the purpose of descriptive modeling.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

CCSS.MATH.CONTENT.HSN.Q.A.3

Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Seeing Structure in Expressions

Interpret the Structure of Expressions

CCSS.MATH.CONTENT.HSA.SSE.A.1

Interpret expressions that represent a quantity in terms of its context.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

Reasoning with Equations and Inequalities

Represent and Solve Equations and Inequalities Graphically

CCSS.MATH.CONTENT.HSA.REI.D.10

Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Interpreting Functions

Interpret Functions That Arise in Applications in Terms of the Context

CCSS.MATH.CONTENT.HSF.IF.B.6

Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for Mathematics

Analyze Functions Using Different Representations

CCSS.MATH.CONTENT.HSF.IF.C.7

Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Interpreting Categorical and Quantitative Data

Summarize, Represent, and Interpret Data on a Single Count or Measurement Variable

CCSS.MATH.CONTENT.HSS.ID.A.1

Represent data with plots on the real number line (dot plots, histograms, and box plots).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

CCSS.MATH.CONTENT.HSS.ID.A.3

Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Summarize, Represent, and Interpret Data on Two Categorical and Quantitative Variables

CCSS.MATH.CONTENT.HSS.ID.B.6

Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Making Inferences and Justifying Conclusions

Make inferences and Justify Conclusions From Sample Surveys, Experiments, and Observational Studies

CCSS.MATH.CONTENT.HSS.IC.B.3

Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.MATH.CONTENT.HSS.IC.B.5

Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.MATH.CONTENT.HSS.IC.B.6

Evaluate reports based on data.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

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Using Probability to Make Decisions

Use Probability to Evaluate Outcomes of Decisions

CCSS.MATH.CONTENT.HSS.MD.B.5.B

Evaluate and compare strategies on the basis of expected values. For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

CCSS.MATH.CONTENT.HSS.MD.B.7

(+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Reading Informational Text

Key Ideas and Details

CCSS.ELA-LITERACY.RI.9-10.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.9-10.7

Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RI.9-10.8

Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

Writing

Text Types and Purpose

CCSS.ELA-LITERACY.W.9-10.2.D

Use precise language and domain-specific vocabulary to manage the complexity of the topic.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.W.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.W.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.SL.9-10.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.1.B

Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.1.C

Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.1.D

Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.2

Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Presentation of Knowledge and Ideas

CCSS.ELA-LITERACY.SL.9-10.4

Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.5

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.9-10.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.9-10.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.9-10.2.C

Spell correctly.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.9-10.4.A

Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.9-10.6

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Reading Science and Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.9-10.1

Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.9-10.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RST.9-10.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RST.9-10.10

By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Writing History/Social Studies, Science, and Technical

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.9-10.1

Write arguments focused on discipline-specific content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.1.E

Provide a concluding statement or section that follows from or supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

CCSS.ELA-LITERACY.WHST.9-10.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.A

Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.B

Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.D

Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.WHST.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.WHST.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.9

Draw evidence from informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Reading Informational Text

Key Ideas and Details

CCSS.ELA-LITERACY.RI.11-12.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.11-12.7

Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Writing

Text Types and Purpose

CCSS.ELA-LITERACY.W.11-12.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

CCSS.ELA-LITERACY.W.11-12.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.B

Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.D

Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.W.11-12.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.W.11-12.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.W.11-12.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.SL.11-12.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.B

Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.C

Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.D

Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.2

Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Presentation of Knowledge and Ideas

CCSS.ELA-LITERACY.SL.11-12.4

Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.5

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.11-12.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.11-12.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.11-12.2.B

Spell correctly.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.11-12.4.A

Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.11-12.4.D

Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.L.11-12.6

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Reading Science and Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.11-12.1

Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RST.11-12.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RST.11-12.7

Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.8

Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.9

Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RST.11-12.10

By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Writing History/Social Studies, Science, and Technical

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.11-12.1

Write arguments focused on discipline-specific content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.1.E

Provide a concluding statement or section that follows from or supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.A

Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.B

Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.E

Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).

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Common Core State Standards for English Language Arts

Production and Distribution of Writing

CCSS.ELA-LITERACY.WHST.11-12.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.WHST.11-12.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.9

Draw evidence from informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Next Generation Science Standards

From Molecules to Organisms: Structures and Processes

HS.LS1.2

Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

HS.LS1.3

Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Engineering Design

HS.ETS1.1

Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

HS.ETS1.3

Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Disciplinary core ideas

ETS1.A Engineering Design - Defining and Delimiting Engineering Problems

• Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. (secondary to HS-PS2-3)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

ETS1.B Engineering Design - Developing Possible Solutions

• When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (HS-ETS1-3)

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

LS1.A From Molecules to Organisms: Structures and Processes - Structure and Function

• Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

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- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Science and Engineering Practice

Practice 1 - Asking questions and defining problems in 9-12 builds on K-8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.

- Ask questions that can be investigated within the scope of the school laboratory, research facilities, or field (e.g., outdoor environment) with available resources and, when appropriate, frame a hypothesis based on a model or theory.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

Practice 2 Developing and Using Models
Modeling in 9-12 builds on K-8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.

- Evaluate merits and limitations of two different models of the same proposed tool, process, mechanism or system in order to select or revise a model that best fits the evidence or design criteria.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Design a test of a model to ascertain its reliability.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Practice 3 Planning and Carrying Out Investigations
Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.

- Plan an investigation or test a design individually and collaboratively to produce data to serve as the basis for evidence as part of building and revising models, supporting explanations for phenomena, or testing solutions to problems. Consider possible confounding variables or effects and evaluate the investigation's design to ensure variables are controlled.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

- Select appropriate tools to collect, record, analyze, and evaluate data. Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

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Next Generation Science Standards

Practice 8 Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in 9-12 builds on K-8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.

- Critically read scientific literature adapted for classroom use to determine the central ideas or conclusions and/or to obtain scientific and/or technical information to summarize complex evidence, concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Evaluate the validity and reliability of and/or synthesize multiple claims, methods, and/or designs that appear in scientific and technical texts or media reports, verifying the data when possible. Communicate scientific and/or technical information or ideas (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (i.e., orally, graphically, textually, mathematically).

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

Crosscutting Concepts

Structure and Function

- The way an object is shaped or structured determines many of its properties and functions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Stability and Change

- Feedback (negative or positive) can stabilize or destabilize a system.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Foundation Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Human Anatomy and Physiology - Describe the organization of the human body and directional terms.

1.1.1 a

Identify levels of organization
- Cellular
- Chemical
- Organ
- Organsim
- System
- Tissue

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.1 b

Demonstrate anatomical position

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.1 c

Identify body planes
- Coronal / Frontal
- Midsagittal
- Sagittal
- Transverse / Horizontal

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.1 d

Use directional terms
- Anterior / Posterior
- Cephalic/Cadual
- Medial / Lateral
- Proximal / Distal
- Superficial /Deep
- Superior / Inferior
- Ventral / Dorsal

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

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1.1.1 e

Identify body cavities

- Abdominal
- Cranial
- Dorsal
- Nasal
- Oral
- Orbital
- Pelvic
- Spinal
- Thoracic

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.1 f

Identify the components of the abdominal quadrants

- Left upper
- Left lower
- Right upper
- Right lower

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

Human Anatomy and Physiology - Identify basic structures and describe functions of human body systems.

1.1.2 a

Skeletal

- Structures of the skeletal system
  - Distinguish between axial and appendicular skeletons
  - Describe long bone anatomy
  - Identify joint types and movement
  - Name and classify all bones (206)
- Functions of the skeletal system
  - Hematopoiesis
  - Mineral storage
  - Muscle attachment and movement
  - Ossification
  - Structure and support

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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National Consortium for Health Science Education

1.1.2 b

Muscular

- Structures of the muscular system
  - Identify types of muscle tissue
  - Identify major muscle groups of neck, shoulder, chest, abdomen, back, arms, and legs
- Functions of the muscular system
  - Body movement
  - Posture
  - Protection

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

1.1.2 c

Integumentary

- Structures of the integumentary system
  - Identify integumentary components
  - Label the layers of skin
- Functions of the integumentary system
  - Infection protection
  - Sensory organ
  - Temperature regulation
  - UV light protection
  - Vitamin D production

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

1.1.2 d

Cardiovascular

- Structures of the cardiovascular system
  - Distinguish blood components
  - Identify cardiovascular organs
  - Label the parts of the heart
- Functions of the cardiovascular system
  - Blood flow through the heart and body
  - Cardiac conduction system
  - Transports nutrients, waste, antibodies, hormones, and gases

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

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1.1.2 e

Lymphatic / Immune

- Structures of the lymphatic system
  - Identify lymphatic organs
- Functions of the lymphatic system
  - Movement of lymph fluid
  - Provide protection against disease

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

1.1.2 f

Respiratory

- Structures of the respiratory system
  - Identify respiratory organs
- Functions of the respiratory system
  - Gas exchange

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

1.1.2 g

Nervous

- Structures of the nervous system
  - Differentiate CNS and PNS
  - Differentiate sympathetic and parasympathetic
  - Identify organs of the nervous system
  - Identify structures of the special sense organs
- Functions of the nervous system
  - Movement
  - Processing
  - Sensation

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

1.1.2 h

Endocrine

- Structures of the endocrine system
  - Identify endocrine glands
- Functions of the endocrine system
  - Controls metabolism
  - Production of hormones
  - Regulation of body processes
  - Regulates growth, development, and maturation

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

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1.1.2 i

Digestive

- Structures of the digestive system
  - Differentiate between alimentary and accessory organs
  - Identify digestive organs in sequence
- Functions of the digestive system
  - Absorption of nutrients
  - Chemical and mechanical digestion
  - Excretion of waste

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

1.1.2 j

Urinary

- Structures of the urinary system
  - Identify gross and microscopic anatomy of the kidney
  - Identify urinary organs
- Functions of the urinary system
  - Homeostatic balance
  - Process of urine formation
  - Urine composition

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

1.1.2 k

Reproductive

- Structures of the reproductive system
  - Identify female reproductive organs
  - Identify male reproductive organs
- Functions of the reproductive system
  - Formation of gametes
  - Production of hormones

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

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National Consortium for Health Science Education

Diseases and Disorders -

1.2.1

Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders, including, but not limited to the following:

- Anxiety
- Arthritis
- Asthma
- Bipolar Disorder
- Cancer
- Cataracts
- Concussion / Traumatic Brain Injury (TBI)
- Cystic fibrosis
- Diabetes
- Dementia
- Depression
- Gastric ulcer
- Hepatitis
- Hypertension
- Melanoma
- Muscular Dystrophy
- Myocardial Infarction
- Sexually Transmitted Infection (STI)
- Stroke / Cerebrovascular Accident (CVA)
- Tuberculosis
- Urinary Tract Infection (UTI)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.2.2

Describe biomedical therapies as they relate to the prevention, pathology, and treatment of disease.

- Gene editing
- Gene testing
- Gene therapy
- Immunizations
- Immunotherapy
- Stem cell research

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National Consortium for Health Science Education

Medical Mathematics - Demonstrate competency using basic math skills and mathematical conversions as they relate to healthcare.

1.3.1

Metric system
- Centi-
- Deci-
- Kilo-
- Milli-
- Micro-

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.3.1 b

Mathematical
- Addition / Subtraction
- Average
- Fractions
- Multiplication / Division
- Percentages
- Ratios

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.3.1 c

Conversions
- Height (inches/meters)
- Household measurements (Tbsp/tsp/cup/oz)
- Length (inches/meters)
- Temperature (F/C)
- Volume (ml/cc)
- Weight/mass (pounds/grams)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Medical Mathematics

1.3.2

Demonstrate the ability to analyze diagrams, charts, graphs, and tables to interpret healthcare results.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Foundation Standard 2: Communications Demonstrate methods of delivering and obtaining information, while communicating effectively.

Concepts of Effective Communication - Identify common barriers to communication.

2.1.2 a

Physical disabilities
- Aphasia
- Developmental level
- Hearing loss
- Impaired vision

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

2.1.2 b

Psychological barriers
- Attitudes
- Bias
- Prejudice
- Stereotyping

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Concepts of Effective Communication

2.1.5

Modify communication to meet the needs of the patient/client and to be appropriate to the situation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Medical Terminology

2.2.1

Use common roots, prefixes, and suffixes to communicate information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

2.2.2

Interpret common medical abbreviations to communicate information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Written Communication Skills

2.3.1

Use proper elements of written and electronic communication (spelling, grammar, and formatting).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

2.3.2

Prepare examples of technical and informative writing.

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Foundation Standard 3: Systems Identify how key systems affect services performed and quality of care.

Healthcare Delivery Systems - Differentiate healthcare delivery systems and healthcare related agencies.

3.1.1 a

Types of practice settings

- Acute care
- Ambulatory care
- Behavioral and mental health services
- Home care
- Long-term care
- Medical and dental practices

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Foundation Standard 4: Employability Skills Use employability skills to enhance employment opportunities and job satisfaction.

Personal Traits of the Health Professional

4.1.1

Identify personal traits and attitudes desirable in a career ready member of a health team.

- Acceptance of criticism
- Competence
- Dependability
- Discretion
- Empathy
- Enthusiasm
- Honesty
- Initiative
- Integrity
- Patience
- Positive attitude
- Responsibility
- Self-motivation
- Social and cultural competence
- Tact
- Team player
- Willingness to learn

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Career Decision-making

4.3.1

Research levels of education, credentialing requirements, and employment trends in health professions.

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4.3.2

Distinguish differences among careers within a health science pathway.
- Biotechnology research and development
- Diagnostic services
- Health informatics
- Support services
- Therapeutic services

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Foundation Standard 5: Legal Responsibilities Describe legal responsibilities, limitations, and implications on healthcare worker actions.

Legal Practices

5.2.1

Apply standards for the safety, privacy and confidentiality of health information.
- Privileged communication

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

Foundation Standard 6: Ethics Understand accepted ethical practices with respect to cultural, social, and ethnic differences within the healthcare environment.

Ethical Practice

6.1.2

Identify ethical issues and their implications related to healthcare.
- Ethics committee
- Euthanasia
- Gene editing
- Immunizations
- In vitro fertilization
- Organ donation/transplantation
- Scope of practice

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6.2.1

Discuss religious, social, and cultural values as they impact healthcare.

- Ageism
- Ethnicity
- Gender
- Race
- Religion

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Foundation Standard 7: Safety Practices Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Infection Control - Explain principles of infection transmission.

7.1.1 a

Identify classifications of pathogens

- Bacteria
- Fungi
- Parasites
- Protoza
- Viruses

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.1.1 b

Describe characteristics of microorganisms

- Aerobic
- Anaerobic
- Non-pathogenic
- Pathogenic

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.1.1 c

Recognize chain of infection

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

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7.1.1 d

Describe mode of transmission

- Common vehicle (air, food, water)
- Direct
- Healthcare-associated infections (nosocomial)
- Indirect
- Opportunistic
- Vectors

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Infection Control - Differentiate methods of controlling the spread and growth of pathogens.

7.1.2 a

Asepsis

- Antisepsis
- Disinfection
- Sanitization
- Sterile technique
- Sterilization

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.1.2 b

Standard precautions

- Environmental cleaning
- Gloving
- Handwashing
- Personal Protective Equipment (PPE)

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.1.2 e

Vaccinations

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

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Foundation Standard 8: Teamwork Identify roles and responsibilities of individual members as part of the healthcare team.

Healthcare Teams

8.1.2

Identify characteristics of effective teams.

- Collaboration
- Defined roles
- Effective communication
- Effective leadership
- Measurable processes and outcomes
- Mutual respect
- Shared goals

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Team Member Participation

8.2.1

Recognize methods for building positive team relationships.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Team Member Participation

8.2.3

Apply effective techniques for managing team conflict.

- Communicate assertively
- Gather the facts
- Mediate disputes
- Negotiate resolutions
- Set clear expectations

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

8.2.4

Evaluate why teamwork is an important part of healthcare and how it improves patient care.

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Foundation Standard 10: Technical Skills
Apply and demonstrate technical skills and knowledge common to health career specialties.

Technical Skills

10.1.1

Demonstrate procedures for measuring and recording vital signs in both normal and abnormal ranges - including but not limited to:

- Blood pressure
- Height and weight
- Oxygen saturation
- Pain
- Pulse
- Respirations
- Temperature

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

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Follow the fictitious Smith family as you learn about the prevention, diagnosis, and treatment of disease.

Play the role of biomedical professionals to analyze case information and diagnose and treat your patients. Investigate the medical interventions of the past and present, and begin to brainstorm the innovations of the future.

PLTW Medical Interventions (MI) allows students to investigate the variety of interventions involved in the prevention, diagnosis, and treatment of disease as they follow the lives of a fictitious family. A "How-To" manual for maintaining overall health and homeostasis in the body, the course explores how to prevent and fight infection, how to screen and evaluate the code in our DNA, how to prevent, diagnose, and treat cancer, and how to prevail when the organs of the body begin to fail. Through these scenarios, students are exposed to the wide range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics. Each family case scenario introduces multiple types of interventions, reinforces concepts learned in the previous two courses, and presents new content. Interventions may range from simple diagnostic tests to treatment of complex diseases and disorders. These interventions are showcased across the generations of the family and provide a look at the past, present, and future of biomedical science. Lifestyle choices and preventive measures are emphasized throughout the course as well as the important role that scientific thinking and engineering design play in the development of interventions of the future.

Students practice problem solving with structured activities and progress to open-ended projects and problems that require them to develop planning, documentation, communication, and other professional skills.

The following is a summary of the units of study that are included in the course for the academic year. Course content is designed with strong connections to state and national standards. Activities, projects, and problems are provided to the teacher in the form of student-ready handouts, teacher notes, and supplementary materials, including resource documents, student response sheets, and presentations.

MI Unit Summary

Unit 1	How to Fight Infection (25%)
Unit 2	How to Screen What Is in Your Genes (15%)
Unit 3	How to Conquer Cancer (30%)
Unit 4	How to Prevail When Organs Fail (30%)

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Unit 1: How to Fight Infection

In this unit, students are introduced to Sue Smith, the 18-year-old daughter of Mr. and Mrs. Smith. Sue is a college freshman who is presenting symptoms of an unknown infectious disease, which students eventually identify as bacterial meningitis. Sue survives the infection but is left with hearing impairment. Through this case, students explore the diagnostic process used to identify an unknown infection, the use of antibiotics as a treatment, how bacteria develop antibiotic resistance, how hearing impairment is assessed and treated, and how vaccinations are developed and used to prevent infection.

How to Fight Infection Lesson Summary

Lesson 1.1	The Mystery Infection
Lesson 1.2	Antibiotic Treatment
Lesson 1.3	The Aftermath: Hearing Loss
Lesson 1.4	Vaccination

Lesson 1.1 The Mystery Infection

The goal of this lesson is to expose students to interventions involved in detecting, fighting, and preventing an infectious disease as they investigate a potential outbreak at a fictitious college. Sue Smith, a freshman, thinks she just has a cold, but further investigation reveals something far more serious. Students use various techniques and technologies to diagnose Sue and determine the source of the disease on campus. They analyze clues found in the history and physical of each possible patient, identify pathogens present in body fluids through DNA sequence analysis, and test for the infectious agent using the antibody-based Enzyme-Linked Immunosorbent Assay (ELISA). Students are introduced to the field of bioinformatics as they explore genetic databases to identify known gene sequences. At the conclusion of the investigation, students outline a plan to stop a potential outbreak on campus and discuss interventions such as antibiotic therapy and vaccination, two topics to be explored in greater detail in the subsequent lessons.

Lesson 1.2 Antibiotic Treatment

In this lesson, students review bacterial structure and investigate the mechanisms by which DNA from one bacterial cell is transferred to another. Students then explore various types of antibiotics and their mode of action against the bacteria they target. They suggest an antibiotic treatment for Sue Smith, as she was diagnosed with a bacterial infection in the previous lesson. Finally, students look at the propagation of antibiotic-resistant bacteria and how the misuse of antibiotics plays a role in the development of antibiotic-resistant bacteria.

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Lesson 1.3 The Aftermath: Hearing Loss
The goal of this lesson is to introduce students to the auditory system. Students investigate the physics of sound, learn how hearing works, and conduct a variety of hearing assessments. Students are assigned a patient with a specific type of hearing loss. Using the assigned patient case study, students explore how damage to the outer, middle, and/or inner ear results in hearing loss. Students learn how to interpret audiograms and match up their patient case study with the corresponding audiogram. Students then use what they have learned to make a recommendation as to what intervention is the most appropriate for the patient case study. Finally, students investigate the science behind cochlear implants and debate the use of this medical intervention.

Lesson 1.4 Vaccination
The goal of this lesson is for students to explore infectious disease prevention and the development of vaccinations. Students discuss the impact vaccination has had on public health over the years and interpret how vaccines have altered disease trends. Students review how vaccines work in the body and relate this mechanism to the workings of the human immune system. Students explore the techniques scientists use to produce vaccines. They delve deeper into the science of recombinant DNA technology and learn how genetic engineering can be used to manufacture viable vaccines. Students engineer a paper plasmid to produce a viral protein that can be used as a vaccine. Finally, students explore the career field of epidemiology. Working as epidemiologists, they brainstorm steps and questions needed to deal with a potential outbreak, analyze data to gather evidence, design epidemiologic studies, and design and implement prevention and treatment strategies.

Unit 2: How to Screen What Is in Your Genes

In this unit, students are introduced to Mr. and Mrs. Smith, Sue's parents. Mr. and Mrs. Smith are very excited to find out they are expecting a new baby. Because the couple is in their early 40s, the doctor has suggested genetic screening and testing. Through this case, students explore how to screen and evaluate the code in DNA, the value of good prenatal care, and the future of genetic technology.

How to Screen What Is in Your Genes Lesson Summary

Lesson 2.1	Genetic Testing and Screening
Lesson 2.2	Our Genetic Future

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Lesson 2.1 Genetic Testing and Screening

The goal of this lesson is for students to examine the available types of genetic testing and screening and discuss ethical implications of these tests. Assuming the role of genetic counselors, students analyze a patient case concerning issues of genetic testing and provide appropriate recommendations. Next, students explore molecular techniques necessary to complete a genetic test. They use the tools of molecular biology to extract their own DNA, amplify a part of the gene for bitter-tasting ability, identify their own gene sequence by restriction digest, and view their resultant genotype using gel electrophoresis. Students then have a chance to test their own phenotype and see how well this genotype predicts their own ability. Finally, students investigate the interventions that exist to help protect and monitor a growing fetus.

Lesson 2.2 Our Genetic Future

The goal for this lesson is for students to examine how the study of genetics alters the way doctors and scientists treat disease and the way humans reproduce. Students learn about gene therapy, debate its safety, and write a policy statement highlighting guidelines and restrictions on gene therapy testing and research. Students examine available reproductive technology and debate and discuss medical interventions of the future.

Unit 3: How to Conquer Cancer

In this unit, students are introduced to Mike Smith, the 16-year-old son of Mr. and Mrs. Smith. Mike is diagnosed with osteosarcoma, a type of bone cancer that often affects teenagers. Mike's treatments put him into remission; however, to remove all of the cancerous tissue, he had to have most of his arm amputated. Mike now needs a prosthesis. Through this case, students explore the diagnostic process used to determine the presence of cancerous cells, the risk factors and prevention of cancer, rehabilitation after disease or injury, and the design process for new medications, prosthetics, and nanotechnology.

How to Conquer Cancer Lesson Summary

Lesson 3.1	Detecting Cancer
Lesson 3.2	Reducing Your Risk
Lesson 3.3	Treating Cancer
Lesson 3.4	Building a Better Cancer Treatment

Lesson 3.1 Detecting Cancer

In this lesson, students are introduced to Mike Smith, the 16-year-old son in the Smith family. For the last couple of months, Mike has been experiencing pain in his upper arm that may be indicative of cancer. Through the exploration of Mike's case, students explore techniques used to diagnose Mike's particular cancer, including diagnostic imaging and examination of cancerous tissue. Students look at the physiology of cancer and investigate the genes involved with cancer.

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Students examine the technology that is being used to give researchers a better understanding of the differences in gene expression in both cancer cells and normal cells. Students learn ways that this technology is being used to potentially develop personalized medicine for treating cancer.

Lesson 3.2 Reducing Your Risk
The goal of this lesson is for students to look at some of the risk factors associated with cancer by exploring the various situations which cause changes to our DNA. In particular, students investigate mutations caused by UV light, mutations that are inherited, and mutations caused by viruses. Students design and perform an experiment to test the effectiveness of various sunscreens or types of cloth against UV light as they attempt to protect UV-sensitive yeast cells. They analyze marker analysis results to diagnose a BRCA2 gene mutation associated with breast cancer, play the role of a virologist working with viruses associated with cancer, and create a timeline of routine cancer screenings we must complete in our lifetime. Throughout the lesson, students look at lifestyle choices that can reduce the chances that a person will develop particular types of cancer.

Lesson 3.3 Treating Cancer
The goal of this lesson is for students to follow Mike Smith as he progresses through treatment for his osteosarcoma. Students learn about the treatments available for cancer patients, as well as the therapies available to help patients cope with the pain associated with treatment. This lesson begins with an introduction to chemotherapy and radiation therapy. Next, students investigate biofeedback therapy. They use data acquisition software to monitor their body's reaction to stress and test methods to reduce their response level. Students learn that Mike will have to have his arm amputated to prevent further tumor growth. Through this scenario, students study prosthetic limb technologies, design and build a model prosthetic arm, and explore the role physical and occupational therapists play in a patient's rehabilitation following amputation surgery.

Lesson 3.4 Building a Better Cancer Treatment
The goal of this lesson is for students to explore the future of cancer treatment. Students begin this lesson with an investigation into how one drug can cause varied effects in similar patients and learn about personalized medicine, also known as pharmacogenetics. Students then investigate the set-up of clinical trials and consider the ethics governing clinical trials. Students study the nanoscale and the possible application of nanotechnology in medicine. Finally, students research the variety of nanotechnologies currently being developed for the diagnosis and treatment of cancer. They use everything they have learned in this unit to design their own nanotechnology-based cancer treatment and design a clinical trial to test the safety and efficacy of their designed treatment.

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Unit 4: How to Prevail When Organs Fail

In this unit, students are introduced to Mrs. Jones, the 44-year-old sister of Mrs. Smith. Mrs. Jones has been struggling with Type 1 diabetes for 20 years. Over the years, Mrs. Jones did not take good care of herself or properly control her diabetes. She eventually began using an insulin pump and changed her lifestyle to regulate her blood sugar levels, but the damage had already been done. Mrs. Jones is now dealing with end-stage renal failure and needs a kidney transplant. Through this case, students explore protein production, blood sugar regulation, dialysis, organ donation and transplantation, and non-invasive surgery techniques. In addition, students create a bionic human.

How to Prevail When Organs Fail Lesson Summary

Lesson 4.1	Manufacturing Human Proteins
Lesson 4.2	Organ Failure
Lesson 4.3	Transplant
Lesson 4.4	Building a Better Body

Lesson 4.1 Manufacturing Human Proteins

The goal of this lesson is for students to investigate the biomanufacturing of human proteins used for medical interventions. They first use the process of bacterial transformation to insert a plasmid containing the gene for green fluorescent protein (GFP) into E. coli cells. Students then use chromatography to separate the GFP protein from the other proteins in the bacterial cells. They collect proteins in differential fractions and analyze the contents of these fractions using gel electrophoresis. Students relate their molecular work to the case of Diana Jones, who is a Type 1 diabetic on insulin therapy. Without insulin produced by the biomanufacturing process explored in this lesson, she would have died long ago. As the unit progresses, students research and design other medical interventions that will help Diana in her battle with diabetes and renal failure.

Lesson 4.2 Organ Failure

The goal of this lesson is for students to use problem solving and critical thinking skills to solve Diana Jones' medical mystery. Students investigate Diana's symptoms, suggest further diagnostic tests, and use information they find to piece together the clues provided to make a diagnosis and suggest the best treatment option.

Lesson 4.3 Transplant

In Lesson 4.2, students diagnosed Diana Jones with end-stage renal disease. In this lesson, students follow Diana as she goes through the transplant process. Students learn about organ allocation policies by deciding which of two matching patients should receive a donated kidney. Students then learn that members of Diana's family have offered to be potential living donors and must determine who should donate their kidney to Diana based on blood type and tissue

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type. Students then practice laparoscopic and general surgery techniques and investigate the members of the transplant team involved along the transplant path. Students conclude the lesson by investigating the similarities and differences between kidney transplants and heart transplants.

Lesson 4.4 Building a Better Body

The goal of this lesson is for students to investigate some of the technologies researchers are exploring as they strive to replace damaged organs, including xenotransplantation and tissue engineering. Students investigate how these technologies work and then construct an argument from the perspective of different stakeholders arguing over whether further research for these interventions should be banned. In the final activities, students have the chance to reflect on everything they have explored in this course. They think about how science is changing the ability of humans to survive in the face of illness and injury and use what they learned during the course to design their own version of a superhuman. As they review the Smith family tree, students reflect on the role medical interventions play in preventing, diagnosing, and treating disease. Finally, students consider their own career aspirations.

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Course resumes showcase the technical skills students obtain in each PLTW course. Each resume outlines the computational skills, analytical skills, and knowledge acquired in the course. Course Resumes also detail student experience with tools, software, lab work, and engineering design. The detailed skills listed within course resumes illustrate the immediate, applicable contributions that students can make within a workplace.

Laboratory Skills

- Aseptic technique
- Bacterial plating
- Micropipetting
- DNA extraction
- Restriction enzyme digest
- DNA gel electrophoresis
- Protein gel electrophoresis
- Hydrophobic Interaction Chromatography (HIC)
- Bacterial transformation

Clinical Skills

- Karyotyping
- Quantitative Enzyme-linked Immunosorbent Assay (ELISA) analysis
- Interpretation of audiograms
- Blood typing
- Tissue typing

Equipment and Software Proficiencies

- Microsoft Office (Excel, Word, PowerPoint)
- Vernier probes and sensors
- Data Acquisition Software (Vernier Logger Pro)
- Microscope
- Thermal cycler

Scientific Experimentation Skills

- Design and conduct reliable scientific experiments
- Analyze and interpret laboratory data
- Construct graphs (by hand and using graphing software)
- Interpolate and extrapolate data from a graph
- Draw conclusions based on experimental data
- Thoroughly and clearly communicate results and conclusions both orally and in writing

Professional Skills

- Group collaboration
- Planning and organizing
- Time management
- Problem-solving
- Technical writing
- Verbal and written communication
- Decision-making
- Creative thinking

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Course Topics

- Over-arching Themes
  - Homeostasis
  - Biomedical science careers
  - Bioethics
  - Design process
  - Interrelationship between body systems and health/disease
  - Current and future medical internations
- Infectious Disease
  - Epidemiology
  - Bioinformatics/DNA sequence analysis
  - Antibiotic mode of action and antibiotic resistance
  - Bacterial transduction, transformation, and conjugation
  - Physics of sound and anatomy and physiology of the ear
  - Hearing loss and audiograms
  - Cochlear implant technology
  - Vaccine production and mechanism
- Innovative Medicine
  - Prenatal screenings
  - Gene therapy
  - Reproductive technology
  - Xenotransplantation and tissue engineering
- Molecular Biology
  - Recombinant DNA technology and genetic engineering
  - DNA microarrays
  - Restriction Fragment Length Polymorphisms (RFLP) and marker analysis
  - Single Nucleotide Polymorphisms (SNPs) and pharmacogenetics
  - Biomanufacturing of human proteins
- Cancer Genetics, Diagnostics, and Treatment
  - Diagnostic imaging
  - Histology
  - Statistical analysis
  - Biofeedback therapy
  - Prosthetic limb technology
  - Nanomedicine
  - Clinical trials
- Organ Transplant
  - End Stage Renal Disease
  - Organ allocation policies and organ transplant
  - Laparoscopic surgical techniques
  - Antigen/antibody interactions
  - Pedigree construction/analysis

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PLTW Standards Connection
Medical Interventions

Connections to Standards in Biomedical Science

PLTW curriculum is designed to empower students to thrive in an evolving world. As a part of the design process when developing and updating our curriculum, we focus on connections to a variety of standards. PLTW Medical Interventions connects to standards in the following:

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Common Core State Standards for Mathematics

Making Inferences and Justifying Conclusions

Make Inferences and Justify Conclusions From Sample Surveys, Experiments, and Observational Studies

CCSS.MATH.CONTENT.HSS.IC.B.6

Evaluate reports based on data.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Reading Literature

Key Ideas and Details

CCSS.ELA-LITERACY.RL.9-10.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.9-10.2

Determine a theme or central idea of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.9-10.3

Analyze how complex characters (e.g., those with multiple or conflicting motivations) develop over the course of a text, interact with other characters, and advance the plot or develop the theme.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RL.9-10.4

Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language evokes a sense of time and place; how it sets a formal or informal tone).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.9-10.5

Analyze how an author's choices concerning how to structure a text, order events within it (e.g., parallel plots), and manipulate time (e.g., pacing, flashbacks) create such effects as mystery, tension, or surprise.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.9-10.6

Analyze a particular point of view or cultural experience reflected in a work of literature from outside the United States, drawing on a wide reading of world literature.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RL.9-10.7

Analyze the representation of a subject or a key scene in two different artistic mediums, including what is emphasized or absent in each treatment (e.g., Auden's "Musée des Beaux Arts" and Breughel's Landscape with the Fall of Icarus).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Common Core State Standards for English Language Arts

CCSS.ELA-LITERACY.RL.9-10.8

(Not applicable to literature)

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.9-10.9

Analyze how an author draws on and transforms source material in a specific work (e.g., how Shakespeare treats a theme or topic from Ovid or the Bible or how a later author draws on a play by Shakespeare).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RL.9-10.10

By the end of grade 9, read and comprehend literature, including stories, dramas, and poems, in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Reading Informational Text

Key Ideas and Details

CCSS.ELA-LITERACY.RI.9-10.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.9-10.2

Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.9-10.3

Analyze how the author unfolds an analysis or series of ideas or events, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RI.9-10.4

Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Common Core State Standards for English Language Arts

CCSS.ELA-LITERACY.RI.9-10.5

Analyze in detail how an author's ideas or claims are developed and refined by particular sentences, paragraphs, or larger portions of a text (e.g., a section or chapter).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.9-10.6

Determine an author's point of view or purpose in a text and analyze how an author uses rhetoric to advance that point of view or purpose.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.9-10.7

Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.9-10.8

Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.9-10.9

Analyze seminal U.S. documents of historical and literary significance (e.g., Washington's Farewell Address, the Gettysburg Address, Roosevelt's Four Freedoms speech, King's "Letter from Birmingham Jail"), including how they address related themes and concepts.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.9-10.10

By the end of grade 9, read and comprehend literary nonfiction in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Writing

Text Types and Purpose

CCSS.ELA-LITERACY.W.9-10.1

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.1.A

Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among claim(s), counterclaims, reasons, and evidence.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Common Core State Standards for English Language Arts

CCSS.ELA-LITERACY.W.9-10.1.B

Develop claim(s) and counterclaims fairly, supplying evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level and concerns.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.1.C

Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.1.E

Provide a concluding statement or section that follows from and supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.2.A

Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.2.B

Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.2.C

Use appropriate and varied transitions to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.2.D

Use precise language and domain-specific vocabulary to manage the complexity of the topic.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.W.9-10.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.3

Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.3.A

Engage and orient the reader by setting out a problem, situation, or observation, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.3.B

Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.3.C

Use a variety of techniques to sequence events so that they build on one another to create a coherent whole.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.3.D

Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.3.E

Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Common Core State Standards for English Language Arts

Production and Distribution of Writing

CCSS.ELA-LITERACY.W.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.W.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.9.A

Apply grades 9–10 Reading standards to literature (e.g., "Analyze how an author draws on and transforms source material in a specific work [e.g., how Shakespeare treats a theme or topic from Ovid or the Bible or how a later author draws on a play by Shakespeare]").

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.W.9-10.9.B

Apply grades 9–10 Reading standards to literary nonfiction (e.g., “Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning”).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Range of Writing

CCSS.ELA-LITERACY.W.9-10.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.SL.9-10.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.9-10.1.A

Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.9-10.1.B

Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.9-10.1.C

Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.9-10.1.D

Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Common Core State Standards for English Language Arts

CCSS.ELA-LITERACY.SL.9-10.2

Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.3

Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Presentation of Knowledge and Ideas

CCSS.ELA-LITERACY.SL.9-10.4

Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.5

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.6

Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.9-10.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.9-10.1.A

Use parallel structure.*

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.1.B

Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to convey specific meanings and add variety and interest to writing or presentations.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.L.9-10.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.9-10.2.A

Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.2.B

Use a colon to introduce a list or quotation.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.2.C

Spell correctly.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Knowledge of Language

CCSS.ELA-LITERACY.L.9-10.3

Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.3.A

Write and edit work so that it conforms to the guidelines in a style manual (e.g., MLA Handbook, Turabian's Manual for Writers) appropriate for the discipline and writing type.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.9-10.4

Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9–10 reading and content, choosing flexibly from a range of strategies.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.4.A

Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.L.9-10.4.B

Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.4.C

Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.4.D

Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.5

Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.5.A

Interpret figures of speech (e.g., euphemism, oxymoron) in context and analyze their role in the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.5.B

Analyze nuances in the meaning of words with similar denotations.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.6

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Reading History/Social Studies

Key Ideas and Details

CCSS.ELA-LITERACY.RH.9-10.1

Cite specific textual evidence to support analysis of primary and secondary sources, attending to such features as the date and origin of the information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.RH.9-10.2

Determine the central ideas or information of a primary or secondary source; provide an accurate summary of how key events or ideas develop over the course of the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RH.9-10.3

Analyze in detail a series of events described in a text; determine whether earlier events caused later ones or simply preceded them.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RH.9-10.4

Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, or economic aspects of history/social science.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RH.9-10.5

Analyze how a text uses structure to emphasize key points or advance an explanation or analysis.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RH.9-10.6

Compare the point of view of two or more authors for how they treat the same or similar topics, including which details they include and emphasize in their respective accounts.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RH.9-10.7

Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RH.9-10.8

Assess the extent to which the reasoning and evidence in a text support the author’s claims.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RH.9-10.9

Compare and contrast treatments of the same topic in several primary and secondary sources.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Common Core State Standards for English Language Arts

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RH.9-10.10

By the end of grade 10, read and comprehend history/social studies texts in the grades 9–10 text complexity band independently and proficiently.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Reading Science and Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.9-10.1

Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.9-10.2

Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RST.9-10.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RST.9-10.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.9-10.5

Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RST.9-10.6

Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RST.9-10.7

Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RST.9-10.8

Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RST.9-10.9

Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RST.9-10.10

By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Writing History/Social Studies, Science, and Technical

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.9-10.1

Write arguments focused on discipline-specific content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.1.A

Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.1.B

Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.WHST.9-10.1.C

Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.1.E

Provide a concluding statement or section that follows from or supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.A

Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.B

Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.C

Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.D

Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.WHST.9-10.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.3

(See note; not applicable as a separate requirement)

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.WHST.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.WHST.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.WHST.9-10.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.9

Draw evidence from informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.10

Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Reading Literature

Key Ideas and Details

CCSS.ELA-LITERACY.RL.11-12.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.11-12.2

Determine two or more themes or central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account; provide an objective summary of the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.11-12.3

Analyze the impact of the author’s choices regarding how to develop and relate elements of a story or drama (e.g., where a story is set, how the action is ordered, how the characters are introduced and developed).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RL.11-12.4

Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (Include Shakespeare as well as other authors.)

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.RL.11-12.5

Analyze how an author's choices concerning how to structure specific parts of a text (e.g., the choice of where to begin or end a story, the choice to provide a comedic or tragic resolution) contribute to its overall structure and meaning as well as its aesthetic impact.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.11-12.6

Analyze a case in which grasping a point of view requires distinguishing what is directly stated in a text from what is really meant (e.g., satire, sarcasm, irony, or understatement).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RL.11-12.7

Analyze multiple interpretations of a story, drama, or poem (e.g., recorded or live production of a play or recorded novel or poetry), evaluating how each version interprets the source text. (Include at least one play by Shakespeare and one play by an American dramatist.)

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.11-12.8

(Not applicable to literature)

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.11-12.9

Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.11-12.10

By the end of grade 11, read and comprehend literature, including stories, dramas, and poems, in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Reading Informational Text

Key Ideas and Details

CCSS.ELA-LITERACY.RI.11-12.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.RI.11-12.2

Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to provide a complex analysis; provide an objective summary of the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.11-12.3

Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RI.11-12.4

Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze how an author uses and refines the meaning of a key term or terms over the course of a text (e.g., how Madison defines faction in Federalist No. 10).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.11-12.5

Analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument, including whether the structure makes points clear, convincing, and engaging.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.11-12.6

Determine an author's point of view or purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness or beauty of the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.11-12.7

Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RI.11-12.8

Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning (e.g., in U.S. Supreme Court majority opinions and dissents) and the premises, purposes, and arguments in works of public advocacy (e.g., The Federalist, presidential addresses).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.RI.11-12.9

Analyze seventeenth-, eighteenth-, and nineteenth-century foundational U.S. documents of historical and literary significance (including The Declaration of Independence, the Preamble to the Constitution, the Bill of Rights, and Lincoln's Second Inaugural Address) for their themes, purposes, and rhetorical features.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.11-12.10

By the end of grade 11, read and comprehend literary nonfiction in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Writing

Text Types and Purpose

CCSS.ELA-LITERACY.W.11-12.1

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.1.A

Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.1.B

Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.1.C

Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.W.11-12.1.E

Provide a concluding statement or section that follows from and supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.A

Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.B

Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.C

Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.D

Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.W.11-12.3

Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.3.A

Engage and orient the reader by setting out a problem, situation, or observation and its significance, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.3.B

Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.3.C

Use a variety of techniques to sequence events so that they build on one another to create a coherent whole and build toward a particular tone and outcome (e.g., a sense of mystery, suspense, growth, or resolution).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.3.D

Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.3.E

Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.W.11-12.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.W.11-12.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.W.11-12.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.9.A

Apply grades 11–12 Reading standards to literature (e.g., “Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics”).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.9.B

Apply grades 11–12 Reading standards to literary nonfiction (e.g., “Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning [e.g., in U.S. Supreme Court Case majority opinions and dissents] and the premises, purposes, and arguments in works of public advocacy [e.g., The Federalist, presidential addresses]”).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Range of Writing

CCSS.ELA-LITERACY.W.11-12.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes.

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Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.SL.11-12.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.A

Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.B

Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.C

Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.D

Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.11-12.2

Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.11-12.3

Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Presentation of Knowledge and Ideas

CCSS.ELA-LITERACY.SL.11-12.4

Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.5

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.6

Adapt speech to a variety of contexts and tasks, demonstrating a command of formal English when indicated or appropriate.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.11-12.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.11-12.1.A

Apply the understanding that usage is a matter of convention, can change over time, and is sometimes contested.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.1.B

Resolve issues of complex or contested usage, consulting references (e.g., Merriam-Webster's Dictionary of English Usage, Garner's Modern American Usage) as needed.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.11-12.2.B

Spell correctly.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Knowledge of Language

CCSS.ELA-LITERACY.L.11-12.3

Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.3.A

Vary syntax for effect, consulting references (e.g., Tufte's Artful Sentences) for guidance as needed; apply an understanding of syntax to the study of complex texts when reading.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.11-12.4

Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, choosing flexibly from a range of strategies.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.4.A

Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.4.B

Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., conceive, conception, conceivable).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.4.C

Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, its etymology, or its standard usage.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.4.D

Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.5

Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.L.11-12.5.A

Interpret figures of speech (e.g., hyperbole, paradox) in context and analyze their role in the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.5.B

Analyze nuances in the meaning of words with similar denotations.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.6

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Conventions of Standard English

CCSS.ELA-LITERACY.L.11-12.2.A

Observe hyphenation conventions.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Reading History/Social Studies

Key Ideas and Details

CCSS.ELA-LITERACY.RH.11-12.1

Cite specific textual evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RH.11-12.2

Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RH.11-12.3

Evaluate various explanations for actions or events and determine which explanation best accords with textual evidence, acknowledging where the text leaves matters uncertain.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Craft and Structure

CCSS.ELA-LITERACY.RH.11-12.4

Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines faction in Federalist No. 10).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RH.11-12.5

Analyze in detail how a complex primary source is structured, including how key sentences, paragraphs, and larger portions of the text contribute to the whole.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RH.11-12.6

Evaluate authors' differing points of view on the same historical event or issue by assessing the authors' claims, reasoning, and evidence.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RH.11-12.7

Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RH.11-12.8

Evaluate an author's premises, claims, and evidence by corroborating or challenging them with other information.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RH.11-12.9

Integrate information from diverse sources, both primary and secondary, into a coherent understanding of an idea or event, noting discrepancies among sources.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RH.11-12.10

By the end of grade 12, read and comprehend history/social studies texts in the grades 11–CCR text complexity band independently and proficiently.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Reading Science and Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.11-12.1

Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.2

Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RST.11-12.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RST.11-12.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.5

Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RST.11-12.6

Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RST.11-12.7

Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.RST.11-12.8

Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.9

Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RST.11-12.10

By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Writing History/Social Studies, Science, and Technical

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.11-12.1

Write arguments focused on discipline-specific content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.1.A

Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.1.B

Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.1.C

Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.WHST.11-12.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.1.E

Provide a concluding statement or section that follows from or supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.A

Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.B

Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.C

Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.D

Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.E

Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).

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CCSS.ELA-LITERACY.WHST.11-12.3

(See note; not applicable as a separate requirement)

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.WHST.11-12.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.WHST.11-12.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.9

Draw evidence from informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Range of Writing

CCSS.ELA-LITERACY.WHST.11-12.10

Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Next Generation Science Standards

From Molecules to Organisms: Structures and Processes

HS.LS1.1

Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

HS.LS1.3

Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

HS.LS1.6

Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

Heredity: Inheritance and Variation of Traits

HS.LS3.1

Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

HS.LS3.2

Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

HS.LS3.3

Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Disciplinary core ideas

LS1.A From Molecules to Organisms: Structures and Processes - Structure and Function

• Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)

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Next Generation Science Standards

• All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1), (Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

LS3.A Heredity: Inheritance and Variation of Traits - Inheritance of Traits

• Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA . All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function. (HS-LS3-1)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

LS4.A Biological Evolution: Unity and Diversity - Evidence of Common Ancestry and Diversity

• Genetic information provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence. (HS-LS4-1)

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Next Generation Science Standards

Science and Engineering Practice

Practice 1 - Asking questions and defining problems in 9-12 builds on K-8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.

- Ask questions
  - that arise from careful observation of phenomena, or unexpected results, to clarify and/or seek additional information.
  - that arise from examining models or a theory, to clarify and/or seek additional information and relationships.
  - to determine relationships, including quantitative relationships, between independent and dependent variables.
  - to clarify and refine a model, an explanation, or an engineering problem.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

- Ask questions that can be investigated within the scope of the school laboratory, research facilities, or field (e.g., outdoor environment) with available resources and, when appropriate, frame a hypothesis based on a model or theory.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Practice 2 Developing and Using Models
Modeling in 9-12 builds on K-8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.

- Develop, revise, and/or use a model based on evidence to illustrate and/or predict the relationships between systems or between components of a system.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

- Develop and/or use multiple types of models to provide mechanistic accounts and/or predict phenomena, and move flexibly between model types based on merits and limitations.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

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Next Generation Science Standards

Practice 3 Planning and Carrying Out Investigations
Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.

- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Plan and conduct an investigation or test a design solution in a safe and ethical manner including considerations of environmental, social, and personal impacts.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Select appropriate tools to collect, record, analyze, and evaluate data. Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Practice 4 Analyzing and Interpreting Data
Analyzing data in 9-12 builds on K-8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.

- Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Evaluate the impact of new data on a working explanation and/or model of a proposed process or system.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

Practice 5 Using Mathematics and Computational Thinking
Mathematical and computational thinking in 9- 12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.

- Use mathematical, computational, and/or algorithmic representations of phenomena or design solutions to describe and/or support claims and/or explanations.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

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Next Generation Science Standards

- Apply techniques of algebra and functions to represent and solve scientific and engineering problems.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

- Apply ratios, rates, percentages, and unit conversions in the context of complicated measurement problems involving quantities with derived or compound units (such as mg/mL, kg/m3, acre-feet, etc.)

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Practice 6 Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 9-12 builds on K-8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.

- Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Apply scientific reasoning, theory, and/or models to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Practice 7 Engaging in Argument from Evidence

- Compare and evaluate competing arguments or design solutions in light of currently accepted explanations, new evidence, limitations (e.g., trade-offs), constraints, and ethical issues.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

- Evaluate the claims, evidence, and/or reasoning behind currently accepted explanations or solutions to determine the merits of arguments.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Respectfully provide and/or receive critiques on scientific arguments by probing reasoning and evidence, challenging ideas and conclusions, responding thoughtfully to diverse perspectives, and determining additional information required to resolve contradictions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Next Generation Science Standards

• Construct, use, and/or present an oral and written argument or counterarguments based on data and evidence.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

• Make and defend a claim based on evidence about the natural world or the effectiveness of a design solution that reflects scientific knowledge and student-generated evidence.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

• Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and/or logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Practice 8 Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in 9-12 builds on K-8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.

• Critically read scientific literature adapted for classroom use to determine the central ideas or conclusions and/or to obtain scientific and/or technical information to summarize complex evidence, concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Compare, integrate and evaluate sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a scientific question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Evaluate the validity and reliability of and/or synthesize multiple claims, methods, and/or designs that appear in scientific and technical texts or media reports, verifying the data when possible. Communicate scientific and/or technical information or ideas (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (i.e., orally, graphically, textually, mathematically).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Crosscutting Concepts

Patterns

• Patterns of performance of designed systems can be analyzed and interpreted to reengineer and improve the system.

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Next Generation Science Standards

Cause and Effect: Mechanism and Prediction

- Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Systems can be designed to cause a desired effect.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Changes in systems may have various causes that may not have equal effects.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Scale, Proportion, and Quantity

- Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth).

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Systems and System Models

- Systems can be designed to do specific tasks.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Stability and Change

- Feedback (negative or positive) can stabilize or destabilize a system.

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National Consortium for Health Science Education

Foundation Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Human Anatomy and Physiology - Describe the organization of the human body and directional terms.

1.1.1 a

Identify levels of organization

- Cellular
- Chemical
- Organ
- Organsim
- System
- Tissue

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Human Anatomy and Physiology - Identify basic structures and describe functions of human body systems.

1.1.2 a

Skeletal

- Structures of the skeletal system
  - Distinguish between axial and appendicular skeletons
  - Describe long bone anatomy
  - Identify joint types and movement
  - Name and classify all bones (206)
- Functions of the skeletal system
  - Hematopoiesis
  - Mineral storage
  - Muscle attachment and movement
  - Ossification
  - Structure and support

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.2 b

Muscular

- Structures of the muscular system
  - Identify types of muscle tissue
  - Identify major muscle groups of neck, shoulder, chest, abdomen, back, arms, and legs
- Functions of the muscular system
  - Body movement
  - Posture
  - Protection

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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1.1.2 c

Integumentary

- Structures of the integumentary system
  - Identify integumentary components
  - Label the layers of skin
- Functions of the integumentary system
  - Infection protection
  - Sensory organ
  - Temperature regulation
  - UV light protection
  - Vitamin D production

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.2 d

Cardiovascular

- Structures of the cardiovascular system
  - Distinguish blood components
  - Identify cardiovascular organs
  - Label the parts of the heart
- Functions of the cardiovascular system
  - Blood flow through the heart and body
  - Cardiac conduction system
  - Transports nutrients, waste, antibodies, hormones, and gases

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.2 e

Lymphatic / Immune

- Structures of the lymphatic system
  - Identify lymphatic organs
- Functions of the lymphatic system
  - Movement of lymph fluid
  - Provide protection against disease

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.2 f

Respiratory

- Structures of the respiratory system
  - Identify respiratory organs
- Functions of the respiratory system
  - Gas exchange

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1.1.2 g

Nervous

- Structures of the nervous system
  - Differentiate CNS and PNS
  - Differentiate sympathetic and parasympathetic
  - Identify organs of the nervous system
  - Identify structures of the special sense organs
- Functions of the nervous system
  - Movement
  - Processing
  - Sensation

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.2 h

Endocrine

- Structures of the endocrine system
  - Identify endocrine glands
- Functions of the endocrine system
  - Controls metabolism
  - Production of hormones
  - Regulation of body processes
  - Regulates growth, development, and maturation

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.2 i

Digestive

- Structures of the digestive system
  - Differentiate between alimentary and accessory organs
  - Identify digestive organs in sequence
- Functions of the digestive system
  - Absorption of nutrients
  - Chemical and mechanical digestion
  - Excretion of waste

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1.1.2 j

Urinary

- Structures of the urinary system
  - Identify gross and microscopic anatomy of the kidney
  - Identify urinary organs
- Functions of the urinary system
  - Homeostatic balance
  - Process of urine formation
  - Urine composition

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.2 k

Reproductive

- Structures of the reproductive system
  - Identify female reproductive organs
  - Identify male reproductive organs
- Functions of the reproductive system
  - Formation of gametes
  - Production of hormones

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Diseases and Disorders -

1.2.1

Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders, including, but not limited to the following:

- Anxiety
- Arthritis
- Asthma
- Bipolar Disorder
- Cancer
- Cataracts
- Concussion / Traumatic Brain Injury (TBI)
- Cystic Fibrosis
- Diabetes
- Dementia
- Depression
- Gastric ulcer
- Hepatitis
- Hypertension
- Melanoma
- Muscular dystrophy
- Myocardial infarction
- Sexually Transmitted Infection (STI)
- Stroke / Cerebrovascular Accident (CVA)
- Tuberculosis
- Urinary Tract Infection (UTI)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.2.2

Describe biomedical therapies as they relate to the prevention, pathology, and treatment of disease.

- Gene editing
- Gene testing
- Gene therapy
- Immunizations
- Immunotherapy
- Stem cell research

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Medical Mathematics - Demonstrate competency using basic math skills and mathematical conversions as they relate to healthcare.

1.3.1

Metric system
- Centi-
- Deci-
- Kilo-
- Milli-
- Micro-

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

1.3.1 b

Mathematical
- Addition / Subtraction
- Average
- Fractions
- Multiplication / Division
- Percentages
- Ratios

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

1.3.1 c

Conversions
- Height (inches/meters)
- Household measurements (Tbsp/tsp/cup/oz)
- Length (inches/meters)
- Temperature (F/C)
- Volume (ml/cc)
- Weight/mass (pounds/grams)

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Medical Mathematics

1.3.2

Demonstrate the ability to analyze diagrams, charts, graphs, and tables to interpret healthcare results.

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Foundation Standard 2: Communications Demonstrate methods of delivering and obtaining information, while communicating effectively.

Concepts of Effective Communication

2.1.1

Model verbal and nonverbal therapeutic communication.

- Active listening
- Reflecting
- Silence
- Summarizing

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Concepts of Effective Communication - Identify common barriers to communication.

2.1.2 a

Physical disabilities

- Aphasia
- Developmental level
- Hearing loss
- Impaired vision

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

2.1.2 b

Psychological barriers

- Attitudes
- Bias
- Prejudice
- Stereotyping

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Concepts of Effective Communication

2.1.3

Distinguish between subjective and objective information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

2.1.5

Modify communication to meet the needs of the patient/client and to be appropriate to the situation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Medical Terminology

2.2.1

Use common roots, prefixes, and suffixes to communicate information.

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Written Communication Skills

2.3.1

Use proper elements of written and electronic communication (spelling, grammar, and formatting).

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Foundation Standard 4: Employability Skills Use employability skills to enhance employment opportunities and job satisfaction.

Employability Skills

4.2.1

Apply employability/soft skills in healthcare.

- Chain of command
- Communication Skills
- Customer service
- Decision making
- Emotional Intelligence
- Flexible
- Organization
- Problem Solving
- Scope of practice
- Time Management
- Work Ethic

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Career Decision-making

4.3.1

Research levels of education, credentialing requirements, and employment trends in health professions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

4.3.2

Distinguish differences among careers within a health science pathway.

- Biotechnology research and development
- Diagnostic services
- Health informatics
- Support services
- Therapeutic services

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Foundation Standard 6: Ethics Understand accepted ethical practices with respect to cultural, social, and ethnic differences within the healthcare environment.

Ethical Practice

6.1.1

Differentiate between ethical and legal issues impacting healthcare.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

6.1.2

Identify ethical issues and their implications related to healthcare.

- Ethics committee
- Euthanasia
- Gene editing
- Immunizations
- In vitro fertilization
- Organ donation/transplantation
- Scope of practice

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

6.2.1

Discuss religious, social, and cultural values as they impact healthcare.

- Ageism
- Ethnicity
- Gender
- Race
- Religion

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

Foundation Standard 7: Safety Practices Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Infection Control - Explain principles of infection transmission.

7.1.1 a

Identify classifications of pathogens

- Bacteria
- Fungi
- Parasites
- Protoza
- Viruses

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7.1.1 b

Describe characteristics of microorganisms
- Aerobic
- Anaerobic
- Non-pathogenic
- Pathogenic

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7.1.1 c

Recognize chain of infection

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

7.1.1 d

Describe mode of transmission
- Common vehicle (air, food, water)
- Direct
- Healthcare-associated infections (nosocomial)
- Indirect
- Opportunistic
- Vectors

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

Infection Control - Differentiate methods of controlling the spread and growth of pathogens.

7.1.2 a

Asepsis
- Antisepsis
- Disinfection
- Sanitization
- Sterile technique
- Sterilization

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

7.1.2 b

Standard precautions
- Environmental cleaning
- Gloving
- Handwashing
- Personal Protective Equipment (PPE)

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7.1.2 c

Isolation precautions
• Transmission-based contact

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

7.1.2 d

Bloodborne pathogen precautions

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

7.1.2 e

Vaccinations

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

Personal Safety

7.2.2

Demonstrate principles of body mechanics during patient care.
• Ambulating
• Lifting
• Positioning

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.2.3

Demonstrate and apply the use of personal protective equipment (PPE).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Common Safety Hazards

7.4.1

Observe all safety standards related to the occupational exposure to hazardous chemicals standard (safety data sheets [SDS]).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

7.4.2

Comply with safety signs, symbols, and labels.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Foundation Standard 8: Teamwork Identify roles and responsibilities of individual members as part of the healthcare team.

Healthcare Teams

8.1.1

Evaluate roles and responsibilities of healthcare team members.

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8.1.2

Identify characteristics of effective teams.

- Collaboration
- Defined roles
- Effective communication
- Effective leadership
- Measurable processes and outcomes
- Mutual respect
- Shared goals

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Team Member Participation

8.2.1

Recognize methods for building positive team relationships.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Team Member Participation - Analyze attributes and attitudes of an effective leader.

8.2.2 a

Characteristics

- Focused and driven
- Interpersonal skills
- Motivates and inspires
- Organized and balanced

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

8.2.2 b

Types

- Autocratic
- Democratic
- Laissez faire

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

8.2.2 c

Roles

- Communicates vision
- Leads change
- Manages accountability

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Team Member Participation

8.2.3

Apply effective techniques for managing team conflict.
• Communicate assertively
• Gather the facts
• Mediate disputes
• Negotiate resolutions
• Set clear expectations

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Foundation Standard 9: Health Maintenance Practices
Differentiate between wellness and disease. Promote disease prevention and model healthy behaviors.

Healthy Behaviors

9.1.1

Promote self-care behaviors of health and wellness.
- Exercise
- Nutrition
- Relationships
- Sleep habits
- Stress management
- Weight control

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

9.1.3

Describe public health strategies for prevention of disease.
- Community health education outreach programs
- Immunizations
- Medical, dental, and mental health screenings
- Routine physical exams
- Self-care behaviors

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

9.1.4

Investigate complementary and alternative health practices as they relate to wellness and disease prevention.
- Eastern medicine
- Holistic medicine
- Homeopathic medicine
- Manipulative medicine

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Foundation Standard 10: Technical Skills
Apply and demonstrate technical skills and knowledge common to health career specialties.

Technical Skills

10.1.1

Demonstrate procedures for measuring and recording vital signs in both normal and abnormal ranges - including but not limited to:

- Blood pressure
- Height and weight
- Oxygen saturation
- Pain
- Pulse
- Respirations
- Temperature

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You are about to embark on detailed missions in science and medicine. Apply all you have learned in the BMS pathway to solve problems, design solutions, and complete each medical mission.

In PLTW Biomedical Innovation (BI), students apply their knowledge and skills to answer questions or solve problems related to the biomedical sciences. Students design innovative solutions for the health challenges of the 21st century as they work through progressively challenging open-ended problems, addressing topics such as clinical medicine, physiology, biomedical engineering, and public health. They have the opportunity to work on an independent project and may work with a mentor or advisor from a university, hospital, physician's office, or industry. Throughout the course, students are expected to present their work to an adult audience that may include representatives from the local business and healthcare community.

In this capstone course, students are asked to apply what they have learned in the previous three courses to solve unique problems in science, medicine, and healthcare. Students work systematically through required problems before completing optional directed problems or independent work. Each problem is staged as a mission — a unique set of tasks the students must work through to achieve their desired objective. Students are presented with each problem in a Mission File — a document that includes a case brief, a list of completion tasks, links to available resources, as well as a reflection section. Working through the missions not only exposes students to current issues in biomedical science but also provides skills-based instruction in research and experimentation — tools students will use to design innovative solutions to real-world problems. Students use what they learn in these missions as they develop and implement their independent project at the end of the year. A teacher may use additional resources in the community — the guidance of other teachers in the school, the advice of scientists or biomedical professionals, or the knowledge presented in scientific literature to help students achieve each goal.

The following is a summary of the units of study that are included in the course for the academic year. Course content is designed with strong connections to multiple state and national standards. Activities, projects, and problems are provided to the teacher in the form of student-ready handouts, teacher notes, and supplementary materials, including resource documents, student response sheets, and presentations.

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BI Unit Summary

Problem 1	Design of an Effective Emergency Room
Problem 2	Exploring Human Physiology
Problem 3	Design of a Medical Innovation
Problem 4	Investigating Environmental Health
Problem 5	Combating a Public Health Issue
Problem 6	Molecular Biology in Action (Optional)
Problem 7	Forensic Autopsy (Optional)
Problem 8	Independent Project (Optional)

Problem 1: Design of an Effective Emergency Room

In this problem, students apply their knowledge of emergency medical careers, diagnostic testing and patient evaluation, human body systems, and medical interventions to analyze the workings of an emergency room and discuss inefficiencies that may hinder appropriate clinical care. Student teams work collaboratively to design a more efficient emergency medicine delivery system. As students work through their designs, they review research methods, practice effective presentation skills, and learn project management techniques.

Design of an Effective Emergency Room Lesson Summary

Lesson 1.1	Design of an Effective Emergency Room

Lesson 1.1

In this lesson, students focus on biomedical problems related to clinical care. Hospitals and emergency care centers strive to provide quality care to all who enter, but time is of the essence. Timely patient care can make the difference between life and death. The first mission of the course is to design an emergency department that takes efficient patient care to the next level. Using knowledge they have gleaned in the previous courses regarding emergency medical careers, diagnostic testing and patient evaluation, human body systems, and medical interventions, students analyze the workings of an emergency room, discuss inefficiencies, and work with a team to design a more efficient emergency medicine delivery system. As students work through a solution, they also review research techniques and proper documentation of sources, practice presentation skills, and discuss project management.

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Problem 2: Exploring Human Physiology

In this problem, students build upon what they know about the research process to design, conduct, and analyze an experimental study. Students choose a question relating to one or more body systems that they are interested in studying and work with a team to investigate and answer that question. As students work through the experimental process, they review and expand what they know about experimental design, collection of data, statistical analysis of data, and the presentation of data.

Exploring Human Physiology Lesson Summary

Lesson 2.1 Exploring Human Physiology

Lesson 2.1

Whether trying to learn more about the functioning of the human body and the cause of disease, investigating new diagnostic procedures, or testing new or better treatment options, the biomedical sciences rely on scientific research. Scientific research is the systematic method of finding answers to testable questions and making observations for the purpose of learning new facts or testing the application of theories.

In this mission, students learn about the variety of research study designs available and how to set up and conduct valid and reliable studies. Students investigate the various ways in which data can be manipulated, explore what to look for when evaluating data presented by others, critique scientific data presented in popular media, and compare such data with scientific data presented in scientific journals. Students learn one process that scientists use to statistically analyze data and then use this process to analyze the results of a scientific investigation. Finally, students use everything they have learned to design, conduct, and analyze an experimental study relating to one or multiple body systems that they are interested in studying.

Problem 3: Design of a Medical Innovation

In this problem, students review the diseases and disorders, as well as the corresponding medical interventions, they have investigated in the previous courses, and propose a new or better medical device, pharmaceutical, surgical procedure, or genetic intervention. Students work with a team to build a prototype, model, or schematic of the intervention as well as develop a marketing plan for the product. As students work through this problem, they review the design process, complete a literature review, and further practice effective presentation skills.

Design of a Medical Innovation Lesson Summary

Lesson 3.1 Design of a Medical Innovation

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Lesson 3.1
Whether it is creating a product from scratch or improving a current design, biomedical professionals work to create the specialized products that save lives and make patients safer and more comfortable. In this lesson, students work through a design process to create or improve a medical innovation. Students investigate the evolution of various biomedical products, brainstorm ideas for a new biomedical product or for a way to improve an existing product, and evaluate solutions of the past and present. Students explore possible design solutions, select the best approach, and develop a design proposal. Finally, students showcase their designs with a model, prototype, or schematic and create a marketing plan to pitch their product to potential investors.

Problem 4: Investigating Environmental Health

In this problem, students explore how substances or chemicals in the environment impact human health. Students investigate a disease cluster in a fictional family and assess the activities of the individuals for environmental risks. Students test water samples for the presence of contaminants that could be detrimental to human health and use molecular biology techniques to identify specific microorganisms. Students explore the field of toxicology and design an experiment to test the effects of a particular chemical and doses of that chemical on plant growth. Students then compile a comprehensive environmental health profile and action plan for their local area.

Investigating Environmental Health Lesson Summary

Lesson 4.1	Investigating Environmental Health

Lesson 4.1
Pollution or contamination in the environment can impact the incidence of disease and affect overall quality of life. In this lesson, students investigate various aspects of environmental health. They are presented with a fictional family who are all showing gastrointestinal symptoms caused by something in their environment. Through this case, students identify environmental health concerns and toxins and identify potential exposures in their own daily lives. Students test a local water sample as well as simulated well water from the case for the presence of coliforms and E. coli. Students then isolate DNA from three different bacterial cultures and perform PCR to detect which bacterial strain present in the water is making the family sick.

Students study the relationship between exposure and illness using a case study involving lead poisoning. They design an experiment to test the effects of a particular chemical and doses of that chemical on plant growth. They use their results to produce a dose-response curve and relate this graph to the overall effect of the selected chemical. In the final problem, students compile a comprehensive environmental health profile for their local area. They use publicly available databases, as well as personal contacts and visits, to uncover possible sources of environmental

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contamination in the community and to assess risk and level of exposure to people, wildlife, and environmental resources. Students use their compiled information to design an action plan to increase awareness, monitor resources or individuals in the community, improve conditions, and ensure a clean and safe environment.

Problem 5: Combating a Public Health Issue

In this problem, students draw on information they have learned in the previous courses about public health, epidemiology, and disease diagnosis to work through one of two epidemiology studies. In each study, students analyze data to define the outbreak, generate a hypothesis by diagnosing the patients' symptoms and identifying the disease pathogen, design and analyze an epidemiological study to test the hypothesis, and outline a plan for initiating control and prevention measures. Students then identify a local, national, or global public health crisis and write a mini-grant proposal, based on the National Institutes of Health grant structure, outlining a plan with intervention strategies. As students work through this problem, they review evidence analysis, review the design process and methodology, and analyze study data to evaluate risk.

Combating a Public Health Issue Lesson Summary

Lesson 5.1	Combating a Public Health Issue

Lesson 5.1

Students play the role of epidemiologists, dedicated medical professionals at the heart of the public health field, as they monitor the health of populations and search for patterns in disease. Students investigate one of two mystery illnesses. They evaluate patient diagnostic test results to identify the mystery illness, assess evidence to deduce the source of the illness, design and analyze an epidemiological study to test the proposed source, and plan control and prevention efforts to limit future cases of the mystery illness. In this problem, students investigate major health issues in their local area, across the United States, and around the globe. They evaluate what types of interventions would address these health issues and begin to identify where they feel a comprehensive public health plan would have the greatest impact. The proposed intervention plan should target an infectious disease, a chronic illness, a specific injury or set of injuries, a mental illness, or any other pressing health concern and focus on the treatment, prevention, research, or education efforts surrounding the chosen health issue. Students present the plan in the form of a grant proposal.

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Problem 6: Molecular Biology in Action (Optional)

In this problem, students complete a multi-step, long-term molecular biology experiment. Students design and work through a protocol to construct and clone recombinant DNA. They perform DNA ligation and bacterial transformation, as well as restriction analysis of the completed plasmid. Alternatively, students work through a more in-depth DNA cloning and sequencing project. This laboratory investigation provides students with the opportunity to isolate plant DNA, perform ligation and bacterial transformation, purify a plasmid, submit DNA for sequencing, and present all work to GenBank, the NIH genetic sequence database, for publication. As students work through either of these projects, they learn new laboratory skills, practice laboratory troubleshooting techniques, and review proper protocol for research notebook documentation.

Molecular Biology in Action Lesson Summary

Lesson 6.1	Molecular Biology in Action

Lesson 6.1

In the previous BMS courses, students investigated and practiced many of the laboratory techniques of biotechnology and molecular biology. In this problem, students have a chance to build upon these skills as they complete one of two long-term projects. Both projects allow students to assemble a recombinant plasmid as they ligate, or link, DNA from two different sources. Students then analyze the results of this ligation through both transformation and restriction analysis. The second project, described in Problem 6.1.3, asks students to take the process one step further. They purify the plasmid, sequence the gene of interest, analyze gene data using bioinformatics databases, and submit final work to GenBank, the NIH genetic sequence database, for publication.

Before beginning either wet lab portion of the problem, students review what they have learned about restriction enzymes. They complete preliminary logic puzzles to explore the process of ligation and demonstrate how digestion with restriction enzymes, and subsequent gel electrophoresis of the digestion results, can identify specific ligation products. As students work through either laboratory project, they learn new skills, practice laboratory troubleshooting techniques, and review proper protocol for research notebook documentation.

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Problem 7: Forensic Autopsy (Optional)

In this problem, students work as medical experts to investigate mysterious death cases. First, as forensic pathologists, students examine a fetal pig using the same protocol as a human autopsy. Second, students draw on information they have learned in the previous courses about human body systems to design a fictional death case. Students showcase the clues left behind in the body and tell the story of how the person died through medical documents, including an autopsy report and medical history forms. Students are finally tasked with solving another group's proposed case.

Forensic Autopsy Lesson Summary

Lesson 7.1	Forensic Autopsy

Lesson 7.1

In this lesson, students assume the role of a forensic pathologist to perform an autopsy on a fetal pig, an animal whose anatomy, both internal and external, is very similar to human anatomy. They examine the fetal pig and note any abnormalities using the same protocol as a human autopsy, including examination of the tissues, organs, systems, and body fluids. Students then create a fictitious death scenario and showcase the clues left behind in the body to tell the story of how the fictional person died through an autopsy report, medical history forms, and other documents of their choosing. Student groups then exchange scenarios and are tasked with solving each other's mysteries.

Problem 8: Independent Project (Optional)

In this problem, students work independently to determine an area of interest in the biomedical sciences and work on a long-term open-ended problem. Students use skills learned in the previous courses as well as the previous problems to help them complete their project. Student work includes completing a literature review, writing and carrying out the methodology for their project, analyzing the results, making adjustments as needed, and finally presenting the results of their work to an adult audience. Students may work with mentors or advisors from a university, hospital, physician's office, or industry partner to help guide them as they complete their work.

Independent Project Lesson Summary

Lesson 8.1	Independent Project

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Lesson 8.1

This lesson provides students the opportunity to complete an independent project of their choice. Students are challenged to apply the skills and knowledge they have learned throughout their biomedical science coursework, especially their time and project management skills. Projects could include a series of experiments to answer a question, planning a community event related to biomedical science, prototyping a medical or healthcare device, drawing blueprints for a new hospital or doctor's office design, or completing an internship.

Each project will result in the creation of a product. The choice of project will determine the product. For example, if a student chooses to do a series of experiments, the product could be a laboratory report or a research poster. A student who completes an internship may make a multimedia presentation of the experience. A community event might be the product of a student who wants to inform people about healthy living habits or about a specific illness. Just as the choice of the project is up to you and the student, so is the choice of the product.

Students will review the mission reflections they wrote for the previous lessons, brainstorm topics, and do background research about a topic they choose. They will use their research to write a formal proposal for their project. These will be submitted to you for approval. You and the student will agree on intermediate milestones and products that will be submitted to you. This will allow you to monitor the student's progress on the project. Upon completion of the project, the student will submit a completed product, a written report, and a portfolio, and will present an oral report to a professional audience.

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Course resumes showcase the technical skills students obtain in each PLTW course. Each resume outlines the computational skills, analytical skills, and knowledge acquired in the course. Course Resumes also detail student experience with tools, software, lab work, and engineering design. The detailed skills listed within course resumes illustrate the immediate, applicable contributions that students can make within a workplace.

Laboratory Skills

- Aseptic technique
- Bacterial plating
- Micropipetting
- Restriction enzyme digestion
- DNA gel electrophoresis
- Multiplex Polymerase Chain Reaction (PCR)
- DNA ligation
- Bacterial transformation
- Restriction analysis of plasmids

Equipment and Software Proficiencies

- Microsoft Office (Excel, Word, PowerPoint)
- Vernier probes and sensors
- Data Acquisition Software (Vernier Logger Pro)
- Microscope
- Thermal cycler

Scientific Experimentation Skills

- Design and conduct reliable scientific experiments
- Analyze and interpret laboratory data
- Statistical analysis of data, including t-tests
- Construct graphs (by hand and using graphing software)
- Interpolate and extrapolate data from a graph
- Draw conclusions based on experimental data
- Thoroughly and clearly communicate results and conclusions both orally and in writing

Professional Skills

- Group collaboration
- Planning and organizing
- Time management
- Problem-solving
- Technical writing
- Verbal and written communication
- Decision-making
- Creative thinking

Course Topics

- Homeostasis
- Biomedical science careers
- Design process
- Emergency room efficiency
- Scientific research
- Design and marketing of a medical innovation
- Literature review
- Environmental health and environmental contamination
- Water quality testing
- Dose-response of chemicals or medications
- Epidemiologic studies
- Grant proposals
- Public health planning and policy
- Construction and cloning of recombinant DNA
- Autopsy and determination of cause of death

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PLTW Standards Connection
Biomedical Innovation

Connections to Standards in Biomedical Science

PLTW curriculum is designed to empower students to thrive in an evolving world. As a part of the design process when developing and updating our curriculum, we focus on connections to a variety of standards. PLTW Biomedical Innovation connects to standards in the following:

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Common Core College and Career Readiness Anchor Standards

Reading

Key Ideas and Details

CCSS.ELA-LITERACY.CCRA.R.1

Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [x] Problem 4
- [x] Problem 5 [ ] Problem 6 [ ] Problem 7 [x] Problem 8

CCSS.ELA-LITERACY.CCRA.R.2

Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [x] Problem 4
- [x] Problem 5 [ ] Problem 6 [ ] Problem 7 [x] Problem 8

CCSS.ELA-LITERACY.CCRA.R.3

Analyze how and why individuals, events, and ideas develop and interact over the course of a text.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [x] Problem 4
- [x] Problem 5 [ ] Problem 6 [x] Problem 7 [x] Problem 8

Craft and Structure

CCSS.ELA-LITERACY.CCRA.R.4

Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

- [x] Problem 1 [x] Problem 2 [ ] Problem 3 [ ] Problem 4
- [ ] Problem 5 [ ] Problem 6 [ ] Problem 7 [ ] Problem 8

CCSS.ELA-LITERACY.CCRA.R.5

Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.

- [x] Problem 1 [x] Problem 2 [ ] Problem 3 [ ] Problem 4
- [ ] Problem 5 [ ] Problem 6 [ ] Problem 7 [ ] Problem 8

CCSS.ELA-LITERACY.CCRA.R.6

Assess how point of view or purpose shapes the content and style of a text.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [ ] Problem 4
- [ ] Problem 5 [ ] Problem 6 [ ] Problem 7 [ ] Problem 8

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Common Core College and Career Readiness Anchor Standards

Integration of knowledge and Ideas

CCSS.ELA-LITERACY.CCRA.R.7

Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.CCRA.R.8

Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.ELA-LITERACY.CCRA.R.9

Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

☑ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.CCRA.R.10

Read and comprehend complex literary and informational texts independently and proficiently.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Writing

Text Types and Purposes

CCSS.ELA-LITERACY.CCRA.W.1

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.ELA-LITERACY.CCRA.W.2

Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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Common Core College and Career Readiness Anchor Standards

CCSS.ELA-LITERACY.CCRA.W.3

Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Production and distribution of Writing

CCSS.ELA-LITERACY.CCRA.W.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.ELA-LITERACY.CCRA.W.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.ELA-LITERACY.CCRA.W.6

Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.CCRA.W.7

Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.CCRA.W.8

Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.ELA-LITERACY.CCRA.W.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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Common Core College and Career Readiness Anchor Standards

Range of Writing

CCSS.ELA-LITERACY.CCRA.W.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

☑ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.CCRA.SL.1

Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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Foundation Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Human Anatomy and Physiology

1.1.1 a

Identify basic levels of organization of the human body
a. Chemical
b. Cellular
c. Tissue
d. Organs
e. Systems
f. Organism

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

Human Anatomy and Physiology - Identify basic structures and describe functions of human body systems.

1.1.2 a

Skeletal

- Structures of the skeletal system
  - Distinguish between axial and appendicular skeletons
  - Describe long bone anatomy
  - Identify joint types and movement
  - Name and classify all bones (206)
- Functions of the skeletal system
  - Structure and support
  - Muscle attachment and movement
  - Mineral storage
  - Hematopoiesis

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

1.1.2 b

Muscular

- Structures of the muscular system
  - Identify types of muscle tissue
  - Identify major muscle groups of neck, shoulder, chest, abdomen, back, arms, and legs
- Functions of the muscular system
  - Body movement
  - Posture
  - Protection

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

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1.1.2 c

Integumentary

- Structures of the integumentary system
  - Identify integumentary components
  - Label the layers of skin
- Functions of the integumentary system
  - Vitamin D production
  - Sensory organ
  - Infection protection
  - Temperature regulation
  - UV light protection

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

1.1.2 d

Cardiovascular

- Structures of the cardiovascular system
  - Identify cardiovascular organs
  - Label the parts of the heart
  - Distinguish blood components
- Functions of the cardiovascular system
  - Blood flow through the heart and body
  - Transports nutrients, waste, antibodies, hormones, and gases
  - Cardiac conduction system

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

1.1.2 e

Lymphatic / Immune

- Structures of the lymphatic system
  - Identify lymphatic organs
- Functions of the lymphatic system
  - Provide protection against disease
  - Movement of lymph fluid

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

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1.1.2 f

Respiratory

- Structures of the respiratory system
  - Identify respiratory organs
- Functions of the respiratory system
  - Gas exchange

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

1.1.2 g

Structures of the nervous system

- Identify organs of the nervous system
- Identify structures of the special sense organs

- Functions of the nervous system
  - Sensation
  - Movement
  - Processing

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

1.1.2 h

Endocrine

- Structures of the endocrine system
  - Identify endocrine glands
- Functions of the endocrine system
  - Production of hormones
  - Regulation of body processes
  - Controls metabolism
  - Regulates growth, development, and maturation

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

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1.1.2 i

Digestive

- Structures of the digestive system
  - Identify digestive organs in sequence
  - Differentiate between alimentary and accessory organs
- Functions of the digestive system
  - Chemical and mechanical digestion
  - Absorption of nutrients
  - Excretion of waste

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

1.1.2 j

Urinary

- Structures of the urinary system
  - Identify urinary organs
  - Identify gross and microscopic anatomy of the kidney
- Functions of the urinary system
  - Process of urine formation
  - Urine composition
  - Homeostatic balance

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

1.1.2 k

Reproductive

- Structures of the reproductive system
  - Identify female reproductive organs
  - Identify male reproductive organs
- Functions of the reproductive system
  - Formation of gametes
  - Production of hormones

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

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National Consortium for Health Science Education

Diseases and Disorders

1.2.2

Describe biomedical therapies as they relate to the prevention, pathology, and treatment of disease.

- Gene testing
- Gene therapy
- Cloning
- Stem cell research

☐ Problem 1 ☐ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

Medical Mathematics - Demonstrate competency using basic math skills and mathematical conversions as they relate to healthcare.

1.3.1

Metric system

- Kilo-
- Centi-
- Deci-
- Milli-
- Micro-

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

1.3.1 b

Mathematical

- Average
- Ratios
- Fractions
- Percentages
- Addition / Subtraction
- Multiplication / Division

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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1.3.1 c

Conversions

- Height (inches/meters)
- Weight/mass (pounds/grams)
- Length (inches/meters)
- Volume (ml/cc)
- Temperature (F/C)
- Household measurements (Tbsp/tsp/cup/oz)

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Medical Mathematics

1.3.2

Demonstrate the ability to analyze diagrams, charts, graphs, and tables to interpret healthcare results.

☑ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☑ Problem 7 ☑ Problem 8

Foundation Standard 2: Communications Demonstrate methods of delivering and obtaining information, while communicating effectively.

Concepts of Effective Communication

2.1.1

Model verbal and nonverbal therapeutic communication.

- Active listening
- Silence
- Summarizing
- Reflecting

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Concepts of Effective Communication

2.1.3

Distinguish between subjective and objective information.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

2.1.5

Modify communication to meet the needs of the patient/client and be appropriate to the situation.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

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Written Communication Skills

2.3.1

Use proper elements of written and electronic communication (spelling, grammar, and formatting).

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

2.3.2

Prepare examples of technical and informative writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Foundation Standard 4: Employability Skills Use employability skills to enhance employment opportunities and job satisfaction.

Employability Skills

4.2.1

Apply employability skills in healthcare.
- Chain of command
- Communication Skills
- Decision making
- Flexible
- Organization
- Problem Solving
- Scope of practice
- Time Management
- Work Ethic

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Employability Preparation

4.4.1

Develop components of a personal portfolio.
- Letter of introduction
- Resume
- Sample Projects
- Writing Sample
- Work-based Learning Documentation
- Oral Report
- Community Service / Service Learning
- Credentials
- Technology Skills
- Leadership Examples

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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Foundation Standard 7: Safety Practices Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Infection Control - Explain principles of infection transmission.

7.1.1 a

Identify classifications of pathogens
• Bacteria
• Fungi
• Parasites
• Protozoa
• Viruses

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

7.1.1 b

Describe characteristics of microorganisms
• Aerobic
• Anaerobic
• Non-pathogenic
• Pathogenic

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

7.1.1 c

Recognize chain of infection

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

7.1.1 d

Describe mode of transmission
• Common vehicle (air, food, water)
• Direct
• Healthcare-associated infections (nosocomial)
• Indirect
• Opportunistic
• Vectors

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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National Consortium for Health Science Education

Infection Control - Differentiate methods of controlling the spread and growth of pathogens.

7.1.2 a

Asepsis
• Sanitization
• Antisepsis
• Disinfection
• Sterile technique
• Sterilization

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

7.1.2 b

Standard precautions
• Handwashing
• Gloving
• Personal Protective Equipment (PPE)
• Environmental cleaning

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

7.1.2 c

Isolation precautions
• Transmission-based contact

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

7.1.2 d

Bloodborne pathogen precautions

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

7.1.2 e

Vaccinations

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

Personal Safety

7.2.1

Apply personal safety procedures based on Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

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7.2.2

Demonstrate principles of body mechanics during patient care.
• Ambulating
• Lifting
• Positioning

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

7.2.3

Demonstrate and apply the use of personal protective equipment (PPE).

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

7.3.1

Apply safety techniques in the work environment.
• Ergonomics
• Safe operation of equipment
• Patient/client/employee safety measures

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

Common Safety Hazards

7.4.1

Observe all safety standards related to the occupational exposure to hazardous chemicals standard (safety data sheets [SDS]).

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

7.4.2

Comply with safety signs, symbols, and labels.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

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Foundation Standard 8: Teamwork Identify roles and responsibilities of individual members as part of the healthcare team.

Healthcare Teams

8.1.2

Identify characteristics of effective teams.
• Defined roles
• Common purpose
• Effective communication
• Effective leadership
• Measurable processes and outcomes
• Mutual respect
• Shared goals

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Team Member Participation

8.2.1

Recognize methods for building positive team relationships.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Team Member Participation - Analyze attributes and attitudes of an effective leader.

8.2.2 a

Characteristics
• Focused and driven
• Interpersonal skills
• Motivates and inspires
• Organized and balanced

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

8.2.2 b

Types
• Autocratic
• Democratic
• Laissez faire

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

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8.2.2 c

Roles
• Communicates vision
• Leads change
• Manages accountability

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Team Member Participation

8.2.3

Apply effective techniques for managing team conflict.
• Communicate assertively
• Set clear expectations
• Gather the facts
• Mediate disputes
• Negotiate resolutions

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Foundation Standard 9: Health Maintenance Practices
Differentiate between wellness and disease. Promote disease prevention and model healthy behaviors.

Healthy Behaviors

9.1.1

Promote behaviors of health and wellness.
• Exercise
• Nutrition
• Relationships
• Sleep habits
• Stress management
• Weight control

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

9.1.3

Describe strategies for prevention of disease.
• Community health education outreach programs
• Immunizations
• Medical, dental, and mental health screenings
• Routine physical exams
• Stress management

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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Foundation Standard 10: Technical Skills
Apply and demonstrate technical skills and knowledge common to health career specialties.

Technical Skills

10.1.1

Demonstrate procedures for measuring and recording vital signs including the normal ranges.
• Blood pressure
• Temperature
• Oxygen saturation
• Pain
• Pulse
• Respirations

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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Common Core State Standards for Mathematics

Interpreting Functions

Analyze Functions Using Different Representations

CCSS.MATH.CONTENT.HSF.IF.C.7

Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.MATH.CONTENT.HSF.IF.C.7.A

Graph linear and quadratic functions and show intercepts, maxima, and minima.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.MATH.CONTENT.HSF.IF.C.7.B

Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.MATH.CONTENT.HSF.IF.C.8

Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.MATH.CONTENT.HSF.IF.C.8.A

Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.MATH.CONTENT.HSF.IF.C.9

Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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Common Core State Standards for Mathematics

Building Functions

Build a Function That Models a Relationship Between Two Quantities

CCSS.MATH.CONTENT.HSF.BF.A.1

Write a function that describes a relationship between two quantities.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Linear, Quadratic, and Exponential Models

Construct and Compare Linear, Quadratic, and Exponential Models and Solve Problems

CCSS.MATH.CONTENT.HSF.LE.A.2

Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Expressing Geometric Properties with Equations

Use Coordinates to Prove Simple Geometric Theorems Algebraically

CCSS.MATH.CONTENT.HSG.GPE.B.6

Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Modeling with Geometry

Apply Geometric Concepts in Modeling Situations

CCSS.MATH.CONTENT.HSG.MG.A.3

Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Interpreting Categorical and Quantitative Data

Summarize, Represent, and Interpret Data on a Single Count or Measurement Variable

CCSS.MATH.CONTENT.HSS.ID.A.1

Represent data with plots on the real number line (dot plots, histograms, and box plots).

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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Common Core State Standards for Mathematics

CCSS.MATH.CONTENT.HSS.ID.A.2

Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.MATH.CONTENT.HSS.ID.A.4

Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.

☑ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

Interpret Linear Models

CCSS.MATH.CONTENT.HSS.ID.C.8

Compute (using technology) and interpret the correlation coefficient of a linear fit.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.MATH.CONTENT.HSS.ID.C.9

Distinguish between correlation and causation.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

Making Inferences and Justifying Conclusions

Make inferences and Justify Conclusions From Sample Surveys, Experiments, and Observational Studies

CCSS.MATH.CONTENT.HSS.IC.B.3

Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.MATH.CONTENT.HSS.IC.B.6

Evaluate reports based on data.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

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Using Probability to Make Decisions

Use Probability to Evaluate Outcomes of Decisions

CCSS.MATH.CONTENT.HSS.MD.B.7

(+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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Common Core State Standards for English Language Arts

Reading Literature

Key Ideas and Details

CCSS.ELA-LITERACY.RL.9-10.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RL.9-10.2

Determine a theme or central idea of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Writing

Text Types and Purpose

CCSS.ELA-LITERACY.W.9-10.1

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.1.A

Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among claim(s), counterclaims, reasons, and evidence.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.1.B

Develop claim(s) and counterclaims fairly, supplying evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level and concerns.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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CCSS.ELA-LITERACY.W.9-10.1.E

Provide a concluding statement or section that follows from and supports the argument presented.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.2.A

Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.2.B

Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.2.C

Use appropriate and varied transitions to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.2.D

Use precise language and domain-specific vocabulary to manage the complexity of the topic.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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CCSS.ELA-LITERACY.W.9-10.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Production and Distribution of Writing

CCSS.ELA-LITERACY.W.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.W.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☐ Problem 1 ☐ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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CCSS.ELA-LITERACY.W.9-10.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Range of Writing

CCSS.ELA-LITERACY.W.9-10.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.9-10.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.L.9-10.1.B

Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to convey specific meanings and add variety and interest to writing or presentations.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.L.9-10.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.L.9-10.2.C

Spell correctly.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

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Knowledge of Language

CCSS.ELA-LITERACY.L.9-10.3

Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.L.9-10.3.A

Write and edit work so that it conforms to the guidelines in a style manual (e.g., MLA Handbook, Turabian's Manual for Writers) appropriate for the discipline and writing type.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.9-10.4.A

Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.L.9-10.4.D

Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Reading History/Social Studies

Key Ideas and Details

CCSS.ELA-LITERACY.RH.9-10.1

Cite specific textual evidence to support analysis of primary and secondary sources, attending to such features as the date and origin of the information.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RH.9-10.2

Determine the central ideas or information of a primary or secondary source; provide an accurate summary of how key events or ideas develop over the course of the text.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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Common Core State Standards for English Language Arts

Craft and Structure

CCSS.ELA-LITERACY.RH.9-10.4

Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, or economic aspects of history/social science.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RH.9-10.7

Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RH.9-10.9

Compare and contrast treatments of the same topic in several primary and secondary sources.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Reading Science and Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.9-10.1

Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RST.9-10.2

Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RST.9-10.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

☐ Problem 1 ☐ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☑ Problem 7 ☐ Problem 8

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Common Core State Standards for English Language Arts

Craft and Structure

CCSS.ELA-LITERACY.RST.9-10.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.ELA-LITERACY.RST.9-10.5

Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RST.9-10.6

Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RST.9-10.7

Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.ELA-LITERACY.RST.9-10.8

Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RST.9-10.9

Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

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Common Core State Standards for English Language Arts

Writing History/Social Studies, Science, and Technical

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.9-10.1

Write arguments focused on discipline-specific content.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.1.A

Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.1.B

Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.1.C

Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.1.E

Provide a concluding statement or section that follows from or supports the argument presented.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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CCSS.ELA-LITERACY.WHST.9-10.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.2.A

Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.2.B

Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.2.C

Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.2.D

Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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Production and Distribution of Writing

CCSS.ELA-LITERACY.WHST.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.WHST.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.9

Draw evidence from informational texts to support analysis, reflection, and research.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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CCSS.ELA-LITERACY.WHST.9-10.10

Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Reading Informational Text

Key Ideas and Details

CCSS.ELA-LITERACY.RI.11-12.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.11-12.7

Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Writing

Text Types and Purpose

CCSS.ELA-LITERACY.W.11-12.1

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.11-12.1.A

Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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CCSS.ELA-LITERACY.W.11-12.1.B

Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.11-12.1.C

Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.11-12.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.11-12.1.E

Provide a concluding statement or section that follows from and supports the argument presented.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.11-12.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.11-12.2.A

Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

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CCSS.ELA-LITERACY.W.11-12.2.B

Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.11-12.2.C

Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.11-12.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.11-12.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.L.11-12.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.L.11-12.2.B

Spell correctly.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

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Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.11-12.6

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Reading History/Social Studies

Key Ideas and Details

CCSS.ELA-LITERACY.RH.11-12.1

Cite specific textual evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RH.11-12.2

Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RH.11-12.7

Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RH.11-12.8

Evaluate an author’s premises, claims, and evidence by corroborating or challenging them with other information.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RH.11-12.9

Integrate information from diverse sources, both primary and secondary, into a coherent understanding of an idea or event, noting discrepancies among sources.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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Reading Science and Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.11-12.1

Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [x] Problem 4
- [x] Problem 5 [ ] Problem 6 [ ] Problem 7 [x] Problem 8

CCSS.ELA-LITERACY.RST.11-12.2

Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [x] Problem 4
- [x] Problem 5 [ ] Problem 6 [ ] Problem 7 [x] Problem 8

CCSS.ELA-LITERACY.RST.11-12.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [x] Problem 4
- [x] Problem 5 [x] Problem 6 [x] Problem 7 [x] Problem 8

Craft and Structure

CCSS.ELA-LITERACY.RST.11-12.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

- [ ] Problem 1 [x] Problem 2 [x] Problem 3 [ ] Problem 4
- [ ] Problem 5 [x] Problem 6 [ ] Problem 7 [x] Problem 8

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RST.11-12.7

Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [x] Problem 4
- [x] Problem 5 [ ] Problem 6 [ ] Problem 7 [x] Problem 8

CCSS.ELA-LITERACY.RST.11-12.8

Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [x] Problem 4
- [x] Problem 5 [x] Problem 6 [x] Problem 7 [x] Problem 8

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CCSS.ELA-LITERACY.RST.11-12.9

Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RST.11-12.10

By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Writing History/Social Studies, Science, and Technical

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.11-12.1

Write arguments focused on discipline-specific content.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.1.A

Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.1.B

Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.1.C

Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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CCSS.ELA-LITERACY.WHST.11-12.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.1.E

Provide a concluding statement or section that follows from or supports the argument presented.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.2.A

Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.2.B

Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.2.C

Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.2.E

Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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Production and Distribution of Writing

CCSS.ELA-LITERACY.WHST.11-12.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.WHST.11-12.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.9

Draw evidence from informational texts to support analysis, reflection, and research.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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Range of Writing

CCSS.ELA-LITERACY.WHST.11-12.10

Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

- [x] Problem 1
- [x] Problem 2
- [x] Problem 3
- [x] Problem 4
- [x] Problem 5
- [ ] Problem 6
- [ ] Problem 7
- [x] Problem 8

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Next Generation Science Standards

Ecosystems: Interactions, Energy, and Dynamics

HS.LS2.7

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Biological Evolution: Unity and Diversity

HS.LS4.6

Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Earth and Human Activity

HS.ESS3.1

Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

HS.ESS3.4

Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Engineering Design

HS.ETS1.1

Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

HS.ETS1.2

Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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Next Generation Science Standards

HS.ETS1.3

Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Disciplinary core ideas

ETS1.A Engineering Design - Defining and Delimiting Engineering Problems

• Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. (secondary to HS-PS2-3)

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

• Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities. (HS-ETS1-1)

☐ Problem 1 ☐ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

ETS1.B Engineering Design - Developing Possible Solutions

• When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (HS-ETS1-3)

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

• Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed. (secondary to HS-PS1-6)

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

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Next Generation Science Standards

LS2.A Ecosystems: Interactions, Energy, and Dynamics - Interdependent Relationships in Ecosystems

• Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. (HS-LS2-1), (HSLS2-2)

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

LS3.B Heredity: Inheritance and Variation of Traits - Variation of Traits

• Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. (HS-LS3-2), (HS-LS3-3)

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

LS4.C Biological Evolution: Unity and Diversity - Adaptation

• Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline–and sometimes the extinction–of some species. (HS-LS4-5), (HS-LS4-6)

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

ESS2.D Earth's Systems - Weather and Climate

• Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere. (secondary to HSESS3-6)

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Science and Engineering Practice

Practice 1 - Asking questions and defining problems in 9-12 builds on K-8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.

• Evaluate a question to determine if it is testable and relevant.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

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• Ask questions that can be investigated within the scope of the school laboratory, research facilities, or field (e.g., outdoor environment) with available resources and, when appropriate, frame a hypothesis based on a model or theory.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

• Ask and/or evaluate questions that challenge the premise(s) of an argument, the interpretation of a data set, or the suitability of a design.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

• Define a design problem that involves the development of a process or system with interacting components and criteria and constraints that may include social, technical, and/or environmental considerations.

☑ Problem 1 ☐ Problem 2 ☑ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Practice 2 Developing and Using Models
Modeling in 9-12 builds on K-8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.

• Evaluate merits and limitations of two different models of the same proposed tool, process, mechanism or system in order to select or revise a model that best fits the evidence or design criteria.

☑ Problem 1 ☐ Problem 2 ☑ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

• Design a test of a model to ascertain its reliability.

☑ Problem 1 ☐ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

• Develop, revise, and/or use a model based on evidence to illustrate and/or predict the relationships between systems or between components of a system.

☑ Problem 1 ☐ Problem 2 ☑ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

• Develop and/or use multiple types of models to provide mechanistic accounts and/or predict phenomena, and move flexibly between model types based on merits and limitations.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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- Develop a complex model that allows for manipulation and testing of a proposed process or system.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

- Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

Practice 3 Planning and Carrying Out Investigations
Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.

- Plan an investigation or test a design individually and collaboratively to produce data to serve as the basis for evidence as part of building and revising models, supporting explanations for phenomena, or testing solutions to problems. Consider possible confounding variables or effects and evaluate the investigation's design to ensure variables are controlled.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

- Plan and conduct an investigation or test a design solution in a safe and ethical manner including considerations of environmental, social, and personal impacts.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Select appropriate tools to collect, record, analyze, and evaluate data. Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

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Practice 4 Analyzing and Interpreting Data
Analyzing data in 9-12 builds on K-8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.

- Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

- Consider limitations of data analysis (e.g., measurement error, sample selection) when analyzing and interpreting data.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Compare and contrast various types of data sets (e.g., self-generated, archival) to examine consistency of measurements and observations.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Evaluate the impact of new data on a working explanation and/or model of a proposed process or system.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

- Analyze data to identify design features or characteristics of the components of a proposed process or system to optimize it relative to criteria for success.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

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Practice 5 Using Mathematics and Computational Thinking
Mathematical and computational thinking in 9- 12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.

- Use mathematical, computational, and/or algorithmic representations of phenomena or design solutions to describe and/or support claims and/or explanations.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Practice 6 Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 9-12 builds on K-8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.

- Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Apply scientific ideas, principles, and/or evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

- Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Practice 7 Engaging in Argument from Evidence

- Compare and evaluate competing arguments or design solutions in light of currently accepted explanations, new evidence, limitations (e.g., trade-offs), constraints, and ethical issues.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

- Evaluate the claims, evidence, and/or reasoning behind currently accepted explanations or solutions to determine the merits of arguments.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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• Respectfully provide and/or receive critiques on scientific arguments by probing reasoning and evidence, challenging ideas and conclusions, responding thoughtfully to diverse perspectives, and determining additional information required to resolve contradictions.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

• Construct, use, and/or present an oral and written argument or counterarguments based on data and evidence.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

• Make and defend a claim based on evidence about the natural world or the effectiveness of a design solution that reflects scientific knowledge and student-generated evidence.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

• Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and/or logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations).

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Practice 8 Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in 9-12 builds on K-8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.

• Critically read scientific literature adapted for classroom use to determine the central ideas or conclusions and/or to obtain scientific and/or technical information to summarize complex evidence, concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

• Compare, integrate and evaluate sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a scientific question or solve a problem.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

• Gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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- Evaluate the validity and reliability of and/or synthesize multiple claims, methods, and/or designs that appear in scientific and technical texts or media reports, verifying the data when possible. Communicate scientific and/or technical information or ideas (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (i.e., orally, graphically, textually, mathematically).

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4
☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Crosscutting Concepts

Patterns

- Patterns of performance of designed systems can be analyzed and interpreted to reengineer and improve the system.

☑ Problem 1 ☐ Problem 2 ☑ Problem 3 ☑ Problem 4
☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

- Mathematical representations are needed to identify some patterns.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4
☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Empirical evidence is needed to identify patterns.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4
☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

Cause and Effect: Mechanism and Prediction

- Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4
☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4
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- Systems can be designed to cause a desired effect.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

- Changes in systems may have various causes that may not have equal effects.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Scale, Proportion, and Quantity

- In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

- The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

- Patterns observable at one scale may not be observable or exist at other scales.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

- Using the concept of orders of magnitude allows one to understand how a model at one scale relates to a model at another scale.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

- Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth).

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Systems and System Models

- A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

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- Systems can be designed to do specific tasks.
  - ☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4
  - ☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

- When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models.
  - ☑ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4
  - ☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.
  - ☑ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4
  - ☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Models can be used to predict the behavior of a system, but these predictions have limited precision and reliability due to the assumptions and approximations inherent in models.
  - ☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4
  - ☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Structure and Function

- The way an object is shaped or structured determines many of its properties and functions.
  - ☑ Problem 1 ☐ Problem 2 ☑ Problem 3 ☐ Problem 4
  - ☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.
  - ☑ Problem 1 ☐ Problem 2 ☑ Problem 3 ☐ Problem 4
  - ☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Stability and Change

- For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.
  - ☑ Problem 1 ☐ Problem 2 ☑ Problem 3 ☐ Problem 4
  - ☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Much of science deals with constructing explanations of how things change and how they remain stable.
  - ☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4
  - ☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

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- Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible.
  - ☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
  - ☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8
- Systems can be designed for greater or lesser stability.
  - ☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
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INCLUDES

- Course framework
- Sample exam questions
- Scoring guidelines

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Thousands of Advanced Placement teachers have contributed to the principles articulated here. These principles are not new; they are, rather, a reminder of how AP already works in classrooms nationwide. The following principles are designed to ensure that teachers' expertise is respected, required course content is understood, and that students are academically challenged and free to make up their own minds.

1. AP stands for clarity and transparency. Teachers and students deserve clear expectations. The Advanced Placement Program makes public its course frameworks and sample assessments. Confusion about what is permitted in the classroom disrupts teachers and students as they navigate demanding work.
2. AP is an unflinching encounter with evidence. AP courses enable students to develop as independent thinkers and to draw their own conclusions. Evidence and the scientific method are the starting place for conversations in AP courses.
3. AP opposes censorship. AP is animated by a deep respect for the intellectual freedom of teachers and students alike. If a school bans required topics from their AP courses, the AP Program removes the AP designation from that course and its inclusion in the AP Course Ledger provided to colleges and universities. For example, the concepts of evolution are at the heart of college biology, and a course that neglects such concepts does not pass muster as AP Biology.
4. AP opposes indoctrination. AP students are expected to analyze different perspectives from their own, and no points on the AP Exam are awarded for agreement with any specific viewpoint. AP students are not required to feel certain ways about themselves or the course content. AP courses instead develop students' abilities to assess the credibility of sources, draw conclusions, and make up their own minds.

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6. Every AP student who engages with evidence is listened to and respected. Students are encouraged to evaluate arguments but not one another. AP classrooms respect diversity in backgrounds, experiences, and viewpoints. The perspectives and contributions of the full range of AP students are sought and considered. Respectful debate of ideas is cultivated and protected; personal attacks have no place in AP.
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Development Committee

Bobbie Bastian, *FutureForward at Bollman, Thornton, CO*

Dane Brown, *United States Naval Academy, Annapolis, MD*

Joshua Brunty, *Marshall University, Huntington, WV*

Victoria Ferrell, *Forsyth Technical Community College, Winston-Salem, NC*

Donavon Lockett, *Canyon Springs High School, Clark County School District, North Las Vegas, NV*

Connar McCasland, *University of West Florida, Pensacola, FL*

Jessica Tickle, *Shawnee Mission School District Center for Academic Achievement, Shawnee Mission, KS*

Higher Education Advisory Committee

Dane Brown, *United States Naval Academy, Annapolis, MD*

Jun Dai, *Worcester Polytechnic Institute, Worcester, MA*

Melissa Dark, *DARK Enterprises, Inc., Lafayette, IN*

Chance Folmar, *Front Range Community College, Westminster, CO*

Tommy Gober, *Emporia State University, Emporia, KS*

Angel Hueca, *Carnegie Mellon University, Pittsburgh, PA*

Terri Johnson Akse, *University of Colorado–Colorado Springs, Colorado Springs, CO*

Kyle Jones, *Sinclair Community College, Dayton, OH*

Bekah Michael, *University of Cincinnati, Cincinnati, OH*

Michael Qaissaunee, *Brookdale Community College, Lincroft, NJ*

Diego Tibaquirá, *Miami Dade College, Miami, FL*

Anthony Tsetse, *Northern Kentucky University, Highland Heights, KY*

Industry Advisory Committee

Charles Banks, *VP & Manager of Information Security Services, U.S. Bank, Cincinnati, OH*

Charles Gardner, *EnterpriseKC, Leawood, KS*

Carol Kim, *Director of Technology, Data & AI, IBM, Armonk, NY*

Dr. Cynthia Sutherland, *CISSP Chief Information Security Officer (Former) Joint Chiefs of Staff*

High School Advisory Committee

Beth Cerrone, *Innovation Center, St. Vrain Valley School District, Longmont, CO*

Naomi Chamblee, *Shelby County Area Technology Center, Shelbyville, KY*

Jeremiah Milonas, *Red Bank Regional School District, Little Silver, NJ*

Kristi Rice, *Spotsylvania High School, Spotsylvania, VA*

Jennifer Schmerber, *Taft High School, San Antonio, TX*

Expert Consultants

Devin Canaday, *The STEMpreneur, LLC, Chester, VA*

Angel Piñeiro, *Jr., ATCA Services, New York, NY*

Thomas Walcott, *Gambrills, MD*

John R. Williamson, *Eastern Kentucky University, Richmond, KY*

College Board Staff

Joe MacAdam, *Director, AP Cybersecurity Curriculum & Assessment*

Valerie Evans, *Director, AP Cybersecurity Curriculum & Assessment*

Ben Dougherty, *Senior Director, Manager, AP Computer Science and Cyber Curriculum & Assessment*

Simon Glick, *Director, Content Development & Editorial, Career Kickstart*

Alesha Fox, *Executive Director, AP Instructional Services*

Ellen Gluck, *Senior Director, Career Kickstart Product Readiness*

Chad Hoge, *Senior Director, Course Product Manager*

Daniel McDonough, *Senior Director, AP Content & Assessment Publications*

Shawn Harris, *Director, AP Career Kickstart Professional Learning*

Jason VanBilliard, *Executive Director, Assessment Innovation & Department Head, AP Math, Computer Science, and Cyber Curriculum & Assessment*

Allison Thurber, *Vice President, AP Curriculum & Assessment*

Andy Tucker, *Senior Director, AP Access*

Abby Whitbeck, *Vice President, AP Program Strategy*

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About AP

The Advanced Placement® Program (AP®) enables willing and academically prepared students to pursue college-level studies—with the opportunity to earn college credit, advanced placement, or both—while still in high school. Through AP courses in more than 40 subjects, each culminating in a challenging exam, students learn to think critically, construct solid arguments, and see many sides of an issue—skills that prepare them for college and beyond. Taking AP courses demonstrates to college admission officers that students have sought the most challenging curriculum available to them, and research indicates that students who score a 3 or higher on an AP Exam typically experience greater academic success in college and are more likely to earn a college degree than non-AP students. Each AP teacher's syllabus is evaluated and approved by faculty from some of the nation's leading colleges and universities, and AP Exams are developed and scored by college faculty and experienced AP teachers. Most four-year colleges and universities in the United States grant credit, advanced placement, or both on the basis of successful AP Exam scores—more than 3,300 institutions worldwide annually receive AP scores.

AP Course Development

In an ongoing effort to maintain alignment with best practices in college-level learning, AP courses and exams emphasize challenging, research-based curricula aligned with higher education expectations.

Individual teachers are responsible for designing their own curriculum for AP courses, selecting appropriate college-level readings, assignments, and resources. This course and exam description presents the content and skills that are the focus of the corresponding college course and that appear on the AP Exam. It also organizes the content and skills into a series of units that represent a sequence found in widely adopted college textbooks and that many AP teachers have told us they follow in order to focus their instruction. The intention of this publication is to respect teachers' time and expertise by providing a roadmap that they can modify and adapt to their local priorities and preferences.

Enrolling Students: Access, Opportunity, and Readiness

The AP Program welcomes all students willing to challenge themselves with college-level coursework and career preparation. We strongly encourage educators to invite students into AP classes, including students from ethnic, racial, socioeconomic, geographic, or other groups not broadly participating in a school's AP program. We believe that readiness for AP is attainable, and that educators can expand readiness by opening access to Pre-AP course work. We commit to support educators and communities in their efforts to make AP courses widely available, advancing students in their plans for college and careers.

Offering AP Courses: The AP Course Audit

The AP Program unequivocally supports the principle that each school implements its own curriculum that will enable students to develop the content understandings and skills described in the course framework.

While the unit sequence represented in this publication is optional, the AP Program does have a short list of curricular and resource requirements that must be fulfilled before a school can label a course "Advanced Placement" or "AP." Schools wishing to offer AP courses must participate in the AP Course Audit, a process through which AP teachers' course materials are reviewed by college faculty. The AP Course Audit was created to provide teachers and administrators with clear guidelines on curricular and resource requirements for AP courses and to help colleges and universities validate courses marked "AP" on students' transcripts. This process ensures that AP teachers' courses meet or exceed the curricular and resource expectations that college and secondary school faculty have established for college-level courses.

The AP Course Audit form is submitted by the AP teacher and the school principal (or designated administrator) to confirm awareness and understanding of the curricular and resource requirements. A syllabus or course outline, detailing how course requirements are met, is submitted by the AP teacher for review by college faculty.

Please visit the **AP Course Audit** website for more information to support the preparation and submission of materials for the AP Course Audit.

How the AP Program Is Developed

The scope of content for an AP course and exam is derived from an analysis of hundreds of syllabi and course offerings of colleges and universities. Using this research and data, a committee of college faculty and expert AP teachers work within the scope of the corresponding college course to articulate what students should know and be able to do upon the completion of the AP course. The resulting course framework is the heart of this course and exam description and serves as a blueprint of the content and skills that can appear on an AP Exam.

The AP Test Development Committees are responsible for developing each AP Exam, ensuring the exam questions are aligned to the course framework. The AP Exam development process is a multiyear endeavor; all AP Exams undergo extensive review, revision, piloting, and analysis to ensure that questions are accurate, fair, and valid, and that there is an appropriate spread of difficulty across the questions.

Committee members are selected to represent a variety of perspectives and institutions (public and private, small and large schools and colleges), and a range of gender, racial/ethnic, and regional groups. A list of contributors for each subject is available on **AP Central®**.

Throughout AP course and exam development, College Board gathers feedback from various stakeholders in both secondary schools and higher education institutions. This feedback is carefully considered to ensure that AP courses and exams are able to provide students with a college-level learning experience and the opportunity to demonstrate their qualifications for advanced placement and/or college credit.

How AP Exams Are Scored

The exam scoring process, like the course and exam development process, relies on the expertise of both AP teachers and college faculty. While multiple-choice questions are scored by machine, the free-response questions and through-course performance assessments, as applicable, are scored by thousands of college faculty and expert AP teachers. Most are scored at the annual AP Reading, while a small portion is scored online. All AP Readers are thoroughly trained, and their work is monitored throughout the Reading for fairness and consistency. In each subject, a highly respected college faculty

member serves as Chief Faculty Consultant and, with the help of AP Readers in leadership positions, maintains the accuracy of the scoring standards. Scores on the free-response questions and performance assessments are weighted and combined with the results of the computer-scored multiple-choice questions, and this raw score is converted into a composite AP score on a 1–5 scale.

AP Exams are **not** norm referenced or graded on a curve. Instead, they are criterion-referenced, which means that every student who meets the criteria for an AP score of 2, 3, 4, or 5 will receive that score, no matter how many students that is. The criteria for the number of points a student must earn on the AP Exam to receive scores of 3, 4, or 5—the scores that research consistently validates for credit and placement purposes—include:

- The number of points successful college students earn when their professors administer AP Exam questions to them.
- Performance that researchers have found to be predictive of an AP student succeeding when placed into a subsequent higher-level college course.
- The number of points college faculty indicate, after reviewing each AP question, that they expect is necessary to achieve each AP grade level.

Using and Interpreting AP Scores

The extensive work done by college faculty and AP teachers in the development of the course and exam and throughout the scoring process ensures that AP Exam scores accurately represent students' achievement in the equivalent college course. Frequent and regular research studies establish the validity of AP scores as follows:

AP Score	Credit Recommendation	College Grade Equivalent
5	Extremely well qualified	A
4	Well qualified	A-, B+, B
3	Qualified	B-, C+, C
2	Possibly qualified	n/a
1	No recommendation	n/a

While colleges and universities are responsible for setting their own credit and placement policies, most private colleges and universities award credit and/or advanced placement for AP scores of 3 or higher. Additionally, most states in the U.S. have adopted statewide credit policies that ensure college credit for scores of 3 or higher at public colleges and universities. To confirm a specific college's AP credit/ placement policy, use the search engine available on the **AP Credit Policy Search** page.

BECOMING AN AP READER

Each June, thousands of AP teachers and college faculty members from around the world gather for seven days in multiple locations to evaluate and score the free-response sections of the AP Exams. Ninety-eight percent of surveyed educators who took part in the AP Reading say it was a positive experience.

There are many reasons to consider becoming an AP Reader, including opportunities to:

- **Bring positive changes to the classroom:** Surveys show that the vast majority of returning AP Readers—both high school and college educators—

make improvements to the way they teach or score because of their experience at the AP Reading.

- **Gain in-depth understanding of AP Exam and AP scoring standards:** AP Readers gain exposure to the quality and depth of the responses from the entire pool of AP Exam takers and thus are better able to assess their students' work in the classroom.
- **Receive compensation:** AP Readers are compensated for their work during the Reading. Expenses, lodging, and meals are covered for Readers who travel.
- **Score from home:** AP Readers have online distributed scoring opportunities for certain subjects. Check the **AP Reader** site for details.
- **Earn Continuing Education Units (CEUs):** AP Readers earn professional development hours and CEUs that can be applied to PD requirements by states, districts, and schools.

HOW TO APPLY

Visit the **Become an AP Reader** site for eligibility requirements and to start the application process.

About AP Career Kickstart

AP Career Kickstart courses provide high schools a new set of AP offerings that prepare students for high-skill, high-growth careers through:

- Instruction in both technical and professional skills
- Emphasis on hands-on learning grounded in authentic scenarios
- Alignment to career and technical education (CTE) and industry standards
- Opportunity to earn an employer-endorsed credential upon achieving a qualifying exam score

Students often recognize the benefits of career exploration while they are still in high school, but many lack access to quality career-focused programs that lead to in-demand jobs. With a proven record of delivering high-quality educational opportunities at scale, the Advanced Placement Program is building AP Career Kickstart courses to ensure nationwide access to outstanding career education that today is only available in some communities.

How AP Career Kickstart Courses Are Developed

Every AP course is designed—and regularly updated—to include current data, evidence, and findings in each discipline. AP courses include the content and skills most frequently taught in introductory college courses, so that students who earn qualifying scores on AP Exams can be placed into upper-division college courses with a strong foundation for success.

AP Career Kickstart courses are built in partnership with industry advisors, higher education faculty, high school educators, and career and technical education (CTE) leaders. These advisors are engaged to evaluate research; recommend course skills, scope, and sequence; and review the course framework and the AP Exam.

Credit and Placement

The AP Program engages faculty from colleges and universities to ensure that AP Career Kickstart courses reflect the academic rigor of introductory college courses in the discipline. Students with qualifying AP Exam scores can earn credit or placement in required or elective courses at colleges and universities.

Credentials and Industry Recognition

The AP Program partners with industry leaders to ensure the course skills align with employer demand for core requirements in high-growth, high-demand jobs. Along with the potential to earn college credit, students with qualifying scores on the AP Exam will earn the AP Career Kickstart Employer-Endorsed Credential. Created in partnership with industry experts, AP Career Kickstart Credentials accelerate students' progress toward in-demand careers and align with the needs of employers, college-level coursework, and secondary CTE programs.

Students can leverage AP Career Kickstart Credentials in their efforts to further their postgraduation plans.

- For students who are considering moving directly to employment after graduation, AP Career Kickstart Credentials can support their applications to internships, apprenticeships, and part- and full-time employment.
- For students who plan to go on to higher education after graduation, two-year and four-year colleges use AP Exam scores to award credit and facilitate placement into associated programs of study.
- Students can list their AP Career Kickstart Credentials on résumés and post them to career-oriented social media platforms.
- After earning AP Career Kickstart Credentials, students are well positioned to earn "stackable" postsecondary and employer-endorsed credentials throughout their education and professional development.

AP Resources and Supports

By completing a simple activation process at the start of the school year, teachers and students receive access to a robust set of classroom resources.

AP Classroom

AP Classroom is a dedicated online platform designed to support teachers and students throughout their AP experience. The platform provides a variety of powerful resources and tools to provide yearlong support to teachers, offering opportunities to give and get meaningful feedback on student progress.

UNIT GUIDES

Appearing in this publication and on AP Classroom, these planning guides outline all required course content and skills, organized into commonly taught units. Each unit guide suggests a sequence and pacing of content, scaffolds skill instruction across units, organizes content into topics, and provides tips on taking the AP Exam.

LESSON PLANS

Lesson Plans provided by the AP Program are designed to facilitate strong, relevant classroom learning experiences. They give teachers concrete, hands-on lessons that connect learning to authentic, professionally relevant experiences and help students build practical skills while engaging with course content. They serve as professional learning tools to support educator growth and as classroom-ready exemplars that demonstrate relevant, engaging, and standards-aligned instruction.

PROFESSIONAL SKILLS

Professional skills are best developed through meaningful, collaborative work in which students take ownership, solve authentic problems, and practice communication, teamwork, and critical thinking. These skills prepare students to work effectively with others and adapt to real workplace challenges.

PRACTICE TESTS

Full-length practice tests are available on AP Classroom. Full-length practice tests are timed like real tests, except you can move forward from one section to the next before time expires. Students who test with accommodations can select their accommodation when setting up the practice test to see how it will work on test day. Full-length practice tests are scored. After students complete a practice test in Bluebook, their scores will be available on the My Practice section of AP Classroom.

REPORTS

Reports provides teachers with a one-stop shop for student results on practice tests. Teachers can view class trends and see where students struggle with content and skills that will be assessed on the AP Exam. Students can view their own progress over time to improve their performance before the AP Exam.

CLASS SECTION SETUP AND ENROLLMENT

- Teachers and students sign into or create their College Board accounts.
- Teachers confirm that they have added the course they teach to their AP Course Audit account and have had it approved by their school's administrator.
- Teachers or AP coordinators, depending on who the school has decided is responsible, set up class sections so students can access AP resources and have exams ordered on their behalf.
- Students join class sections with a join code provided by their teacher or AP coordinator.
- Students will be asked for additional information upon joining their first class section.

Instructional Model

Integrating AP resources throughout the course can help students develop skills and conceptual understandings. The instructional model outlined below shows possible ways to incorporate AP resources into the classroom.

Plan

Teachers may consider the following approaches as they plan their instruction before teaching each unit.

- Review the overview at the start of each **unit guide** to identify skills and conceptual understanding for each unit.
- Use the **Unit at a Glance** table to identify related topics that build toward a common understanding and then plan appropriate pacing for students.

Teach

When teaching, supporting resources could be used to build students' conceptual understanding and mastery of skills.

- Use the topic pages in the **unit guides** to identify the required content.
- Integrate the content with a skill, considering any appropriate scaffolding.
- Use the available resources, including **unit scenarios**, to bring a variety of authentic experiences into the classroom.

Assess

Teachers can measure student understanding of the content and skills explored in the unit and provide actionable feedback to students.

- Within each lesson, offer brief, formative assessments to check student understand and inform your next instructional move.
- After teaching each topic, offer a formative assessment to check student understanding and provide just-in-time feedback.
- At the end of each unit, create additional practice opportunities that will provide feedback to students on areas where they need to focus.

About the AP Cybersecurity Course

AP Cybersecurity trains students in the field and aligns closely with standard first-year collegiate cybersecurity courses. Students explore defense-in-depth strategies and learn to address specific vulnerabilities, attacks, mitigations, and detection measures across a variety of domains, including physical spaces, computer networks, devices, applications, and data. Developed in partnership with college faculty and industry leaders, this yearlong course aligns with the NICE Workforce Framework.

AP Career Kickstart, a Group of AP Courses

The "Career Kickstart" designation is awarded to AP courses developed not just with colleges to qualify high school students for college credit but also with industry leaders and employers to equip students with the skills needed for specific careers.

College Course Equivalent

The AP Cybersecurity course is designed to be the equivalent of a one-semester college introduction to cybersecurity course.

Prerequisites

There are no specific course prerequisites for AP Cybersecurity. Students should be motivated and willing to work both individually and in teams on college-level projects. AP Cybersecurity is designed to serve as a foundational course that aligns with multiple Programs of Study within Career and Technical Education (CTE) Digital Technology Pathways.

Legal and Professional Norms for the Practice of Cybersecurity

By its nature, cybersecurity relates to the storage, processing, and transmission of sensitive data (e.g., proprietary corporate data, financial data, health care data, educational data). To fulfill their responsibilities, cybersecurity professionals frequently have elevated permissions on devices and access to sensitive data. For this reason, there are norms for the practice of cybersecurity that guide cyber professionals in using their permission, access, and tools to secure and protect systems, data, organizations, and individuals.

Instructors should share and review with students examples of norms from professional cybersecurity organizations (e.g., ISC2) and governmental organizations (e.g., the UK Cyber Security Council) so students understand why these norms exist as well as the importance of following them.

In addition to professional norms, many types of data and sectors of industry are regulated by laws. Specific legal requirements vary by country, but the United States, United Kingdom, and European Union have laws relating to collecting, storing, processing, and transmitting data:

- Personally identifiable information (PII) (including biometric data like voice recordings, fingerprints, and face scans)

- Protected health information (PHI)
- Student education records
- Financial records and transactions

The security of some types of data is mandated by industry regulation. For example, the security of credit card payment data is regulated by the Payment Card Industry Data Security Standard (PCI DSS).

Instructors are expected to introduce students to these laws, industry-specific regulations, and professional norms throughout the duration of the course, integrating them into appropriate topics.

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AP CYBERSECURITY



Course Framework

Introduction

AP Cybersecurity is a broad introduction to the field of cybersecurity that aligns closely with a standard first-year college introductory cybersecurity course. Students learn about common threats and vulnerabilities and how those combine to create risk. Students study the ways that individuals and organizations manage risk and how risk can be mitigated through a defense-in-depth strategy. Students explore specific vulnerabilities, attacks, mitigations, and detection measures across a variety of domains, including physical spaces, computer networks, devices, and data and applications. Throughout the course, students consider the impact of cybersecurity on individuals, organizations, societies, and governments.

Unit scenarios for each unit in the cybersecurity framework offer authentic cybersecurity situations and are designed to connect the knowledge and skills students gain in each unit to relevant, real-world applications. The scenarios in Unit 1 are relevant to personal security in everyday life, while the scenarios in Units 2–5 are derived from common tasks employees perform in cybersecurity jobs. Each scenario is paired with relevant student activities. The scenarios were developed in partnership with teachers from the AP community to share ways that they approach teaching some of the topics in each unit. These scenarios are offered to support hands-on, career-connected instruction. Teachers may use their own scenarios in addition to, or in lieu of, those provided here.

Each unit includes between one and five scenarios that highlight professional career situations that require the use of the skills and course content within that unit. Each scenario is aligned with the topics and learning objectives for that unit. For units with multiple scenarios, each one can be used independently, providing teachers with multiple instructional options: using one or more scenarios with all students or dividing the scenarios across different students within the class.

Course Framework Components

Overview

This course framework provides a clear and detailed description of the course requirements necessary for student success. The framework specifies what students must know, be able to do, and understand to qualify for college credit and/or placement.

The course framework includes two essential components:

(1) COURSE SKILLS

Cybersecurity skills, including collaboration, are critical to the deep understanding and application of cybersecurity knowledge and practice. Students should develop and use these skills throughout the course.

(2) COURSE CONTENT

The course content is organized into units that reflect key domains of cybersecurity knowledge and practice. These units comprise the content and skills colleges and universities typically expect students to be proficient in to qualify for college credit and/or placement. Units 1–5 introduce students to security and present knowledge and skills needed to secure spaces, secure networks, secure devices, and secure applications and data.

Cybersecurity Skills

	Skill Category 1	Skill Category 2	Skill Category 3	Skill Category 4
	Analyze Risk Evaluate risk to organizational assets.	**Mitigate Risk** Implement protective and deterrent security controls.	**Detect Attacks** Implement detection methods, monitor systems, and analyze evidence.	**Collaborate** Work with others and AI to accomplish a task.
Communicating concepts Explain key cybersecurity concepts.	1.A Identify, with and without the support of AI, vulnerabilities, threats, and attack methods, and explain how they generate risk.	2.A Identify security controls, and explain how they mitigate risks.	3.A Identify methods for monitoring systems, and explain how they detect attacks.	4.A Develop clear, shared team objectives related to a cybersecurity task.
Investigating problems Explore the parameters of a problem to plan for solutions.	1.B Determine ways adversaries exploit vulnerabilities to compromise an asset.	2.B Determine layered security controls that address vulnerabilities.	3.B Determine strategies and methods to detect attacks.	4.B Determine clear roles and responsibilities for members of a team working to accomplish a cybersecurity task.
Assessing impacts Evaluate impacts on systems.	1.C Evaluate, with and without the support of AI, the likelihood and impact of risks.	2.C Evaluate, with and without the support of AI, the impact of protective risk-management strategies.	3.C Evaluate the impact of threat detection methods.	4.C Implement AI as a collaboration tool individually and as a group.
Enacting solutions Apply and communicate solutions.	1.D Document, with and without the support of AI, the likelihood and impact of risks.	2.D Implement and log mitigations with and without the support of AI.	3.D Detect and classify cyberattacks by analyzing digital evidence with and without the support of AI.	4.D Complete assigned work to accomplish a collaborative cybersecurity task.

Course Content

This course framework provides a clear and detailed description of course requirements necessary for student success. The framework specifies what students should know and be able to do, with a focus on understanding, identifying, protecting against, and remediating common threats and vulnerabilities through a defense-in-depth strategy across a variety of domains including physical spaces, computer networks, devices, and data and applications. The framework emphasizes the impact of cybersecurity on individuals, organizations, governments, and societies.

Units

There are five units in AP Cybersecurity. Pacing recommendations at the unit level and on the Course at a Glance table provide suggestions for how to teach the required course content. The suggested class periods are based on a schedule in which the class meets five days a week for 45 minutes each day. While these recommendations have been made to aid in planning, adjust the pacing based on student needs, alternate schedules (e.g., block scheduling), or individual schools' academic calendars.

Topics

Each unit is divided into teachable segments called topics. The topic pages (starting on page 33) contain all required content for each topic. Topics typically require 2-8 class periods of instruction. Teachers are not obligated to teach the topics in the suggested sequence listed in each unit. However, to receive authorization to label this course "Advanced Placement," all topics must be included in the course.

Course at a Glance

Plan

The Course at a Glance provides a useful visual organization of the AP Cybersecurity components, including:

- Sequence of units, along with suggested pacing. Please note, pacing is based on 45-minute class periods, meeting five days each week for a full academic year.
- Progression of topics within each unit.

Teach

COURSE SKILLS

1 Analyze Risk
2 Mitigate Risk
3 Detect Attacks
4 Collaborate

Assess

At the end of each topic and unit, assess students' understanding of the content and skills and provide them with actionable feedback.

UNIT 1

Introduction to Security

~10
CLASS PERIODS

Skill		Topic
1	1.1	Understanding Social Engineering
1, 2	1.2	Suspicious Website Logins
1, 2	1.3	Best Practices for Public Networks
1, 2	1.4	AI-Based Cybersecurity Attacks
2, 3	1.5	Leveraging AI in Cyber Defense

UNIT 2

Securing Spaces

~21
CLASS PERIODS

Skill		Topic
1, 2	2.1	Cyber Foundations
1	2.2	Physical Vulnerabilities and Attacks
2	2.3	Protecting Physical Spaces
3	2.4	Detecting Physical Attacks

UNIT 3

Securing Networks

~26
CLASS PERIODS

Skill		Topic
1	3.1	Network Vulnerabilities and Attacks
2	3.2	Protecting Networks: Managerial Controls and Wireless Security
2	3.3	Protecting Networks: Segmentation
2	3.4	Protecting Networks: Firewalls
3	3.5	Detecting Network Attacks

UNIT 4

Securing Devices

~23
CLASS PERIODS

Skill		Topic
1	4.1	Device Vulnerabilities and Attacks
2	4.2	Authentication
2	4.3	Protecting Devices
3	4.4	Detecting Attacks on Devices

UNIT 5

Securing Applications and Data

~30
CLASS PERIODS

Skill		Topic
1	5.1	Application and Data Vulnerabilities and Attacks
2	5.2	Protecting Applications and Data: Managerial Controls and Access Controls
2	5.3	Protecting Stored Data with Cryptography
2	5.4	Asymmetric Cryptography
2	5.5	Protecting Applications
3	5.6	Detecting Attacks on Data and Applications

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AP CYBERSECURITY

Unit Guides

Introduction

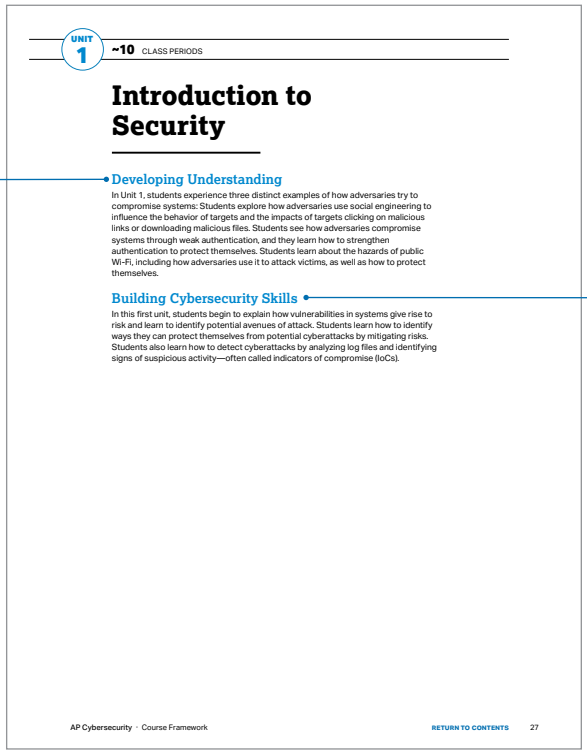
Developed in partnership with industry leaders, college faculty, and experienced high school educators, these guides offer teachers helpful guidance in building students' skills and content knowledge.

This unit structure respects AP teachers' time by providing one possible sequence that can be adopted or modified, rather than having to be built from scratch.

Using the Unit Guides

Unit Openers

Developing Understanding provides an overview that contextualizes and situates the key content of the unit within the scope of the course.



UNIT 1 ~10 CLASS PERIODS

Introduction to Security

Developing Understanding

In Unit 1, students experience three distinct examples of how adversaries try to compromise systems: Students explore how adversaries use social engineering to influence the behavior of targets and the impacts of targets clicking on malicious links or downloading malicious files. Students see how adversaries compromise systems through weak authentication, and they learn how to strengthen authentication to protect themselves. Students learn about the hazards of public Wi-Fi, including how adversaries use it to attack victims, as well as how to protect themselves.

Building Cybersecurity Skills

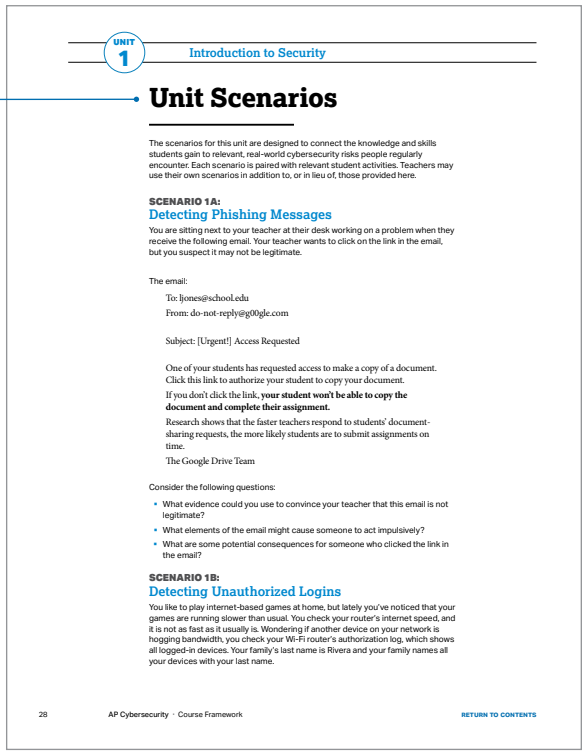
In this first unit, students begin to explain how vulnerabilities in systems give rise to risk and learn to identify potential avenues of attack. Students learn how to identify ways they can protect themselves from potential cyberattacks by mitigating risks. Students also learn how to detect cyberattacks by analyzing log files and identifying signs of suspicious activity—often called indicators of compromise (IoCs).

AP Cybersecurity · Course Framework RETURN TO CONTENTS 27

Building Cybersecurity Skills describes specific subskills within the course skills that are appropriate to focus on in that unit.

Unit Scenarios

Unit scenarios are designed to connect the knowledge and skills students gain to relevant, real-world applications. They are paired with applicable student activities. Teachers may use their own scenarios in addition to, or in lieu of, the scenarios provided.



UNIT 1 Introduction to Security

Unit Scenarios

The scenarios for this unit are designed to connect the knowledge and skills students gain to relevant, real-world cybersecurity risks people regularly encounter. Each scenario is paired with relevant student activities. Teachers may use their own scenarios in addition to, or in lieu of, those provided here.

SCENARIO 1A:
Detecting Phishing Messages

You are sitting next to your teacher at their desk working on a problem when they receive the following email. Your teacher wants to click on the link in the email, but you suspect it may not be legitimate.

The email:

To: ljones@school.edu
From: do-not-reply@g00gle.com

Subject: [Urgent!] Access Requested

One of your students has requested access to make a copy of a document. Click this link to authorize your student to copy your document.
If you don't click the link, **your student won't be able to copy the document and complete their assignment.**
Research shows that the faster teachers respond to students' document-sharing requests, the more likely students are to submit assignments on time.
The Google Drive Team

Consider the following questions:

- What evidence could you use to convince your teacher that this email is not legitimate?
- What elements of the email might cause someone to act impulsively?
- What are some potential consequences for someone who clicked the link in the email?

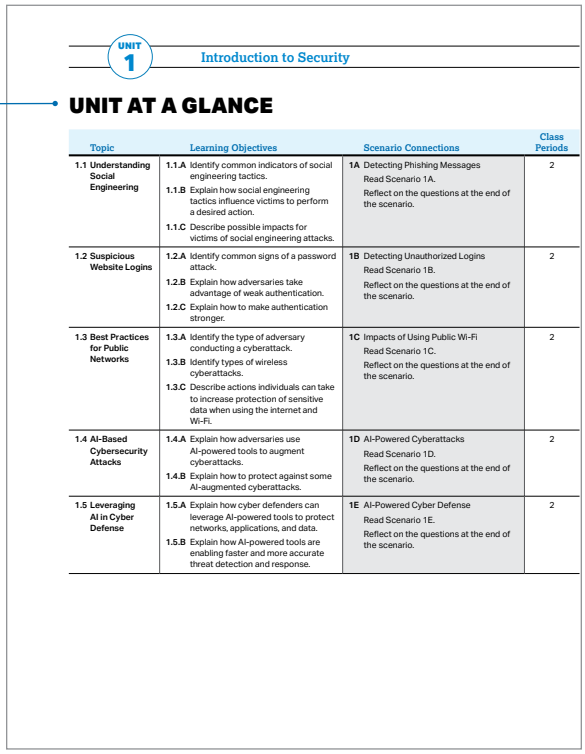
SCENARIO 1B:
Detecting Unauthorized Logins

You like to play internet-based games at home, but lately you've noticed that your games are running slower than usual. You check your router's internet speed, and it is not as fast as it usually is. Wondering if another device on your network is hogging bandwidth, you check your Wi-Fi router's authorization log, which shows all logged-in devices. Your family's last name is Rivera and your family names all your devices with your last name.

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Unit at a Glance

Unit at a Glance shows the topics, learning objectives, and connections to unit scenarios for each topic.

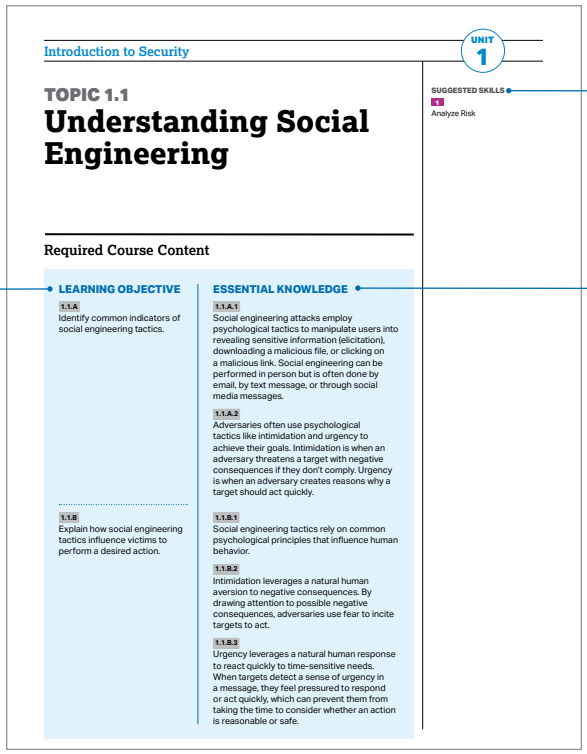


UNIT 1 Introduction to Security

UNIT AT A GLANCE

Topic	Learning Objectives	Scenario Connections	Class Periods
1.1 Understanding Social Engineering	**1.1.A** Identify common indicators of social engineering tactics. **1.1.B** Explain how social engineering tactics influence victims to perform a desired action. **1.1.C** Describe possible impacts for victims of social engineering attacks.	**1A** Detecting Phishing Messages Read Scenario 1A. Reflect on the questions at the end of the scenario.	2
1.2 Suspicious Website Logins	**1.2.A** Identify common signs of a password attack. **1.2.B** Explain how adversaries take advantage of weak authentication. **1.2.C** Explain how to make authentication stronger.	**1B** Detecting Unauthorized Logins Read Scenario 1B. Reflect on the questions at the end of the scenario.	2
1.3 Best Practices for Public Networks	**1.3.A** Identify the type of adversary conducting a cyberattack. **1.3.B** Identify types of wireless cyberattacks. **1.3.C** Describe actions individuals can take to increase protection of sensitive data when using the internet and Wi-Fi.	**1C** Impacts of Using Public Wi-Fi Read Scenario 1C. Reflect on the questions at the end of the scenario.	2
1.4 AI-Based Cybersecurity Attacks	**1.4.A** Explain how adversaries use AI-powered tools to augment cyberattacks. **1.4.B** Explain how to protect against some AI-augmented cyberattacks.	**1D** AI-Powered Cyberattacks Read Scenario 1D. Reflect on the questions at the end of the scenario.	2
1.5 Leveraging AI in Cyber Defense	**1.5.A** Explain how cyber defenders can leverage AI-powered tools to protect networks, applications, and data. **1.5.B** Explain how AI-powered tools are enabling faster and more accurate threat detection and response.	**1E** AI-Powered Cyber Defense Read Scenario 1E. Reflect on the questions at the end of the scenario.	2

Topic Pages



Introduction to Security — UNIT 1

TOPIC 1.1

Understanding Social Engineering

SUGGESTED SKILLS
1
Analyze Risk

Required Course Content

LEARNING OBJECTIVE

1.1.A
Identify common indicators of social engineering tactics.

1.1.B
Explain how social engineering tactics influence victims to perform a desired action.

ESSENTIAL KNOWLEDGE

1.1.A.1
Social engineering attacks employ psychological tactics to manipulate users into revealing sensitive information (elicitation), downloading a malicious file, or clicking on a malicious link. Social engineering can be performed in person but is often done by email, by text message, or through social media messages.

1.1.A.2
Adversaries often use psychological tactics like intimidation and urgency to achieve their goals. Intimidation is when an adversary threatens a target with negative consequences if they don't comply. Urgency is when an adversary creates reasons why a target should act quickly.

1.1.B.1
Social engineering tactics rely on common psychological principles that influence human behavior.

1.1.B.2
Intimidation leverages a natural human aversion to negative consequences. By drawing attention to possible negative consequences, adversaries use fear to incite targets to act.

1.1.B.3
Urgency leverages a natural human response to react quickly to time-sensitive needs. When targets detect a sense of urgency in a message, they feel pressured to respond or act quickly, which can prevent them from taking the time to consider whether an action is reasonable or safe.

Suggested skills offer one or more recommended skills to pair with the topic.

Learning objectives define what a student should be able to do with content knowledge.

Essential knowledge statements describe the knowledge required to perform the learning objective.

Exam Overview

Sample multiple-choice questions serve as examples of the types of questions that may appear on the AP Exam.

Sample Exam Questions

The sample exam questions that follow illustrate the relationship between the course framework and the AP Cybersecurity Exam and serve as examples of the types of questions that appear on the exam. After the sample questions is a table that shows which skill, learning objective(s), unit, and essential knowledge statement(s) each question assesses. The table also provides the answers to the multiple-choice questions.

Section I: Multiple-Choice Questions

The following are examples of the kinds of multiple-choice questions found on the exam.

1. A cybersecurity analyst recently completed a review of a hotel's security. Consider the following information from their report.
   - The hotel's Wi-Fi extends to the parking area, allowing outsiders potential access to the network.
   - Open network ports in the conference center connect to the hotel's internal network and could enable spoofing of a legitimate device.
   - Guest feedback tablets in the lobby use a shared Wi-Fi network, exposing
   - nonsensitive customer satisfaction data.
   - Model numbers of printers and the firmware versions the printers are running are visible on the internal network, revealing some information about devices on the network.

   Which of the following risks would the cybersecurity analyst most likely document as a high risk?

   (A) The hotel's Wi-Fi extending to the parking area
   (B) Open network ports in the conference center
   (C) Guest feedback tablets using a shared Wi-Fi network
   (D) The model numbers of printers and the firmware versions the printers are running being visible

A sample free-response question serves as an example of the type of question that may appear on the AP Exam.

22. A hospital's security manager has implemented an automated network security tool with the following functions.
    - The tool analyzes network traffic for signs of malicious activity so the security team can quickly spot potential threats.
    - The tool generates an alert when suspicious or malicious traffic is detected because the hospital wants to be notified right away if an attack is attempted.
    - The tool does not take direct action to block or stop the traffic itself because the hospital wants administrators to decide how to respond to threats.

    Which of the following security systems did the security manager implement?

    (A) Data loss prevention system
    (B) Network intrusion prevention system
    (C) Network intrusion detection system
    (D) Security information and event management system

Section II: Free-Response Question

The following is an example of the free-response question found on the exam.

Device Security Analysis

The following sources all come from the same device and are captured in a risk assessment for this device.

Source 1

The device's IP address is 192.168.1.10.

Device Firewall Settings

Rule Number	Action	Source	Destination	Direction	Port Number	Protocol
1	Deny	172.45.66.184	192.168.1.10	Inbound	22	SSH
2	Allow	ALL	192.168.1.10	Inbound	21	FTP
3	Allow	ALL	192.168.1.10	Inbound	80	HTTP
4	Allow	ALL	192.168.1.10	Inbound	445	SMB
5	Allow	ALL	192.168.1.10	Inbound	443	HTTPS
6	Allow	ALL	192.168.1.10	Inbound	22	SSH
7	Allow	172.45.66.184	192.168.1.10	Inbound	3306	MySQL
8	Allow	ALL	192.168.1.10	Inbound	3389	RDP
9	Allow	192.168.1.50	192.168.1.10	Inbound	5900	VNC
10	Deny	ALL	ALL	Inbound	ALL	ALL

AP CYBERSECURITY

UNIT 1

Introduction to Security



~10
CLASS PERIODS

UNIT 1 ~10 CLASS PERIODS

Introduction to Security

Developing Understanding

In Unit 1, students experience three distinct examples of how adversaries try to compromise systems: Students explore how adversaries use social engineering to influence the behavior of targets and the impacts of targets clicking on malicious links or downloading malicious files. Students see how adversaries compromise systems through weak authentication, and they learn how to strengthen authentication to protect themselves. Students learn about the hazards of public Wi-Fi, including how adversaries use it to attack victims, as well as how to protect themselves.

Building Cybersecurity Skills

In this first unit, students begin to explain how vulnerabilities in systems give rise to risk and learn to identify potential avenues of attack. Students learn how to identify ways they can protect themselves from potential cyberattacks by mitigating risks. Students also learn how to detect cyberattacks by analyzing log files and identifying signs of suspicious activity—often called indicators of compromise (IoCs).

Unit Scenarios

The scenarios for this unit are designed to connect the knowledge and skills students gain to relevant, real-world cybersecurity risks people regularly encounter. Each scenario is paired with relevant student activities. Teachers may use their own scenarios in addition to, or in lieu of, those provided here.

SCENARIO 1A:
Detecting Phishing Messages

You are sitting next to your teacher at their desk working on a problem when they receive the following email. Your teacher wants to click on the link in the email, but you suspect it may not be legitimate.

The email:

> To: ljones@school.edu
>
> From: do-not-reply@g00gle.com
>
> Subject: [Urgent!] Access Requested
>
> One of your students has requested access to make a copy of a document. Click this link to authorize your student to copy your document.
>
> If you don't click the link, **your student won't be able to copy the document and complete their assignment.**
>
> Research shows that the faster teachers respond to students' document-sharing requests, the more likely students are to submit assignments on time.
>
> The Google Drive Team

Consider the following questions:

- What evidence could you use to convince your teacher that this email is not legitimate?
- What elements of the email might cause someone to act impulsively?
- What are some potential consequences for someone who clicked the link in the email?

SCENARIO 1B:
Detecting Unauthorized Logins

You participate in an online game that allows users to create and manage virtual teams. One day, you discover that some of your previous choices have been modified without your knowledge. You check the account activity section, which lists each time the account was accessed. You normally log in to the website on weekends and evenings, when you're not in school. A portion of the list of logins follows.

Website Logins

Entry	Date/Time	Device IP Address
1	Saturday April 18 10:43	208.104.29.211
2	Sunday April 19 20:51	208.104.29.211
3	Tuesday April 21 18:34	208.104.29.211
4	Wednesday April 22 11:13	142.54.195.17
5	Saturday April 25 13:21	208.104.29.211
6	Sunday April 26 21:18	208.104.29.211
7	Monday April 27 10:07	142.54.195.17
8	Wednesday April 29 19:12	208.104.29.211

Consider the following questions:

- What types of information does this log contain?
- What patterns do you notice in this log?
- What entries in the log are suspicious and why?

SCENARIO 1C:
Verifying Network Authenticity

You go to your neighborhood coffee shop and try to connect to the shop's Wi-Fi network. You are redirected to a captive portal that requires you to provide some information before allowing you to access the wireless network. This captive portal has options for you to authenticate yourself by using your account credentials for popular online platforms. You select one and enter your login credentials for that platform, and you are granted access to the wireless network.

You open your streaming music service to play some music, and start studying for an upcoming test. While you are taking notes from your textbook, you notice that your music has stopped playing. When you check your streaming music service, you realize you have been logged out. When you try to log back in, the service says that your password is invalid.

You notice a sign on the wall that says "Login to our free Wi-Fi network: Sunshine Coffee Wi-Fi", but you remember joining a network called "Guest Wi-Fi". You accidentally joined a network set up by an adversary to trick customers.

When you logged into the "Guest Wi-Fi" network, you were redirected to a fake captive portal, set up by an adversary, where you supplied your login credentials for a popular online platform. By submitting your credentials on the adversary's fake portal, they were able to capture your username and password. The adversary then used those credentials to log in to other services you had linked to the same platform, including your music service, and change your password. This locked you out of your account.

Consider the following questions:

- How could you have avoided joining the malicious network in this scenario?
- What are the benefits and hazards of using one platform to log in to multiple online services?

SCENARIO 1D:
AI-Powered Cyberattacks

Sitting at home one day, you receive a call from a relative who is frantic, asking questions quickly: "Are you okay? Did you get the money I sent? How did you end up in so much trouble?"

First, you calm them down and tell them you're fine. Then you ask them to explain what they're talking about. They say that you called them earlier from jail, claiming you had been arrested for stealing and needed bail money. They wired the money just as you instructed. You explain to them that you were never arrested, you haven't left home all day, and you never called them. They've been scammed, but they insist that it was you calling them. They say it sounded exactly like you.

What Really Happened?

You have a social media account where you post short videos of yourself. Two weeks ago, you got a friend request on that platform. The friend request came from someone with a name similar to a kid at your school. Figuring it was them, you accepted the request. That person was actually an adversary pretending to be someone from your school. The adversary was able to scrape enough samples of your voice from your social media posts to feed into an AI tool that clones voices. The adversary used social media to find your relative and called them using the voice-cloning tool pretending to be you. They created a fake story about being caught stealing, being in jail, and needing bail money wired to them.

Consider the following questions:

- Do you know all your online connections (on social media and gaming platforms) in real life? Do you know that they are who they claim to be?
- Have you heard of adversaries trying to impersonate someone to get money out of a relative?
- How could you help protect relatives from becoming a victim of a scheme like this?

SCENARIO 1E:
AI-Powered Cyber Defense

The company you work for is developing a new web application that will allow customers to place orders in an online system. The application automatically accesses the company's warehouse inventory database to display current item availability to customers. When a customer purchases an item through the web portal, the application updates the database to remove the item(s) the customer purchased.

Before launching this new website, you ask an AI-powered tool to review the code and flag any potential security vulnerabilities. The AI tool flags several instances where a user input field is being fed directly into database requests as vulnerabilities. Adversaries could take advantage of those parts of the application to learn more about what is in the company's warehouse and possibly modify the database in unintended ways.

The AI tool recommends several fixes to the code that would validate and sanitize user input before passing commands to the database. You share these recommendations with the software development team, who review the code changes and update the code with appropriate suggestions. The application is then pushed to a testing environment before being deployed.

Consider the following questions:

- What are some potential advantages and disadvantages of using an AI-powered tool to review application code?
- Why is it important for the development team to review the changes to the application code before implementing them?
- Are there times when you use AI-powered tools to help you review your work?

UNIT AT A GLANCE

Topic	Learning Objectives	Scenario Connections	Class Periods
1.1 Understanding Social Engineering	**1.1.A** Identify common indicators of social engineering tactics. **1.1.B** Explain how social engineering tactics influence victims to perform a desired action. **1.1.C** Describe possible impacts for victims of social engineering attacks.	**1A Detecting Phishing Messages** ▪ Read Scenario 1A. ▪ Reflect on the questions at the end of the scenario.	2
1.2 Suspicious Website Logins	**1.2.A** Identify common signs of a password attack. **1.2.B** Explain how adversaries take advantage of weak authentication. **1.2.C** Explain how to make authentication stronger.	**1B Detecting Unauthorized Logins** ▪ Read Scenario 1B. ▪ Reflect on the questions at the end of the scenario.	2
1.3 Best Practices for Public Networks	**1.3.A** Identify the type of adversary conducting a cyberattack. **1.3.B** Identify types of wireless cyberattacks. **1.3.C** Describe actions individuals can take to increase protection of sensitive data when using the internet and Wi-Fi.	**1C Impacts of Using Public Wi-Fi** ▪ Read Scenario 1C. ▪ Reflect on the questions at the end of the scenario.	2
1.4 AI-Based Cybersecurity Attacks	**1.4.A** Explain how adversaries use AI-powered tools to augment cyberattacks. **1.4.B** Explain how to protect against some AI-augmented cyberattacks.	**1D AI-Powered Cyberattacks** ▪ Read Scenario 1D. ▪ Reflect on the questions at the end of the scenario.	2
1.5 Leveraging AI in Cyber Defense	**1.5.A** Explain how cyber defenders can leverage AI-powered tools to protect networks, applications, and data. **1.5.B** Explain how AI-powered tools are enabling faster and more accurate threat detection and response.	**1E AI-Powered Cyber Defense** ▪ Read Scenario 1E. ▪ Reflect on the questions at the end of the scenario.	2

TOPIC 1.1
Understanding Social Engineering

SUGGESTED SKILLS

1

Analyze Risk

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
1.1.A Identify common indicators of social engineering tactics.	**1.1.A.1** Social engineering attacks employ psychological tactics to manipulate users into revealing sensitive information (elicitation), downloading a malicious file, or clicking on a malicious link. Social engineering can be performed in person but is often done by email, by text message, or through social media messages. **1.1.A.2** Adversaries often use psychological tactics like intimidation and urgency to achieve their goals. Intimidation is when an adversary threatens a target with negative consequences if they don't comply. Urgency is when an adversary creates reasons why a target should act quickly.
1.1.B Explain how social engineering tactics influence victims to perform a desired action.	**1.1.B.1** Social engineering tactics rely on common psychological principles that influence human behavior. **1.1.B.2** Intimidation leverages a natural human aversion to negative consequences. By drawing attention to possible negative consequences, adversaries use fear to incite targets to act. **1.1.B.3** Urgency leverages a natural human response to react quickly to time-sensitive needs. When targets detect a sense of urgency in a message, they feel pressured to respond or act quickly, which can prevent them from taking the time to consider whether an action is reasonable or safe.

1.1.C
Describe possible impacts for victims of social engineering attacks.

1.1.C.1
Victims may give an adversary personal information that could lead to impersonation, such as name, phone number, address, workplace, pets' names, or birthdate. These types of information, and information like them, are often used on websites as challenge questions to verify a user's identity.

1.1.C.2
Victims may give an adversary secure information like a one-time password (OTP) or authentication login code, which could allow an adversary to log in to a service as the victim.

1.1.C.3
Victims may download malware or click a link that that installs malware on their device, steals information from their web browser, or directs them to a website where their login credentials can be captured by an adversary.

TOPIC 1.2
Suspicious Website Logins

SUGGESTED SKILLS

1 Analyze Risk

2 Mitigate Risk

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
1.2.A Identify common signs of a password attack.	**1.2.A.1** In an online password attack, adversaries try logging in to a device or service using common passwords, common password patterns, or stolen passwords. **1.2.A.2** Signs of an online password attack include: ▪ Many failed attempts to log in over a short duration ▪ Login attempts at unusual times ▪ Login attempts from unknown devices
1.2.B Explain how adversaries take advantage of weak authentication.	**1.2.B.1** Many people use common patterns when creating passwords, such as: ▪ Starting a password with one or two words, adding a two-digit number (often signifying a year), and putting a special character at the end ▪ Including the names of family or pets in their passwords ▪ Including personally significant dates in their passwords **1.2.B.2** Adversaries often construct a dictionary of possible passwords based on personal information gathered about a target (e.g., birthday, anniversary, names of pets and family) and use an automated tool to submit potential passwords.

1.2.C
Explain how to make authentication stronger.

1.2.C.1
Users should create passwords that are long, random, and unique. A password manager can be used to generate and store strong passwords, or a user may create long, unique passphrases for their accounts.

1.2.C.2
When creating passwords, users should avoid names, dates, or other personally meaningful words or numbers.

1.2.C.3
When available, users should enable multifactor authentication (MFA), which will require the user to provide extra proof of identity—such as a one-time code—in addition to the password as an extra layer of security.

TOPIC 1.3

Best Practices for Public Networks

SUGGESTED SKILLS

1 Analyze Risk

2 Mitigate Risk

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
1.3.A Identify the type of adversary conducting a cyberattack.	1.3.A.1 Adversaries can be classified by their skill levels. ▪ Low-skilled adversaries rely on malicious cyber tools created by others that can be purchased online. The tools they use exploit known vulnerabilities. ▪ High-skilled adversaries have the capacity to create new malicious cyber tools or modify existing ones to adapt to new defensive techniques and tools. They also have the capacity to discover undocumented vulnerabilities, known as zero days. 1.3.A.2 Adversaries have a variety of motivations, including greed, desire for recognition, dedication to a cause, revenge, politics, or beliefs.
1.3.B Identify types of wireless cyberattacks.	1.3.B.1 In an evil twin attack, an adversary sets up their own wireless access point (WAP) with a service set identifier (SSID) similar or identical to a target network; the adversary's network is called the evil twin. Victims of this attack could select to unknowingly connect to the evil twin, allowing the adversary to capture their network traffic. The adversary cannot read traffic that uses an encrypted protocol like HTTPS.

1.3.B
Identify types of wireless cyberattacks.

1.3.B.2
In a jamming attack, an adversary floods an area with a strong electromagnetic (EM) signal in the same frequency range as the wireless network, which prevents legitimate traffic between the access point (AP) and users. This type of attack that prevents users from accessing resources is called a denial of service (DoS) attack.

1.3.B.3
In a war driving attack, adversaries try to detect wireless network beacons while driving or walking around a target. If a wireless signal is detected, the adversary can gather information about the type of wireless network used and find areas where the wireless signal extends outside the physical building.

1.3.C
Describe actions individuals can take to increase protection of sensitive data when using the internet and Wi-Fi.

1.3.C.1
Individuals should verify that the name of any wireless network they join exactly matches the name of the network they intend to join.

1.3.C.2
Most internet protocols are encrypted to protect network traffic. However, individuals may consider the sensitivity of their data in choosing whether to join unencrypted Wi-Fi networks to protect vulnerable data such as DNS queries.

1.3.C.3
Individuals may consider using a virtual private network (VPN), which encrypts all their traffic to the VPN operator's system. Although this action prevents a service provider from viewing traffic, the VPN provider can view the traffic.

TOPIC 1.4

AI-Based Cybersecurity Attacks

SUGGESTED SKILLS

1 Analyze Risk

2 Mitigate Risk

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
1.4.A Explain how adversaries use AI-powered tools to augment cyberattacks.	1.4.A.1 Adversaries can use AI-powered tools that leverage existing voice and image samples of a person to create a digital avatar of that person. The use of these technologies enables adversaries to impersonate someone over the phone or even on a video call, which can lead to financial loss or the sharing of sensitive or private information. As more organizations adopt voice-based authentication, the impact of voice-impersonation has a larger potential impact. 1.4.A.2 Adversaries can use generative AI tools, like large language models (LLMs), to create convincing phishing messages in any target language. Because traditional phishing messages are sometimes written by non-native speakers of the target's language, unnatural language is a feature that has been used to distinguish phishing messages from legitimate messages. However, with AI tools, adversaries can now craft phishing messages in any language that read as though they were written by a native speaker. 1.4.A.3 Adversaries can craft prompts that extract secure or sensitive information from LLMs. Secure or sensitive information in LLMs can come from user input and the large data sets used to train LLMs.

1.4.A Explain how adversaries use AI-powered tools to augment cyberattacks.	**1.4.A.4** Adversaries can publish websites or modify existing websites to contain false information so that the false information will be included in the training sets for LLMs, causing the LLMs to repeat the false information. **1.4.A.5** Adversaries can perform reconnaissance on a target using AI-powered tools that scan the internet to gather information posted on social media and public websites. **1.4.A.6** Adversaries can use AI-enhanced coding tools to help them write new malware, modify existing application code to perform malicious activities, or to find vulnerabilities in large code bases.
1.4.B Explain how to protect against some AI-augmented cyberattacks.	**1.4.B.1** Shared secrets with close friends and relatives that can be used to verify each other's identities should be established. A secret word or phrase known only to two parties can be used to authenticate identities in high-stakes situations. **1.4.B.2** Multifactor authentication (MFA) should be enabled. If an adversary clones a target's voice to access a system with voice authentication, requiring a second authentication factor could prevent an adversary from gaining access to accounts. **1.4.B.3** Personal or sensitive data should not be entered into any AI-powered tools, such as chatbots or virtual assistants. Some AI-powered tools feed user input back into the model to provide continuous training. Adversaries could extract data that users have included in prompts. **1.4.B.4** Output from AI-powered tools should be carefully evaluated. Verify information from AI-powered tools using reputable, stable, non-AI-based sources.

TOPIC 1.5

Leveraging AI in Cyber Defense

SUGGESTED SKILLS

2 Mitigate Risk

3 Detect Attacks

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
1.5.A Explain how cyber defenders can leverage AI-powered tools to protect networks, applications, and data.	1.5.A.1 AI tools can review current security configurations, like firewall rules and access controls, and recommend more secure options. Recommendations should always be checked by a knowledgeable security technician before being implemented. 1.5.A.2 AI-powered tools can analyze application code to identify vulnerabilities and recommend mitigations. Recommendations should always be reviewed by a knowledgeable programmer before being implemented. 1.5.A.3 AI-powered tools can suggest rules for automated detection systems. Detection rules should always be reviewed by a knowledgeable detection engineer before being added to a system.
1.5.B Explain how AI-powered tools are enabling faster and more accurate threat detection and response.	1.5.B.1 Of the millions of digital events that happen on networks daily, some likely represent an adversary conducting malicious activity. Humans cannot carefully examine all those events to identify the malicious activity. 1.5.B.2 AI-powered tools can be trained to quickly analyze digital events and sort the events that are likely malicious activity from those that are harmless.

1.5.B
Explain how AI-powered tools are enabling faster and more accurate threat detection and response.

1.5.B.3
AI-powered tools can be programmed to alert human cybersecurity personnel when likely malicious activity is detected or to take specific corrective actions based on the type of malicious activity detected.

1.5.B.4
AI-powered tools enable threat-detection and response teams to catch malicious activity and intervene quickly to prevent loss, harm, damage, and destruction to digital infrastructure and data.

AP CYBERSECURITY

UNIT 2

Securing Spaces



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CLASS PERIODS

Securing Spaces

Developing Understanding

In this unit, students focus on securing a physical location. Adversaries that can gain physical access to a device are often able to bypass many of the technical controls that protect the device and the data on it. Thus, securing the physical space is a critical first layer of defense and a concrete way for students to develop adversarial thinking skills and begin to identify vulnerabilities, threats, attacks, and mitigations. Students consider how physical spaces might be breached by adversaries, how to detect physical breaches, how to select devices to prevent or deter an adversary, and how to place those devices to maximize their usefulness.

Building Cybersecurity Skills

This unit focuses on an aspect of security that is concrete and is present in students' everyday lives. By leveraging the fact that students move through different spaces (e.g., their home, the school building, a bank) that are secured in a variety of ways, teachers can connect the concepts of vulnerabilities, threats, and risk to students' experiences. Students begin assessing and managing risk in this familiar domain while they practice selecting security controls based on the principles from Unit 1. Finally, students consider how to select controls to detect physical breaches and evaluate the impact of those controls.

Unit Scenario

The scenario for this unit is designed to connect the knowledge and skills students gain to realistic workplace tasks. The scenario is paired with relevant student activities. Teachers may use their own scenarios in addition to, or in lieu of, the one provided here.

SCENARIO 2A:
Securing Xtensr Labs

You work on the physical security team at Xtensr Research Labs. Xtensr is buying a smaller research company in the same town to expand their operations. You have been tasked with conducting a physical vulnerability assessment of the new lab.

You will:

- Review the building plans and current security controls for this new lab and identify physical vulnerabilities
- Assess the risk from the vulnerabilities identified
- Recommend physical security controls to mitigate these vulnerabilities
- Recommend the placement of monitoring equipment to detect physical security breaches

UNIT AT A GLANCE

Topic	Learning Objectives	Scenario Connections	Class Periods
2.1 Cyber Foundations	**2.1.A** Identify social engineering attacks. **2.1.B** Identify types of adversaries. **2.1.C** Describe the phases of a cyberattack. **2.1.D** Describe the risk assessment process. **2.1.E** Identify strategies for managing risk. **2.1.F** Identify types of security controls. **2.1.G** Explain why a defense-in-depth security strategy is necessary to optimally protect an organization.		8
2.2 Physical Vulnerabilities and Attacks	**2.2.A** Identify common physical attacks. **2.2.B** Explain how threats can exploit common physical vulnerabilities to cause loss, damage, disruption, or destruction to assets. **2.2.C** Assess and document risks from physical vulnerabilities.	**2A Securing Xtensr Labs** ▪ Review physical plans to identify physical vulnerabilities. ▪ Assess the risk from the vulnerabilities identified.	5
2.3 Protecting Physical Spaces	**2.3.A** Identify managerial controls related to physical security. **2.3.B** Determine mitigation strategies for risks from physical vulnerabilities.	**2A Securing Xtensr Labs** ▪ Recommend physical security controls to mitigate the risks identified in Topic 2.2.	4
2.4 Detecting Physical Attacks	**2.4.A** Identify ways security controls can detect physical attacks. **2.4.B** Determine effective placement of security controls for detecting physical attacks. **2.4.C** Apply detection techniques to identify physical attacks.	**2A Securing Xtensr Labs** ▪ Recommend the placement of monitoring equipment for detecting physical security breaches.	4

SUGGESTED SKILLS

1 Analyze Risk

2 Mitigate Risk

TOPIC 2.1
Cyber Foundations

Required Course Content

LEARNING OBJECTIVE

2.1.A
Identify social engineering attacks.

ESSENTIAL KNOWLEDGE

2.1.A.1
Social engineers use psychological tactics to manipulate targets into taking a desired action.

2.1.A.2
Pretexting is when adversaries create a believable reason to contact a target.

2.1.A.3
Authority is when adversaries impersonate someone with power over a target or pretend to relay instructions from that person.

2.1.A.4
Intimidation is when adversaries state negative consequences if demands aren't met.

2.1.A.5
Consensus is when adversaries create social pressure by making a target believe everyone else is doing a desired action.

2.1.A.6
Scarcity is when adversaries create a sense of limited availability.

2.1.A.7
Familiarity is when adversaries pretend to be or know someone close to a target to establish trust.

2.1.A.8
Urgency is when adversaries create a deadline that requires quick action by a target to avert negative consequences.

2.1.B
Identify types of adversaries.

2.1.B.1
Script kiddies are low-skilled adversaries who use tools developed by others without understanding how the tools work. They are often motivated by greed or a desire for recognition.

2.1.B.2
Hacktivists are motivated by social, political, or personal causes. They compromise computers and networks to support their cause or stop perceived harm, believing their goals justify their illegal methods.

2.1.B.3
Insider adversaries are unique threats because they have legitimate credentials and access to systems and data. They can be recruited by malicious third parties and can be motivated by greed or revenge.

2.1.B.4
Cyberterrorists are motivated by politics or beliefs and seek to disrupt entire communities, regions, or nations through cyberattacks (e.g., attacking a power grid, water treatment plant, or other civil infrastructure). They can act independently or on behalf of governments or criminal organizations.

2.1.B.5
Transnational criminal organizations seek financial gain primarily by deploying ransomware and stealing corporate intellectual property (IP) to sell in illegal markets.

2.1.C
Describe the phases of a cyberattack.

2.1.C.1
Cyberattacks aim to disrupt, harm, steal, or destroy devices, networks, or data. Adversaries work in phases, which may not all be used in every attack. The phases are:

i. Reconnaissance
ii. Initial access
iii. Persistence
iv. Lateral movement
v. Taking action
vi. Evading detection

2.1.C.2
In the reconnaissance phase of an attack, adversaries gather as much information as possible about their target, often using open source intelligence (OSINT), which is freely available information.

2.1.C
Describe the phases of a cyberattack.

2.1.C.3
In the initial-access phase of an attack, adversaries establish a foothold on the target's computer, often through social engineering or compromised or weak credentials.

2.1.C.4
After gaining access during an attack, adversaries establish persistence to maintain access without needing to regain it. They may use a command and control (C2) protocol to send commands to the device and receive output, often through malware like a remote access trojan (RAT) or rootkit.

2.1.C.5
In the lateral-movement phase of an attack, adversaries try to escalate their privileges by accessing computers and user accounts with elevated permissions to services and data.

2.1.C.6
In the taking-action phase of an attack, adversaries act on their objectives by collecting targeted data, exfiltrating it, and disrupting services or destroying data.

2.1.C.7
In the final phase of an attack, many adversaries try to evade detection by removing or editing log files and erasing other files they may have planted on devices (e.g., malware).

2.1.D
Describe the risk assessment process.

2.1.D.1
Risk occurs when a threat can exploit a vulnerability to compromise an asset.

2.1.D.2
An asset is anything valuable. Assets include financial resources, intellectual property, data, digital infrastructure, physical property, and reputation.

2.1.D.3
Risk assessment considers two factors:

- The likelihood of an attack against a specific vulnerability
- The severity of the projected damage from an attack against a specific vulnerability

2.1.D
Describe the risk assessment process.

2.1.D.4
The likelihood of a vulnerability being exploited depends on many factors, including:

- The value of the target: Adversaries are more likely to attack targets they perceive as valuable.
- The level of skill required to exploit the vulnerability (i.e., the difficulty): Vulnerabilities with well-documented exploits often require less skill and can be carried out by more adversaries.
- The motivation and capabilities of likely adversaries: Highly motivated and skilled adversaries are more likely to be able to perform more complex exploits.

2.1.D.5
The severity of an attack is often measured by financial cost, which can also include reputational and operational impacts.

ILLUSTRATIVE EXAMPLE
A hacktivist is passionate about illegal fishing practices supported by a local food production company. The main webpage of this food production company would be a high-value target for this hacktivist; defacing the webpage to expose the company's support of illegal fishing would provide no financial gain to the adversary, but would allow them to raise awareness about an issue that motivates them.

2.1.D.6
The result of a risk assessment can be quantitative or qualitative.

- Quantitative risk assessment assigns a numeric value to a vulnerability based on a numeric scale (e.g., 1–10) or quantifiable impact, which could be financial (e.g., a $10,000 annual risk).

ILLUSTRATIVE EXAMPLES

- Low, medium, high, severe
- Unlikely low impact, likely low impact, unlikely high impact, likely high impact

2.1.D.7
Risk assessment documentation should include:

- Vulnerable assets and their value
- Descriptions of likely threats to the assets
- Details of specific vulnerabilities for specific assets and how they would be exploited

2.1.D
Describe the risk assessment process.

- An explanation of the severity of damage (financial, operational, reputational, etc.) if a specific asset were compromised, and the likelihood of that compromise occurring
- A final rating, quantitative or qualitative, for each risk identified

ILLUSTRATIVE EXAMPLES
- Scaled score (e.g., 1–10)
- Monetary value (e.g., a $10,000 risk vs. a $100,000 risk)

2.1.E
Identify strategies for managing risk.

2.1.E.1
Once a risk has been identified and assessed, an organization has four options for managing that risk:

i. Avoid
ii. Transfer
iii. Mitigate
iv. Accept

2.1.E.2
Risk avoidance stops the activity that is generating the risk. If the activity is a critical part of an organization's mission or purpose, then avoidance is not possible.

2.1.E.3
Risk transference places the burden of the risk on another entity, such as an insurance company, a government, or consumers.

2.1.E.4
Risk mitigation implements security controls to reduce the likelihood or impact of a risk.

2.1.E.5
Residual risk is the risk that remains after an organization has gone through avoidance, transference, and mitigation. The residual risk is the level of risk that an organization is willing to accept. Risk acceptance acknowledges the fact that absolute security is unattainable.

2.1.E.6
To conserve financial resources and employee capacity, an organization will often favor solutions that are cost effective and easy to implement and maintain. Cost-effective solutions cost less to install and maintain than the expected loss from an attack.

2.1.F
Identify types of security controls.

2.1.F.1
Security controls address at least one of the following principles:

- Confidentiality ensures that only authorized individuals, systems, or processes can access data. Systems lacking confidentiality are vulnerable to data theft or destruction.
- Integrity ensures data are accurate and trustworthy. Systems lacking integrity are vulnerable to data manipulation.
- Availability ensures data and services are accessible to authorized individuals when needed. Systems lacking availability may experience unexpected downtime.

2.1.F.2
Security controls can be classified by type.

- Physical controls provide security in the physical space and include locks, fences, and cameras, bollards, and security guards.
- Technical controls provide security in the digital space and include firewalls, anti-malware software, and encryption.
- Managerial controls provide rules, guidelines, policies, and procedures that specify what security should be in place and include password policies, regular access reviews, and incident response plans (IRPs).

2.1.F.3
Security controls can be classified by function.

- Preventative controls address potential vulnerabilities with the goal of stopping an adversary from attacking and include locks and encryption.
- Detective controls help identify attacks when they occur and include intrusion detection systems (IDSs), cameras, and security incident and event management (SIEM) systems.
- Corrective controls fix problems and help restore systems to an operational state and include vulnerability patching, repairing a broken card reader, and intrusion prevention systems (IPSs).

2.1.G
Explain why a defense-in-depth security strategy is necessary to optimally protect an organization.

2.1.G.1
A defense-in-depth strategy, or layered defense, uses multiple types of security controls to protect sensitive data and systems.

2.1.G.2
A defense-in-depth strategy allows an organization to address different types of threats, each with a security control most suited to mitigate it.

2.1.G.3
A defense-in-depth strategy allows for resilience in data protection so when one security control is bypassed by an adversary, another security control may still prevent access to the data or system or limit the damage done to the data or system.

2.1.G.4
Layers in a defense-in-depth strategy can include human, physical, network, device, application, and data.

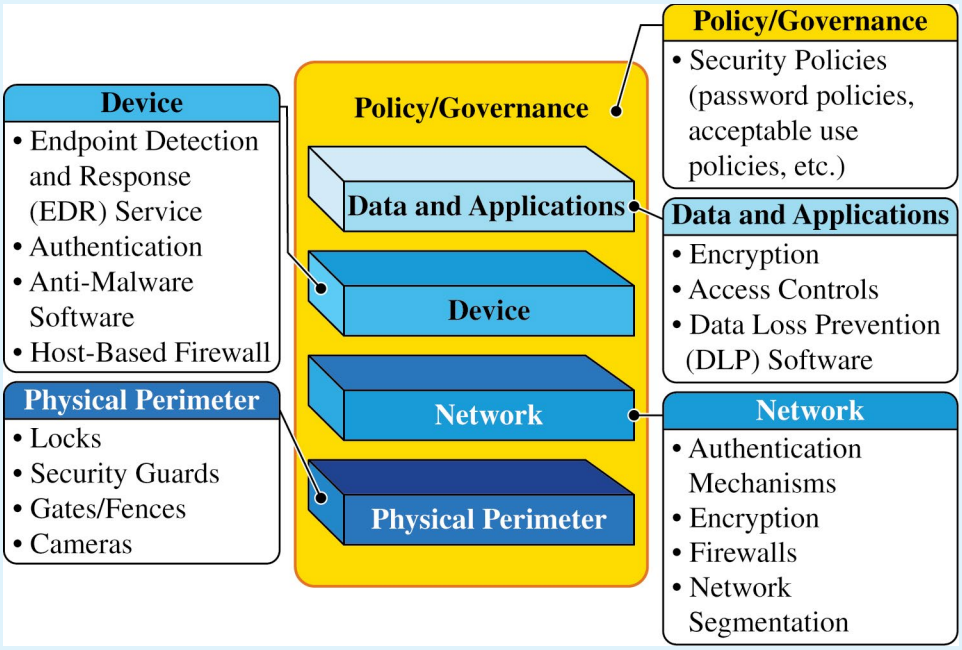


FIGURE 2.1: Defense in Depth

Defense in depth is a layered security strategy that implements protections and deterrence at different levels to make it more challenging for adversaries to compromise a computer, network, or data.

SUGGESTED SKILLS

1
Analyze Risk

TOPIC 2.2
Physical Vulnerabilities and Attacks

Required Course Content

LEARNING OBJECTIVE

2.2.A
Identify common physical attacks.

ESSENTIAL KNOWLEDGE

2.2.A.1
Adversaries often use social engineering when conducting a physical attack.

2.2.A.2
Piggybacking is the name for an attack where an adversary uses social engineering to manipulate an authorized individual to grant the adversary access to a restricted area. Common piggybacking tactics include carrying something large to entice an authorized person to hold the door open, pretending to be an authorized person who has forgotten their access token, or pretending to be a maintenance person who needs to get into a certain area to perform an inspection or repair.

2.2.A.3
Tailgating is the name for an attack where an adversary gains unauthorized access to a restricted area by following close behind an authorized individual without that individual's awareness or knowledge.

2.2.A.4
Shoulder surfing is the name for an attack where an adversary watches as a user accesses sensitive information so the adversary can use it later. Sometimes adversaries use a camera to record the target accessing the sensitive information for later analysis.

2.2.A.5
Dumpster diving is the name for an attack where an adversary goes through a target's physical trash to look for information that could be used to help the adversary reach their goal.

2.2.A
Identify common physical attacks.

2.2.A.6
Card cloning is the name for an attack where an adversary makes a copy of an authorized user's access card so they can gain access to all the resources the user is authorized to access.

2.2.B
Explain how threats can exploit common physical vulnerabilities to cause loss, damage, disruption, or destruction to assets.

2.2.B.1
Threats include human adversaries seeking to cause harm or disruption as well as natural disasters. Natural disasters can cause physical damage or destruction to computers and data as well as disruption of digital services provided by computers.

2.2.B.2
Vulnerabilities are weaknesses or flaws that could allow an asset to be compromised. Common compromises include:

- Unauthorized access to sensitive data or restricted physical spaces
- Disruption of services
- Theft or destruction of digital or physical resources
- Unauthorized modification of data

2.2.B.3
When adversaries disrupt power to a device, the device and any services it provides become unavailable. To disrupt power, adversaries may damage fuses or breakers in an electrical box, unplug or cut electrical wiring, or damage power distribution systems like substations and transformers.

2.2.B.4
When adversaries gain access to an area with sensitive information, they can steal or copy sensitive information.

2.2.B.5
When adversaries gain physical access to a device and its ports, they can plug in a keylogger or external drive containing malware, which could allow them to collect data from a user or possibly even to gain control of the device. With direct physical access adversaries can also physically destroy a device, making the device itself, any data stored on it, and any services it provides unavailable.

Securing Spaces

2.2.C
Assess and document risks from physical vulnerabilities.

2.2.C.1
Physical access to devices can allow adversaries to bypass many technical controls and layers of security.

2.2.C.2
High risks from physical vulnerabilities arise when sensitive information or systems are exposed in physical spaces without sufficiently restricted and controlled access.

ILLUSTRATIVE EXAMPLE
A server that stores customer data is in a room with no lock which is accessed via an unmonitored hallway.

2.2.C.3
Moderate risks from physical vulnerabilities arise when a noncritical or nonsensitive part of an organization is left unprotected in a way that it could act as a foothold for an adversary to gain initial access to other resources.

ILLUSTRATIVE EXAMPLE
An office has a reception area beyond which access is controlled; the receptionist has a computer that connects to the office's internal wireless network and the computer has exposed USB ports.

2.2.C.4
Low risks from physical vulnerabilities arise when a vulnerable asset is of low value and the vulnerability is unlikely to be exploited.

ILLUSTRATIVE EXAMPLE
Employees in an office that requires badge access have laptop computers that they leave on their desks unattended when they all go to lunch together. The computers do not contain any sensitive information, but there are no cables securing the devices to the desks.

SUGGESTED SKILLS

2

Mitigate Risk

TOPIC 2.3

Protecting Physical Spaces

Required Course Content

LEARNING OBJECTIVE

2.3.A

Identify managerial controls related to physical security.

ESSENTIAL KNOWLEDGE

2.3.A.1

Organizations should conduct employee security awareness training to educate employees about how they can contribute to the organization's security by:

- Detecting social engineering attempts like phishing
- Not badging other people into restricted areas
- Preventing device theft

2.3.A.2

Organizations should have a workstation security policy that outlines the measures necessary to protect a physical workplace. The policy may have tiers of workstation security based on the type of data handled at a workstation. Workstation policies often require:

- Locking devices before leaving workstations unattended to prevent unauthorized access
- Clearing sensitive documents off workstations before leaving them unattended (sometimes called a clean desk policy)
- Using a privacy screen filter or other physical barrier to prevent others from viewing information on the screen
- Connecting devices to surge protectors or uninterruptible power supplies (UPS)

Securing Spaces

2.3.B
Determine mitigation strategies for risks from physical vulnerabilities.

2.3.B.1
To determine a relevant control, a cyber defender considers how an adversary could take advantage of a vulnerability to attack a system and how to prevent, detect, or correct the attack.

2.3.B.2
Installing physical controls like fencing, gates, and bollards around a building can deter adversaries from trying to physically access an organization's buildings.

2.3.B.3
Locks on doors, server cabinets, and computers can prevent devices from being accessed or stolen.

2.3.B.4
Card readers can record which employee badges are being used to access different entries at specific times and deny access to unauthorized badges.

2.3.B.5
Access control vestibules and turnstiles can prevent an authorized person from intentionally or accidentally admitting an unauthorized person into a restricted area.

2.3.B.6
Organizations can disable USB ports to prevent external drives from loading malware onto a computer.

2.3.B.7
An uninterruptible power supply (UPS) provides a backup power source for a device in the event of a power outage. Organizations can also use power generators to provide power at a larger scale to a building or set of critical devices.

2.3.B.8
Organizations prioritize risk mitigations based on the severity of the risks and the cost of the recommended mitigations.

SUGGESTED SKILLS

3

Detect Attacks

TOPIC 2.4
Detecting Physical Attacks

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
2.4.A Identify ways security controls can detect physical attacks.	**2.4.A.1** Cameras can capture a visual record of an adversary's malicious activity. The feed from a camera should be recorded and monitored for maximum effect. Recordings can be especially helpful in after-incident investigations. **2.4.A.2** Security guards can monitor activity in an area and respond to suspicious activity once detected. **2.4.A.3** Motion sensors can alert security to movement in an area. **2.4.A.4** Employees that work in a physical space are often the first to notice the presence of an unauthorized person and can alert security.
2.4.B Determine effective placement of security controls for detecting physical attacks.	**2.4.B.1** When placing cameras, consideration should be given to visual coverage, angle, and the ability to be tampered with by an adversary. Consideration should also be given to what a camera in a specific area could capture an adversary doing and how that information would be helpful. Points of ingress and egress are often monitored by camera. **2.4.B.2** Motion sensors should be placed in areas where traffic is unexpected, like server rooms, or areas where sensitive materials are stored and few people have access. Motion sensors in high-traffic areas create many false alarms, making the alarms less likely to be taken seriously when there is a real security event.

2.4.B
Determine effective placement of security controls for detecting physical attacks

2.4.B.3
Locks should be placed on all entries to areas containing sensitive information or systems. For areas with particularly sensitive information or systems, an organization could use an access control vestibule at the entry point to prevent piggybacking or tailgating.

2.4.B.4
Security guards can be stationary or patrolling. Stationary guards can provide constant protection for a specific area, entrance, or high-value item. Patrolling guards are more difficult for an adversary to plan around and can create time pressure for an adversary. Placing stationary guards at places that funnel traffic (e.g., entry gates, main entrances or lobbies, and entrances to more secure access areas) can be highly effective, while patrolling guards are better suited for perimeters and exterior areas.

2.4.C
Apply detection techniques to identify physical attacks.

2.4.C.1
Cameras provide visual monitoring and a visual record of activity within a designated space. Cameras can be paired with facial recognition software that can provide alerts when unauthorized individuals enter controlled areas. Once a physical breach has been detected, defenders can use live and recorded camera footage to track an adversary's path and actions.

2.4.C.2
Motion detectors work best when paired with cameras. When a security alert is raised because a motion detector has been activated, defenders can use cameras to check the space visually and verify a physical security breach.

2.4.C.3
When employees are required to use an electronic badge to unlock a door to a restricted area, a sensor can record how long the door was open. In reviewing entry logs for the door, potential piggybacking or tailgating can be detected by doors being open for longer than normal lengths of time.

AP CYBERSECURITY

UNIT 3

Securing Networks



~26
CLASS PERIODS

UNIT 3 ~26 CLASS PERIODS

Securing Networks

Developing Understanding

Most digital devices are connected to other devices through a computer network. The transmission of data between devices creates new opportunities for adversaries, so defenders must think carefully about how networks are designed and how data is protected while in transit. In this unit, students learn about common network attacks and how to protect against them. Students study the benefits of network segmentation and learn how to place and configure firewalls to manage network traffic. They also learn how to analyze network log files to find possible indicators of compromise (IoCs).

Building Cybersecurity Skills

In Unit 3, students learn to apply their risk assessment skills in the domain of networking, identifying vulnerabilities and evaluating the likelihood and impact of a vulnerability being exploited to determine the risk. Students learn how to apply security controls to a network to help prevent and deter adversaries, and how to collect and analyze network data to detect attacks. Students also learn how automated tools, including AI, enable faster, more efficient detection of malicious activity on networks.

Unit Scenarios

The scenarios for this unit are designed to connect the knowledge and skills students gain to realistic workplace tasks. The scenarios are paired with relevant student activities. Teachers may use their own scenarios in addition to, or in lieu of, those provided here.

SCENARIO 3A:
Protecting Patient Medical Data

You are a network security engineer at Adams County Hospital. Adams County Hospital maintains public servers that run a web application for patients to book appointments and pay bills and an internal file server that stores patient records (see network diagram). You need to determine the best placement for two new firewalls to protect these servers and then configure the servers to meet a set of specifications.

You will:

- Review the building plans and current security controls for this new lab and identify physical vulnerabilities
- Assess the risk from the vulnerabilities identified
- Recommend physical security controls to mitigate these vulnerabilities
- Recommend the placement of monitoring equipment to detect physical security breaches

SCENARIO 3B:
Configuring a Secure Wireless Network

In the aftermath of a natural disaster, as a network technician in the National Guard, you have been called up and asked to set up a secure wireless network at the local high school gymnasium, which has been converted to an emergency shelter, so that those who lost their homes in the disaster can have access to the internet to communicate with family and friends.

There is a satellite link that will provide the access to the internet. Your task is to determine the security features necessary to ensure that the network is safe to use. Your plan should include measures to detect possible malicious activity on the network that would compromise security or performance.

You will:

- Describe configurations to secure the wireless network
- Recommend a collection of detective controls to monitor the network and raise an alert for any potential malicious activity
- Describe the impact of the detective control recommendations

SCENARIO 3C:

Protecting a Network on a Naval Submarine

Submarines are a critical component in a modern navy. Modern submarines have sophisticated control mechanisms that are run by computers that communicate via a secure network. You are a network technician on a naval submarine, and you manage three LANs:

- A dedicated LAN for the weapons systems
- A secure LAN for official naval operations
- A LAN for crew to use for recreation

You will consider the various levels of security needed for each of these LANs and how best to protect each one. Then you will:

- Recommend security features for each LAN
- Use a diagram to demonstrate the recommended security features

UNIT AT A GLANCE

Topic	Learning Objectives	Scenario Connections	Class Periods
3.1 Network Vulnerabilities and Attacks	**3.1.A** Identify common network attacks. **3.1.B** Explain how adversaries can exploit network vulnerabilities to steal, disrupt, or destroy network communication. **3.1.C** Assess and document risks from network vulnerabilities.	**3A Protecting Patient Medical Data** ▪ Analyze the current network architecture and determine network vulnerabilities.	6
3.2 Protecting Networks: Managerial Controls and Wireless Security	**3.2.A** Identify managerial controls related to network security. **3.2.B** Configure wireless network security features.	**3B Configuring a Secure Wireless Network** ▪ Describe configurations to secure the wireless network.	3
3.3 Protecting Networks: Segmentation	**3.3.A** Identify techniques for segmenting a network. **3.3.B** Explain why network segmentation can increase network security.	**3C Protecting a Network on a Naval Submarine** ▪ Recommend security features for each LAN. ▪ Use a diagram to demonstrate the recommended security features.	2
3.4 Protecting Networks: Firewalls	**3.4.A** Identify types of network-based firewalls. **3.4.B** Explain how a firewall uses an access control list to allow or deny traffic entering or leaving a network. **3.4.C** Determine the effective placement of firewalls in a network. **3.4.D** Configure a firewall to manage the flow of network traffic.	**3A Protecting Patient Medical Data** ▪ Determine the type and placement of Firewalls A and B within the existing network. ▪ Configure Firewall A so that external traffic can securely communicate with the web server while blocking other types of nonrelevant, potentially malicious traffic. ▪ Configure Firewall B so that only employees on the internal network can access patient records on the file server. **3C Protecting a Network on a Naval Submarine** ▪ Recommend security features for each LAN. ▪ Use a diagram to demonstrate the recommended security features.	8
3.5 Detecting Network Attacks	**3.5.A** Identify types of automated security tools used to detect network attacks. **3.5.B** Explain how organizations can leverage artificial intelligence (AI) to enhance threat detection and response. **3.5.C** Determine a network detection method. **3.5.D** Evaluate the impact of a network detection method. **3.5.E** Apply detection techniques to identify indicators of network attacks by analyzing log files.	**3B Configuring a Secure Wireless Network** ▪ Recommend a collection of detective controls to monitor the network and raise an alert for any potential malicious activity. ▪ Describe the impact of the detective control recommendations.	7

TOPIC 3.1

Network Vulnerabilities and Attacks

SUGGESTED SKILLS

1

Analyze Risk

Required Course Content

LEARNING OBJECTIVE

3.1.A

Identify common network attacks.

ESSENTIAL KNOWLEDGE

3.1.A.1

The address resolution protocol (ARP) is used by a default gateway on a network to establish a table that pairs internet protocol (IP) addresses with media access control (MAC) addresses. An ARP poisoning attack is when an adversary sends falsified ARP packets to the default gateway to modify the table so that the adversary's device receives traffic intended for the target by linking the target's IP address to the adversary's MAC address. Faking a MAC address is called MAC spoofing. This is an example of an on-path attack (or man-in-the-middle attack), which is when an adversary interrupts a data stream between two parties, captures both parties' data, and copies or alters the data before sending them on. Both parties think they are communicating directly with each other, but instead they are each communicating with the adversary who is secretly intercepting their messages.

3.1.A.2

A MAC flooding attack is when an adversary sends the target switch many Ethernet frames, each with a different MAC address. This can force the switch into broadcast mode, and the adversary can then collect all of the frames on the network (because they are being broadcast), which could allow the adversary to access sensitive information. This is an example of eavesdropping (or sniffing), which is when an adversary captures data in transit and can record and copy the data.

3.1.A Identify common network attacks.	**3.1.A.3** A domain name system (DNS) poisoning attack is when an adversary pretends to be an authoritative name server (NS) and plants a fake DNS record on a DNS server to redirect browser traffic to a malicious website designed to steal credentials. This is an example of credential harvesting, which is when adversaries set up a fake login site that looks like a real one. Unsuspecting users enter their real credentials, which the adversaries capture and use. **3.1.A.4** A smurf attack attempts to overwhelm a network with Internet Control Message Protocol (ICMP) requests. It is a type of denial of service (DoS) attack, which makes a system or resource unavailable to authorized users. During a smurf attack, an adversary sends many ICMP requests with the victim's address to the network's broadcast address. The network's gateway then sends these requests to all devices on the network. Each device on the network replies to the victim's address, creating a flood of traffic that can block legitimate messages. When multiple devices attack the same target simultaneously, it's called a distributed denial of service (DDoS) attack.
3.1.B Explain how adversaries can exploit network vulnerabilities to steal, disrupt, or destroy network communication.	**3.1.B.1** Adversaries can send malicious traffic into a network to flood it creating a DoS, to map the internal structure of the network, or to spoof a legitimate device. Networks without firewalls, or with improperly configured firewalls, are vulnerable to these types of attacks. **3.1.B.2** Adversaries that have compromised a device often attempt to leverage their access to compromise other devices on the local area network (LAN). **3.1.B.3** Adversaries that physically plug into a data port can gain access to a LAN through the switch port unless port security is enabled. This allows adversaries to launch DoS attacks or perform MAC flooding or MAC spoofing attacks.

3.1.B
Explain how adversaries can exploit network vulnerabilities to steal, disrupt, or destroy network communication.

3.1.B.4
Adversaries standing outside of physically secure spaces can pick up the signals and beacon frames from a wireless access point that is broadcasting outside the physical space. This allows them to gather information about the wireless network and to attempt eavesdropping and cryptographic attacks on it.

3.1.B.5
Adversaries can attempt to join networks to launch attacks from within the networks. Networks that do not authenticate devices and users make it easier for adversaries to join.

3.1.B.6
If there is an open network port, an adversary can plug a wireless access point into the port creating a rogue access point. The adversary could use this rogue access point to access the internal network wirelessly (maybe even from outside the physical space). This allows the adversary direct access to the LAN, bypassing any firewalls.

3.1.B.7
Adversaries can attempt to break wireless encryption and intercept, steal, or compromise data on a network.

3.1.C
Assess and document risks from network vulnerabilities.

3.1.C.1
Vulnerabilities on a network can lead to adversaries being able to intercept and alter data in transit, launch DoS attacks, or move laterally on a network to gain access to more sensitive or critical systems. Network vulnerabilities can constitute a risk to confidentiality, integrity, and availability.

3.1.C.2
There are automated vulnerability scanners that can check networks, devices, and applications for known vulnerabilities. These scanners produce a report that often includes the vulnerabilities detected, their severity, and mitigation recommendations.

3.1.C.3
Successfully exploiting a network vulnerability often requires advanced technical ability and knowledge. This can impact the likelihood of an exploit.

3.1.C
Assess and document risks from network vulnerabilities.

3.1.C.4
High risks from network vulnerabilities allow an adversary to easily have a significant impact by capturing network traffic, spoofing a legitimate device on the network, or launching a DoS attack.

ILLUSTRATIVE EXAMPLE
An organization has a single unsegmented internal network that is accessible via a wireless network with weak encryption, and on that network it has a server running its proprietary web-application.

3.1.C.5
Moderate risks from network vulnerabilities could include vulnerabilities that might give adversaries the ability to gain information about systems or devices on a network.

ILLUSTRATIVE EXAMPLE
An organization's external firewall is not configured to block external ICMP traffic.

3.1.C.6
Low risks from network vulnerabilities include vulnerabilities that would be difficult to exploit and would likely have minimal negative impacts on an organization.

ILLUSTRATIVE EXAMPLE
An organization has wireless access points that broadcast a beacon frame, which contains the network service set identifier (SSID) and the wireless encryption protocols.

SUGGESTED SKILLS

2

Mitigate Risk

TOPIC 3.2

Protecting Networks: Managerial Controls and Wireless Security

Required Course Content

LEARNING OBJECTIVE

3.2.A

Identify managerial controls related to network security.

ESSENTIAL KNOWLEDGE

3.2.A.1

A router security policy will set forth a minimum configuration standard for routers on an organization's network and may include:

- Banning local user accounts (All router logins must use an approved authentication server.)
- Disabling unnecessary services (e.g., Telnet)
- Requiring a firewall (An organization may opt for a firewall device separate from the router.)

3.2.A.2

A switch security policy will set forth a minimum configuration standard for switches on an organization's network and may include:

- Banning local user accounts (All switch logins must use an approved authentication server.)
- Requiring port security to be enabled.
- Using MAC filtering

3.2.A.3

A virtual private network (VPN) policy will detail the minimum security requirements for employees using a VPN to access an organization's internal network, and it may include:

- A list of roles within the organization that are allowed to use a VPN to access the organization's internal network

3.2.A
Identify managerial controls related to network security.

- Authentication requirements for employees using a VPN (e.g., public/private key system or MFA)
- A prohibition against split tunneling (also called dual tunneling)

3.2.A.4
A wireless security policy will establish the minimum security requirements for wireless networks within an organization and may include:

- Requiring users to authenticate to the wireless network through an extensible authentication protocol (EAP) connected to an approved authentication server
- Requiring all wireless traffic to be encrypted using AES encryption with a minimum key length
- Disabling beacon frames on wireless access points

3.2.B
Configure wireless network security features.

3.2.B.1
Organizations can disable beacon frame broadcasting on wireless access points (WAPs) to make it harder for adversaries to find their wireless network and learn its basic properties.

3.2.B.2
Organizations can control the broadcast direction and signal strength of a WAP so the signal does not extend beyond the physical space the access point is meant to cover.

3.2.B.3
Organizations should enable strong wireless encryption protocols to ensure wireless frames are not readable by adversaries who might intercept them.

- WEP, WPS, and the original WPA wireless encryption protocols have known vulnerabilities and are insecure.
- WPA3 is currently the strongest wireless encryption algorithm.

3.2.B.4
Organizations can enable MAC filtering to prevent unauthorized devices from accessing the network, and they can require users to authenticate when joining a network.

TOPIC 3.3

Protecting Networks: Segmentation

SUGGESTED SKILLS

2

Mitigate Risk

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
3.3.A Identify techniques for segmenting a network.	3.3.A.1 Firewall zones and rules can be used to create a screened subnet (also known as a demilitarized zone, or DMZ)—a network segment that sits between public, external networks like the internet and internal, private networks. A screened subnet is typically is a lower security zone than the internal, private networks, and it typically holds an organization's publicly facing resources, separating them from the internal network.
	3.3.A.2 Subnetting can be used to create different subnets based on IP addressing. If a device is compromised by an adversary, subnets can contain a security breach to reduce the number of exposed devices.
	3.3.A.3 Switches can be used to create VLANs, which logically separate devices physically connected to central switches.
3.3.B Explain why network segmentation can increase network security.	3.3.B.1 Network segmentation refers to the process of dividing a network into smaller, isolated segments or subnetworks (subnets).
	3.3.B.2 Dividing a network into smaller subnets isolates network traffic, which can prevent attacks on one subnet from impacting devices on other subnets.

3.3.B
Explain why network segmentation can increase network security.

3.3.B.3
Network segmentation can allow for different security policies and controls to be applied to different segments of the network, allowing for higher security zones and lower security zones.

3.3.B.4
Port security on a switch can prevent MAC flooding by limiting the number of addresses assignable to any single switch port.

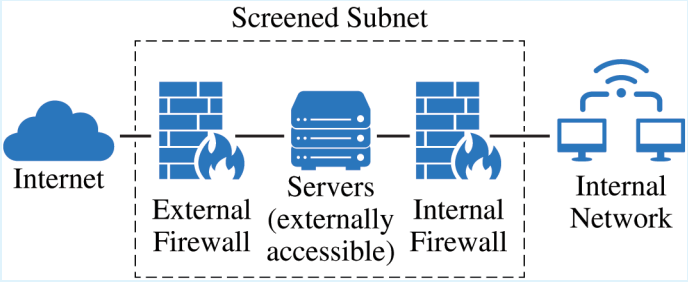


FIGURE 3.3: Screened Subnet (also referred to as DMZ)

A screened subnet, also known as a DMZ, is a part of a network that is behind a firewall but still externally accessible. Screened subnets often contain servers that host web applications or websites. Beyond the screened subnet is a second firewall that more strictly restricts access to the LAN behind it.

SUGGESTED SKILLS

2

Mitigate Risk

TOPIC 3.4
Protecting Networks: Firewalls

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
3.4.A Identify types of network-based firewalls.	3.4.A.1 A firewall is used to allow or deny network traffic in or out of a network. The firewall itself is software that can be hosted on a standalone device or integrated into another network device, such as a router. 3.4.A.2 A stateless firewall filters traffic based on information in packet headers, such as IP addresses, ports, and protocols. 3.4.A.3 A stateful firewall (also known as dynamic packet filtering) tracks the state of network connections passing through the firewall and can filter according to connection-related rules in addition to the filtering done by a stateless firewall. This allows for more control over content allowed in and out of a network. 3.4.A.4 A next-generation firewall (NGFW) has both the capabilities of typical stateless and stateful firewalls and additional advanced features, such as intrusion prevention, deep packet inspection, and filtering by application type.
3.4.B Explain how a firewall uses an access control list to allow or deny traffic entering or leaving a network.	3.4.B.1 Network administrators create a set of rules, called an access control list (ACL), that a firewall uses to permit or deny inbound and outbound network traffic.

3.4.B Explain how a firewall uses an access control list to allow or deny traffic entering or leaving a network.	**3.4.B.2** ACL rules are checked in order and the first rule that matches the criteria will be executed for the specified data. **3.4.B.3** A typical ACL will specify the direction of traffic (inbound or outbound), the criterion to filter by (IP addresses, logical port, service, or application), and the action to take (permit or deny).
3.4.C Determine the effective placement of firewalls in a network.	**3.4.C.1** Each segment of a network should have a firewall to control the flow of data in and out of that segment. **3.4.C.2** Network segments may have different security needs based on the data and services within them. The level of security for each firewall can be set independently. **3.4.C.3** Each point of data ingress and egress between the internal network and the public internet should have a firewall.
3.4.D Configure a firewall to manage the flow of network traffic.	**3.4.D.1** The requirements for a firewall will specify what type of traffic from which sources or to which destinations should be allowed or denied. **3.4.D.2** Specific rules for a firewall can allow or deny inbound or outbound traffic based on source or destination port or IP address, service, protocol, or application. **ILLUSTRATIVE EXAMPLES** ▪ **`Allow inbound TCP port 22 from ALL;`** (this rule will allow all inbound TCP traffic with destination port 22, which is the designated port for the SSH protocol) ▪ **`Deny inbound TCP port 80 from 192.168.1.0/24;`** (this rule will deny inbound TCP traffic with destination port 80 from IP addresses in the 192.168.1.0-192.168.1.255 range)

3.4.D
Configure a firewall to manage the flow of network traffic.

3.4.D.3
Rules are implemented in order, and changing the order of a set of rules can change which traffic is allowed or denied. Consideration must be given to the precedence of filtering priorities when establishing the order of rules.

ILLUSTRATIVE EXAMPLES

This set of rules would allow SSH traffic and deny other inbound TCP traffic

- Rule 1: `ALLOW inbound TCP port 22 from ALL;`
- Rule 2: `DENY inbound TCP ALL from ALL;`

Reversing the order of those rules would deny all inbound TCP traffic including SSH traffic.

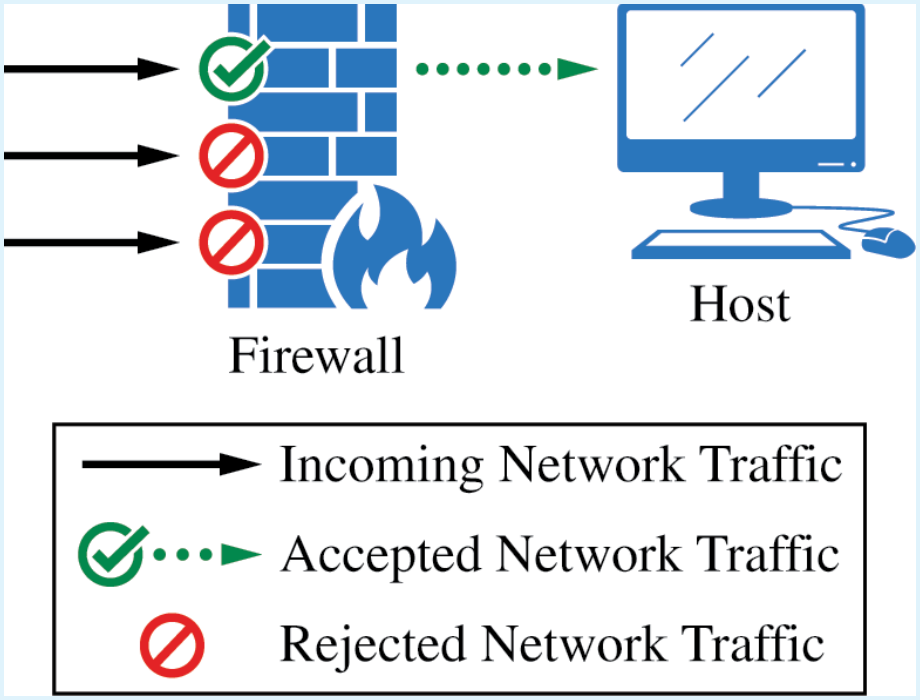


FIGURE 3.4: The Process of Firewalls

A firewall is used to admit or deny traffic entry into a network or host. Firewalls might use source IP addresses, destination IP addresses, or logical ports to filter traffic. This illustration depicts a firewall controlling incoming traffic. Note that firewalls can control traffic into, out of, and within a network.

SUGGESTED SKILLS

3

Detect Attacks

TOPIC 3.5
Detecting Network Attacks

Required Course Content

LEARNING OBJECTIVE

3.5.A
Identify types of automated security tools used to detect network attacks.

ESSENTIAL KNOWLEDGE

3.5.A.1
Automated detection tools analyze data collected from an organization's network and devices, such as switches and routers, servers, firewalls, and user computers. These data are often collected in a log file.

3.5.A.2
A network intrusion detection system (NIDS) is an automated tool that analyzes data to determine if malicious activity is taking place on a network. When an attack is detected, it generates an alert.

3.5.A.3
A network intrusion prevention system (NIPS) is an automated tool that, like an IDS, analyzes data to determine if malicious activity is taking place on a network. A NIPS can also mitigate or halt an attack by closing ports, blocking specific IP or MAC addresses, or rejecting specific protocols.

3.5.A.4
A security information and event management (SIEM) system collects and analyzes data from multiple sources (including firewalls, NIDS/NIPS, device logs, and application logs) to detect patterns that may indicate a cyberattack and raises an alert if a potential attack is detected. Security analysts investigate the alert to determine whether it represents a true threat and follow standard operating procedures to resolve or escalate the alert.

3.5.B Explain how organizations can leverage artificial intelligence (AI) to enhance threat detection and response.	**3.5.B.1** Computers log every action that users take. Firewalls, IDS, IPS, and other network sensors log all the traffic passing through various points in a network. A medium-sized organization's network is logging millions (or even tens of millions) of data points per day. Even a large team of humans is incapable of analyzing so much data. **3.5.B.2** Threat detection teams are creating AI algorithms to analyze large amounts of data and classify the data patterns as malicious or normal. **3.5.B.3** AI models for threat detection are based on probabilistic calculations; they report a percentage to indicate the likelihood that something is malicious. **3.5.B.4** Organizations determine their own thresholds for what percentage of likelihood of a threat results in an alert. If the threshold is set too high, real attacks may go undetected; if the threshold is too low, the security team will be overwhelmed with false alerts.
3.5.C Determine a network detection method.	**3.5.C.1** Volume of network traffic is a criterion for determining a detection method. Signature-based detection is more efficient for networks with high traffic volume. Signature-based detection compares detection data to a database of known indicators of compromise (IoCs), called signatures. Signature databases must be updated with IoCs for the latest attacks. Signature-based detection runs more quickly than anomaly-based detection. **3.5.C.2** Consistency of network traffic patterns is a criterion for determining a detection method. Anomaly-based detection is most effective on networks with consistent traffic patterns. Anomaly-based detection compares detection data to a baseline of recorded activity. Baselines must be recorded on uncompromised systems to establish expected data types and volumes. Anomaly-based detection triggers an alert or action when data types or volumes outside of a specified tolerance range are recorded. Anomaly-based detection relies on consistent patterns in network traffic to detect anomalous traffic patterns.

3.5.C
Determine a network detection method.

3.5.C.3
Degree of sensitivity or criticality of a network is a criterion for determining a detection method. Networks with more sensitive or critical data or services will likely consider a hybrid approach. Hybrid detection combines signature-based and anomaly-based detection. Hybrid detection is more expensive than using either signature- or anomaly-based detection alone, and hybrid-detection models generate more alerts.

3.5.C.4
Likelihood of novel attacks on a network is a criterion for determining a detection method. Signature-based detection cannot detect a new attack. When an organization suspects that adversaries are likely to attempt a new attack on a network, anomaly-based detection is the preferred method when the cost of hybrid detection is prohibitively high.

3.5.D
Evaluate the impact of a network detection method.

3.5.D.1
Speed of detection is a factor in evaluating the impact of a network detection method. Faster detection enables faster response. Signature-based detection methods are faster than anomaly-based detection methods, especially on networks with high traffic volume.

3.5.D.2
Cost is a factor in evaluating the impact of a network detection method. Detection tools and ongoing costs need to be within a budget. Anomaly-based detection systems require more expensive hardware to operate than signature based. Hybrid detection is the most expensive option because it combines both anomaly- and signature-based methods.

3.5.D.3
False positive rate is a factor in evaluating the impact of a network detection method. Signature-based detection has almost no false positives. Anomaly-based or hybrid detection will have higher false positive rates. Impacts of high false positive rates include:

- Time and resources are put toward investigating alerts for nonmalicious activity.
- Alert fatigue is a condition that occurs when responders get accustomed to false positives and take alerts less seriously because they assume alerts are false positives before investigating them.

3.5.D Evaluate the impact of a network detection method.	**3.5.D.4** False negative rate is a factor in evaluating the impact of a network detection method. A false negative occurs when an adversary can bypass a detection system. Signature-based detection systems are easier to bypass than anomaly-based or hybrid systems. False negatives can result in adversaries causing loss, harm, disruption, or destruction to data and systems.
3.5.E Apply detection techniques to identify indicators of network attacks by analyzing log files.	**3.5.E.1** Evil-twin attacks can be detected by regularly scanning for service set identifiers (SSIDs) that look suspicious or similar to local legitimate SSIDs. Signal triangulation can be used to locate and disable an access point broadcasting an evil-twin network. **3.5.E.2** Jamming attacks can be detected by recognizing that no wireless devices in a specific physical space are able to connect to a wireless network and by scanning for electromagnetic (EM) noise in the wireless range. **3.5.E.3** ARP poisoning attacks can be detected by monitoring network traffic for unusual ARP messages (particularly duplicate MAC address ARP packets) and checking the ARP table on the default gateway. **3.5.E.4** MAC flooding attacks can be detected by monitoring network traffic for an unexpected surge of Ethernet frames with different MAC addresses and checking the MAC address table on a switch. **3.5.E.5** DNS poisoning attacks are difficult to detect. However, if an organization's website experiences an abrupt and otherwise inexplicable drop in traffic, DNS records should be examined as a potential cause. **3.5.E.6** Smurf attacks can be detected by watching network traffic for a sudden increase in ICMP requests sent to the network's broadcast address.

3.5.E
Apply detection techniques to identify indicators of network attacks by analyzing log files.

3.5.E.7
Network-based IoCs are discovered when analyzing network traffic, often in the form of packet capture files. Indicators can be found in source and destination IP addresses, ports, and protocols. These can include:

- Connections to known malicious IP addresses
- Unauthorized network scans
- Unusual spikes or slow downs in network traffic
- Mismatched port-application traffic

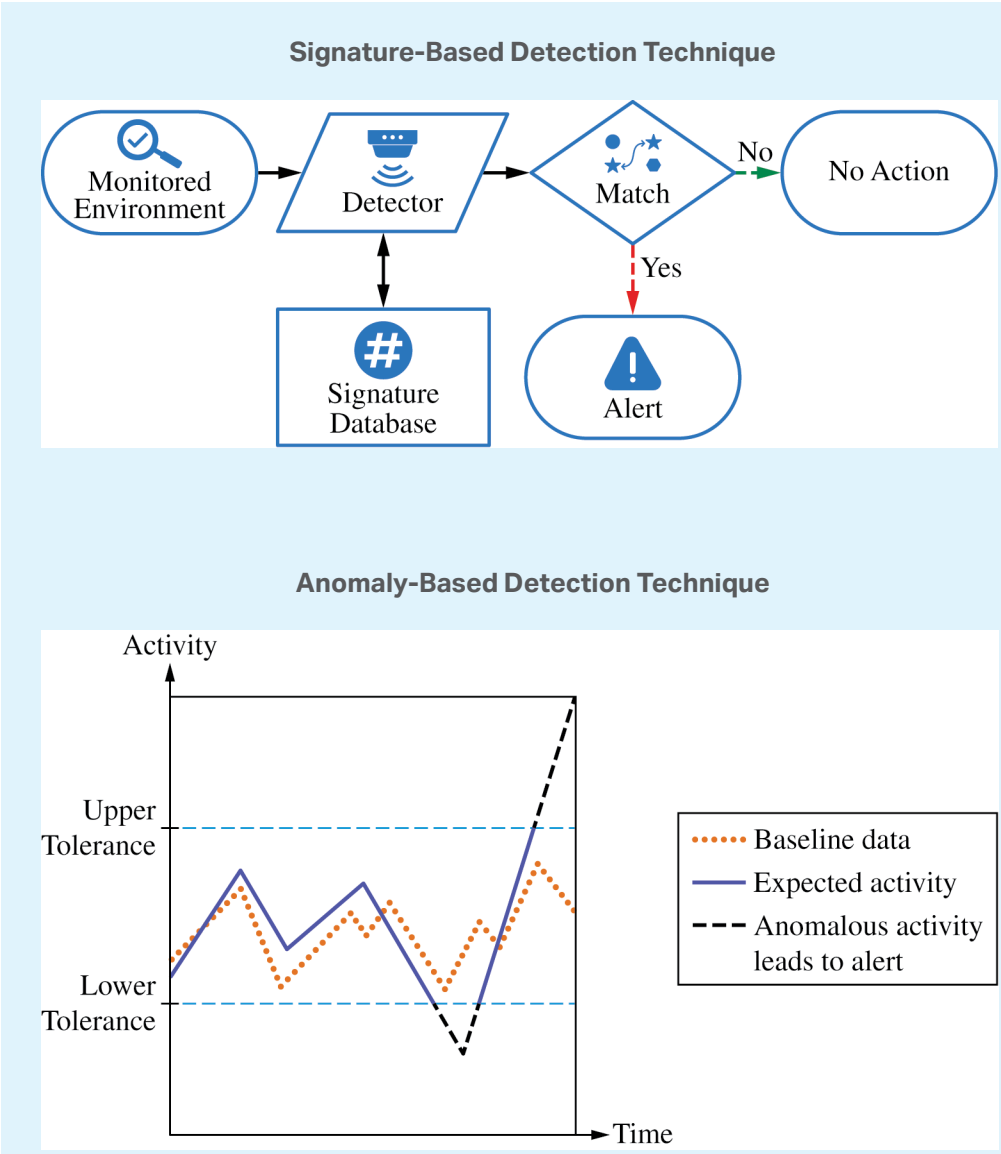


FIGURE 3.5: Signature-Based vs. Anomaly-Based Detection Techniques

Signature-based detection (top) showcases identification of known malware through digital signatures, relying on predefined patterns for efficient threat detection. Anomaly-based detection (bottom) demonstrates detection of new threats by analyzing deviations from normal behavior, identifying potential risks based on abnormal patterns. This enhances overall security measures.

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AP CYBERSECURITY

UNIT 4

Securing Devices



~23
CLASS PERIODS

UNIT 4 ~23 CLASS PERIODS

Securing Devices

Developing Understanding

Computer devices store, process, and transmit all the digital data in the world. Devices include computer systems and laptops, smart phones and tablets, and a range of items that have microcomputers installed in them, like washing machines and coffee makers—these are often called smart devices or IoT (Internet of Things) devices. In Unit 4, students learn about how systems authenticate users of devices and how adversaries attempt to impersonate legitimate users. Students come to understand how adversaries use malware to compromise devices and the importance of keeping devices updated and of using anti-malware software. Students also learn how to analyze log files for indicators of compromise (IoCs).

Building Cybersecurity Skills

As more everyday items incorporate embedded computers, device vulnerabilities and attacks are growing rapidly. In this unit, students learn to assess risk based on these new vulnerabilities. They learn how devices can be protected as another part of a defense-in-depth security strategy. Students also practice detecting attacks against devices by reviewing authentication logs for IoCs.

Unit Scenarios

The scenarios for this unit are designed to connect the knowledge and skills students gain to realistic workplace tasks. The scenarios are paired with relevant student activities. Teachers may use their own scenarios in addition to, or in lieu of, those provided here.

SCENARIO 4A:
Designing Secure Connected Farm Equipment

You work as a security engineer for a company that manufactures internet-connected machinery for agricultural purposes (e.g., tractors, irrigation tools, and automated milking machines for dairy farms). These machines all have onboard computers that allow farmers to remotely control the devices. The computers are updated on an as-needed basis. Some of the machines use GPS to locate and maneuver themselves.

There have been reports of cyberattacks against farming equipment, and your boss has asked you to write a report detailing possible vulnerabilities with suggested mitigations to ensure that the machines your company produces are as safe as possible.

You will:

- Research how an adversary might take advantage of internet-connected farm equipment, and assess the risk from possible vulnerabilities
- Determine possible mitigation strategies to help secure the equipment
- Produce a report for your manager, summarizing your findings and making recommendations

SCENARIO 4B:
Configuring Authentication Settings

You are a junior system administrator at Aceshack, an engineering firm. A new desktop computer has been set up in a drop-in area of Aceshack's office for remote workers who are coming in just for the day. This new computer needs the security settings configured to comply with Aceshack's policies.

You will log on to this computer as an administrator and configure the local security settings related to the password and account-lockout policies.

SCENARIO 4C:
Analyzing Log Files for Indicators of Compromise

You are a forensic analyst for Dynamic, a local manufacturing company. Dynamic has separate networks for its offices and its manufacturing plants. Last month, there was a cyberattack against its business office network, but the adversaries were not able to compromise the manufacturing network. However, the security team has detected continued suspicious activity on the business network, and

they are concerned that the suspicious activity may stem from the original attack and may eventually lead to the manufacturing environment also being compromised. You have been asked to analyze the authentication logs for devices on the manufacturing network for signs of adversaries attempting to compromise the manufacturing plant.

You will:

- Review authentication logs for devices on the manufacturing network
- Identify any potential indicators of compromise (IoCs)
- Submit a report summarizing your findings and recommendations

UNIT AT A GLANCE

Topic	Learning Objectives	Scenario Connections	Class Periods
4.1 Device Vulnerabilities and Attacks	**4.1.A** Identify types of computing devices. **4.1.B** Identify the type of malware used in a cyberattack. **4.1.C** Explain how adversaries can exploit common device vulnerabilities to cause loss, damage, disruption, or destruction. **4.1.D** Assess and document risks from device vulnerabilities.	**4A Designing Secure Connected Farm Equipment** ▪ Research how an adversary might take advantage of internet-connected farm equipment, and assess the risk from possible vulnerabilities. ▪ Produce a report for your manager, summarizing your findings and making recommendations.	6
4.2 Authentication	**4.2.A** Explain why hashes (also called hash outputs, checksums, message digests, or digests) are used to store passwords. **4.2.B** Explain how password attacks exploit vulnerabilities. **4.2.C** Determine the type of authentication used to verify the identity of a user. **4.2.D** Configure login settings to make a device more secure.	**4B Configuring Authentication Settings** ▪ Configure the local security settings related to the password and account-lockout policies.	5
4.3 Protecting Devices	**4.3.A** Identify managerial controls related to device security. **4.3.B** Explain how anti-malware software can make a device more secure. **4.3.C** Explain why keeping a device's operating system and software updated makes it more secure. **4.3.D** Configure a host-based firewall.	**4A Designing Secure Connected Farm Equipment** ▪ Determine possible mitigation strategies to help secure the equipment.	5
4.4 Detecting Attacks on Devices	**4.4.A** Explain how to detect attacks against devices. **4.4.B** Determine controls for detecting attacks against a device. **4.4.C** Evaluate the impact of a device detection method. **4.4.D** Apply detection techniques to identify indicators of password attacks by analyzing log files.	**4C Analyzing Log Files for Indicators of Compromise** ▪ Review authentication logs for devices on the manufacturing network. ▪ Identify any potential IoCs. ▪ Submit a report summarizing your findings and recommendations.	7

SUGGESTED SKILLS

1

Analyze Risk

TOPIC 4.1
Device Vulnerabilities and Attacks

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
4.1.A Identify types of computing devices.	4.1.A.1 Server computers are devices that provide one or more services to other computers (e.g., DNS, DHCP, FTP). Any computer can be a server, and in an enterprise environment servers typically have more processing power and storage than a personal computer. 4.1.A.2 Personal computers are devices that are designed to be used by one person for work or recreational purposes (e.g., word processing, graphic design, web browsing, and media production or viewing). These include desktop, laptop, and notebook computers. 4.1.A.3 Handheld computers (also called mobile computers or information appliances) are smaller than personal computers and run on battery power. These include tablets, smartphones, and wearable technology like smart watches. 4.1.A.4 Embedded computers are devices that are part of a machine. Embedded devices have specific instruction sets for interfacing with the specialized components of the machine they're embedded in. Embedded computers tend to be slower and cheaper than other computers and have minimal storage.

4.1.A
Identify types of computing devices.

4.1.A.5
Everyday devices with embedded computers are often called Internet of Things (IoT) devices. Embedded computers are found in transportation (e.g., cars, trains, and airplanes), devices that operate critical infrastructure (e.g., operating circuit breakers at electrical substations and pumps at water treatment plants), medical equipment (e.g., IV pumps, MRI scanners, pacemakers, and insulin pumps), and everyday devices like washing machines, coffee makers, and thermostats.

4.1.B
Identify the type of malware used in a cyberattack.

4.1.B.1
Malware is malicious software that can damage or destroy a device or network, or allow an adversary access to a device and the data on the device.

4.1.B.2
Malware is often used as a tool to accomplish part of an adversary's plan to achieve their ultimate goal(s). There are many types of malware, such as:

- Viruses are malware that must be activated by a user executing or opening a file.
- Worms spread from one computer to another without human interaction.
- Trojans are malware embedded in other software that seems harmless. Remote access trojans (RATs) provide an adversary with remote access to the target system.
- Ransomware encrypts a device's files, preventing the user from accessing files on the device. The ransomware typically presents the user with a screen demanding payment and promising to give the user a decryption key for their files if the user pays within a fixed amount of time.
- Spyware tracks a user's actions on a computer and sends information back to an adversary.
- A keylogger is software or hardware that logs the users keystrokes and sends the information back to the adversary. Adversaries can often extract usernames and passwords from keylogger data.
- Logic bombs are set to trigger their effect only when a specific set of conditions are met; the conditions can include time and date, specific type or version of the operating system, character set the computer is using, etc.

4.1.B
Identify the type of malware used in a cyberattack.

- A rootkit is sophisticated malware that gets into the target computer's operating system and can control nearly every aspect of the system, including making the rootkit itself invisible to detection.

4.1.B.3
While most malware is a file or a collection of files, fileless malware is malicious code that lives in RAM and uses legitimate programs already installed on a device to compromise it.

4.1.C
Explain how adversaries can exploit common device vulnerabilities to cause loss, damage, disruption, or destruction.

4.1.C.1
Adversaries can develop exploits for known vulnerabilities in software (including operating systems). Devices with unpatched software are vulnerable to these exploits, which could allow an adversary to crash a system, view user actions, enable or disable various services or components on the device (e.g., turning on a webcam or microphone), or even take control of the device to issue their own commands including commands to steal or destroy information on the device.

4.1.C.2
Adversaries can take advantage of weak authentication requirements by guessing a user's password or using social engineering to get a user to divulge their password.

4.1.C.3
When systems don't have a password on the basic input output system (BIOS) or unified extensible firmware interface (UEFI), an adversary can boot a computer into a special mode (e.g., "recovery mode") that gives them higher-level privileges. Without BIOS or UEFI protection, adversaries can load their own operating system onto a device from an external drive and use specialized tools to alter or create user profiles, including changing user passwords.

4.1.C.4
Adversaries can load malware onto an external drive, and if autorun is enabled, then a device will run the malware when the external drive is inserted.

4.1.C.5
Adversaries can leverage open ports to connect to a device.

4.1.C
Explain how adversaries can exploit common device vulnerabilities to cause loss, damage, disruption, or destruction.

4.1.C.6
Adversaries can send malicious data to devices to disrupt them or attempt to take control of them. Devices that have no firewall (or a misconfigured firewall) cannot filter out this malicious data.

4.1.C.7
Adversaries often attempt to install malware on a device to disrupt or control it. Devices lacking anti-malware software are more vulnerable to this type of attack.

4.1.D
Assess and document risks from device vulnerabilities.

4.1.D.1
Risk from device vulnerabilities can come from unauthorized access or malware that allow an adversary to impersonate an authorized user, remotely control a device, encrypt a device's drive to ransom the data, or wipe a device's memory, destroying data or rendering the device inoperable. The level of risk varies depending on the criticality of the device or the services the device provides or data it stores.

4.1.D.2
High risks from device vulnerabilities involve potentially compromising sensitive data or critical operations.

ILLUSTRATIVE EXAMPLE
An organization has not installed the most recent update for their email server which included a patch for a known critical vulnerability.

4.1.D.3
Moderate risks from device vulnerabilities can arise from weak authentication requirements or from vulnerabilities that would be less likely to be exploited.

ILLUSTRATIVE EXAMPLE
A water treatment plant has embedded systems controlling pumps. The pumps can be remotely accessed via username and password for remote management for the plant, but the devices do not require multi-factor authentication (MFA).

4.1.D.4
Low risks from device vulnerabilities are typically related to vulnerabilities that, if exploited, would have little impact.

ILLUSTRATIVE EXAMPLE
An employee's laptop has telnet port 23 open.

TOPIC 4.2
Authentication

SUGGESTED SKILLS

2

Mitigate Risk

Required Course Content

LEARNING OBJECTIVE

4.2.A

Explain why hashes (also called hash outputs, checksums, message digests, or digests) are used to store passwords.

ESSENTIAL KNOWLEDGE

4.2.A.1

A cryptographic hash function (also called a message digest function) is a mathematical algorithm that takes binary data of an arbitrary length, processes it according to a set of instructions, and outputs a fixed-length binary string called the hash (or checksum or message digest). Well known cryptographic hashes include:

- MD5
- SHA-1, SHA-256, SHA-512 (SHA stands for Secure Hash Algorithm)
- NTHash
- RIPEMD-160

4.2.A.2

An n-bit hash has 2^n possible outputs. The number of inputs is infinite, and so inevitably two different inputs will produce the same hash. This is called a collision.

4.2.A.3

Cryptographic hash functions have the following properties:

- Hashes are collision resistant; it is difficult to find two different inputs to the same hash function that produce the same output.
- Hashes have pre-image resistance; given a hash, it is infeasible to figure out the input that generated the hash.
- Hashes are repeatable; the same input will always produce the same hash.
- Hashes have a fixed length; the length in bits of the hash for a specific hash function is constant regardless of the size of the input.

4.2.A
Explain why hashes (also called hash outputs, checksums, message digests, or digests) are used to store passwords.

4.2.A.4
Adversaries try to compromise hashing functions by forcing collisions in their output. If an efficient algorithm exists to force a collision for a specific hash function, then that hash function will be deprecated (no longer used in secure settings). MD5 and SHA1 are examples of deprecated hash functions.

4.2.A.5
Password-based authentication services shouldn't store passwords in plaintext, so that if an adversary gains access to the user:password directory they won't immediately know the passwords for all users. Instead, user passwords should be hashed and the hash stored in a database. When a user enters their password, it is hashed, and the hash is compared to the hash stored on file. If the hashes match, then the user is authenticated.

4.2.A.6
If two users had the same password, then their passwords would have identical hashes in the user:password directory. To prevent this, a few random bits (called salt) are hashed with a user's password to generate the hash. Each user's salt is unique, so even if two users have the same password they will have a different password hash because they have different salt.

4.2.B
Explain how password attacks exploit vulnerabilities.

4.2.B.1
If an adversary can compromise the password of a legitimate user, and that user's organization has not enabled MFA or other authentication protections, then the adversary can act within that organization with all the access and rights available to the user.

4.2.B.2
Password attacks can be classified as online or offline.

- Online password attacks attempt user:password combinations in an active authentication portal.
- Offline password attacks have captured a user:password database and can run password attacks against the database on their own computer. This method bypasses any account lock out protections that may be in place.

4.2.B
Explain how password attacks exploit vulnerabilities.

4.2.B.3
Many users reuse the same passwords (or variations of the same password) for all the services and accounts they have, despite warnings not to. When an organization's user database is stolen, the usernames, emails, and passwords are sold to adversaries or posted online. Adversaries often begin an attempt to compromise an account by trying stolen or leaked credentials for a target individual.

4.2.B.4
Many users set passwords that are easy to guess, and adversaries will attempt to guess common passwords for a user's account. Password spraying is an attack where an adversary attempts a common password against many different user accounts.

4.2.B.5
Some services and devices (e.g., switches, routers, and IoT devices) are preconfigured with a default administrative user and password. Credential stuffing is an attack where an adversary attempts to gain access to these services or devices using common default credentials or account credentials that have been stolen.

4.2.B.6
Offline password attacks use automated hash-cracking tools to hash possible passwords and compare them against a captured hash. Although hashes can't be reversed, an adversary can use these tools to hash many potential passwords and compare them to the target hash. If an adversary finds a hash that matches, they can use the password that generated the hash to login to the user's account. Offline attacks include:

- Brute force attacks, where an adversary uses an automated tool to test all the potential passwords that a user could have
- Dictionary attacks, where an adversary uses an automated tool to test a list of common passwords

4.2.B.7
A rainbow table attack uses a list of common passwords to generate a rainbow table. A rainbow table is a table that contains each potential password and its hash. The table is then sorted by the hashes, and the adversary uses an automated tool to search the list of hashes for the captured hash. If the hashes match, then the adversary has found a password that generates the same hash, and the password will allow the adversary to login to the user's account.

4.2.C
Determine the type of authentication used to verify the identity of a user.

4.2.C.1
Authentication mechanisms are technical controls that verify the identity of a user to ensure that only authorized users access a system. The proof the user provides to identify themselves is called a factor. Common authentication factors include:

- Something the user knows (knowledge factor)
- Something the user has (possession factor)
- Something the user is (biometric factor)
- Somewhere the user is (location factor)

4.2.C.2
Knowledge factors can be passwords, PINs, or answers to preselected challenge questions. For a knowledge factor to be effective it needs to be something an adversary can't easily guess; however, knowledge factors that are difficult for an adversary to figure out can also be harder for a user to remember.

4.2.C.3
A possession factor is an object a user has that is unique to them, such as an access card, a bank card, a cell phone, or an authentication token. The more difficult it is for an adversary to obtain the object (or a copy of it), the more secure the possession factor is.

4.2.C.4
Biometric factors measure features of the human body and can include fingerprints, palm prints, facial recognition, iris or retina scans, or voice identification. Biometric factors are difficult for an adversary to duplicate because they are unique to an individual.

4.2.C.5
Location factors use information about Wi-Fi signals, GPS data, time zone settings, and even IP address information to make determinations about location. Rules can be established for allowing or denying access based on a location factor.

4.2.C.6
Multifactor authentication (MFA) is when a system uses more than one factor to authenticate a user. MFA is more secure than single-factor authentication because it requires the user to provide at least two separate factors of authentication.

4.2.D
Configure login settings to make a device more secure.

4.2.D.1
Requiring complexity in passwords is a login setting that can be configured. When enabled, users setting a new password must include at least one character from each character set. Passwords with characters from each character set are significantly harder for an adversary to crack than passwords that use characters from only one or two character sets. The main character sets often required are:

- Uppercase letters (A–Z)
- Lowercase letters (a–z)
- Numeric digits (0–9)
- Special characters (!"#$%&'()*+,-./:;<=>?@ [\ ] ^_ ` {|}~)

4.2.D.2
Requiring a minimum password length is a login setting that can be configured. This means that users must have at least a certain number of characters in their password. The longer and more complex a password is, the longer it will take a digital tool to crack the password.

4.2.D.3
Requiring a maximum password age is a login setting that can be configured. When configured, users will receive a prompt to change their password a certain number of days after their last password change, usually every 90 or 120 days. If a user's password has been compromised, changing it could prevent an adversary from gaining access to the user's account. However, some national standards recommend that organizations not require users to change their passwords on predefined intervals to discourage users from developing password patterns (e.g., PasswordFall2028).

4.2.D.4
Requiring the system to store a certain number of previous user passwords is a login setting that can be configured. This prevents a user from reusing a password. Many organizations store users' previous 5–10 password hashes to prevent reuse.

4.2.D.5
Requiring a lockout period after a certain number of invalid login attempts is a login setting that can be configured. This prevents an adversary from continuously randomly attempting wrong passwords. Many organizations lock a user's account after 3–5 invalid login attempts. The period of the lockout varies.

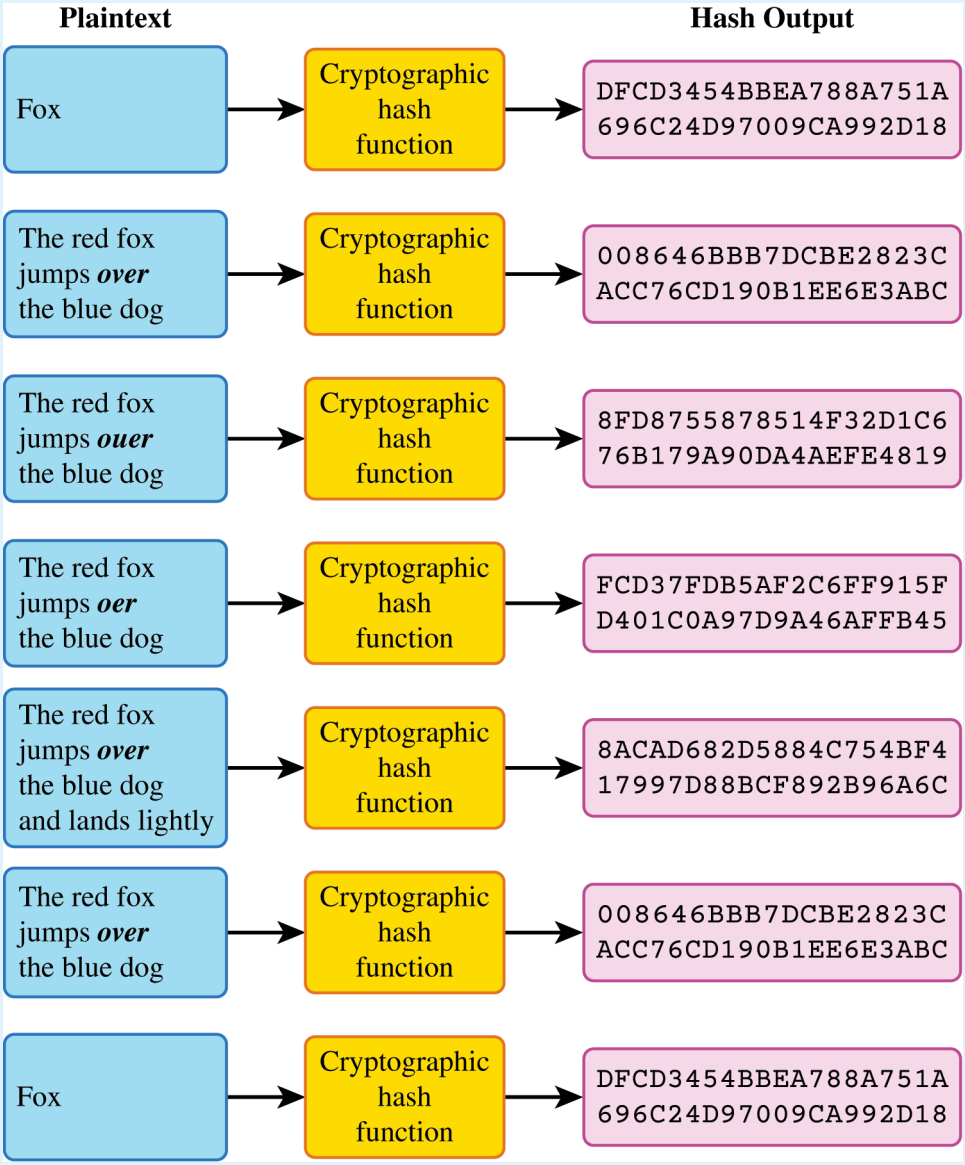


FIGURE 4.2A: The Cryptographic Hash Function

The purpose of a cryptographic hash function is to verify the integrity of data and to show that the data have not been altered. Here, notice that any misspelling, additional text, or changes to the input will completely alter the hash output (also known as the checksum, message digest, or digest). However, any inputs that are exactly the same—such as the first and last, and the second and sixth—result in the same exact digest. The cryptographic hash function is one-way, meaning that a user cannot derive the input from the digest.

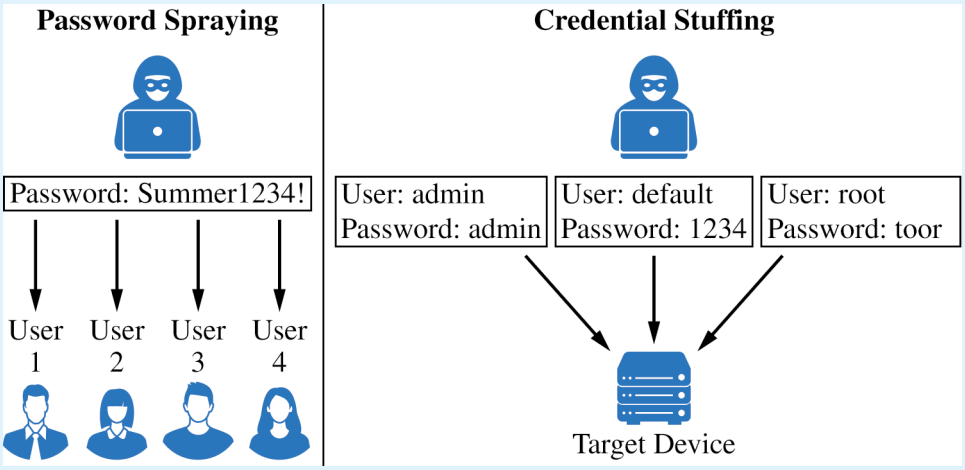


FIGURE 4.2B: Types of Password Attacks – Password Spraying vs. Credential Stuffing

Password spraying (left) depicts an attack method in which adversaries attempt a few commonly used passwords across many accounts to attempt to gain unauthorized access, exploiting weak password policies and practices. Credential stuffing (right) shows attempts to use common credentials from one service to access other accounts, highlighting the risk of using default or common usernames and passwords.

Adversary gets access to a database of hashed passwords.



Username	Password Hash
User 1	5aa910da8a49fd01d52e96843945c921
User 2	d386bc67675e9b6c5215dedf0b4b86a7
User 3	2c61ebff5a7f675451467527df66788d

Hashing algorithms cannot be reversed.

The adversary makes a table of all possible passwords and generates a hash for all of them. This is called a rainbow table. The adversary can search the rainbow table for the hashes that match those in the database.

Plaintext Password	Password Hash
tEsT987	d386bc671a3f9c1e7b42d8f05c6a9be
!2345	d386bc6720d7a4c9e2f1b6a5c8e3d9f
Password123	d386bc673b8e5f0c3a7d2e9b1c4a6d5
L0veC@t$	d386bc6759c1d5a7e0f3b8a2e4c6d9b
Summ3rFun!	d386bc67675e9b6c5215dedf0b4b86a7
B1rdW4tcher	d386bc6794f2a9d0c6e5b1a8d3c7e9f

Because the hash for User 2's password is the same as the hash for the string "Summ3rFun!", the adversary may be able to use this string as User 2's password to gain access to User 2's account.

FIGURE 4.2C: Types of Password Attacks – Rainbow Table Password Attack

The rainbow table (bottom table) contains precomputed hashes for many possible plaintext passwords, sorted alphanumerically. By comparing the hashed passwords from a compromised database (top table) against this table, an adversary can quickly find matching hashes and identify corresponding plaintext passwords. This illustrates the effectiveness of rainbow tables in recovering passwords from unsalted hash databases through hash comparison.

TOPIC 4.3

Protecting Devices

SUGGESTED SKILLS

2

Mitigate Risk

Required Course Content

LEARNING OBJECTIVE

4.3.A

Identify managerial controls related to device security.

ESSENTIAL KNOWLEDGE

4.3.A.1

An acceptable use policy will describe the range of activities that are permissible, prohibited, or required by users on devices owned by an organization and may include:

- Prohibiting users from accessing specific websites or types of websites (e.g., social media or gaming)
- Requiring users to keep software updated
- Allowing users to connect peripheral devices
- Prohibiting users from connecting external drives or media

4.3.A.2

A password policy will detail the requirements for user passwords within an organization and may include:

- A minimum or maximum password length
- A minimum or maximum amount of time a user may keep the same password
- A prohibition of password reuse
- Rules for password construction (e.g., no dictionary words and character set requirements)
- A suggestion to use secure password management tools instead of writing passwords down

4.3.A Identify managerial controls related to device security.	**4.3.A.3** A software installation policy will describe what (if any) software users are allowed to install on their devices and usually also a process for users to request specialized software they may need to perform their role, and it may include: ▪ A prohibition against users installing software on their devices ▪ A process for users to request new software needed for their role ▪ A list of approved software for users
4.3.B Explain how anti-malware software can make a device more secure.	**4.3.B.1** Anti-malware software (sometimes called antivirus software) has tools to quarantine and remove malware that can corrupt, spy on, or destroy a system. Malware contains indicators that make it detectable; these indicators are called signatures. **4.3.B.2** Anti-malware software has a database of malware signatures. It periodically scans the files on a device and checks to see if any of the files match any of the signatures in its database. If there is a match, the software quarantines and removes the malicious files.
4.3.C Explain why keeping a device's operating system and software updated makes it more secure.	**4.3.C.1** When vulnerabilities in operating systems and software are found, the vendor or organization that maintains the operating system software will fix it and send an update. A small update is called a patch. **4.3.C.2** Ensuring that a computer's operating system and software applications are updated to the most recent version prevents adversaries from taking advantage of a known vulnerability.
4.3.D Configure a host-based firewall.	**4.3.D.1** Host-based firewalls allow or deny traffic into or out of a single device. This provides an extra layer of security in case a host is connected to a compromised network. **4.3.D.2** A host-based firewall is software that runs on a device and follows a set of rules (an ACL) like a network-based firewall. Firewall rules are implemented in order, applying the first rule that matches.

4.3.D
Configure a host-based firewall.

4.3.D.3
A host-based firewall can also block specified types of outbound traffic. Host-based firewalls should always block ports or services not needed for a given device.

ILLUSTRATIVE EXAMPLES
A host-based firewall is configured to block outbound FTP traffic. This prevents an adversary with remote access to the host from using FTP to exfiltrate a file to the adversary's server.

4.3.D.4
The rules for a host-based firewall can allow or deny traffic based on source or destination port or IP address, service, protocol, or application.

SUGGESTED SKILLS

3

Detect Attacks

TOPIC 4.4
Detecting Attacks on Devices

Required Course Content

LEARNING OBJECTIVE

4.4.A

Explain how to detect attacks against devices.

ESSENTIAL KNOWLEDGE

4.4.A.1

System processes and settings, login attempts, file download attempts, and user actions are logged by computing systems. These logs can be used to reconstruct circumstances leading up to and during a cyber incident.

4.4.A.2

An indicator of compromise (IoC) is evidence that an adversary has compromised a device or network.

4.4.A.3

Authentication logs (or auth logs) record every attempted login on a system. Analysis of authentication logs can reveal attempted attacks.

4.4.A.4

Host-based IoCs are discovered when analyzing logs and configuration settings. Indicators, such as the following, can be found in authentication logs, user activity logs, and system configuration files:

- Unusual files being created or modified
- Unexpected processes or services
- Unauthorized changes to system configuration settings
- Unauthorized software installation or update

4.4.A
Explain how to detect attacks against devices.

4.4.A.5
File-based IoCs are discovered when analyzing files on a device. Indicators are usually found in executable files and can include:

- Files whose hash matches known malware
- File names that are known to be created by a certain piece of malware
- File paths that are associated with malicious activity

4.4.A.6
Behavior-based IoCs are discovered when analyzing logs. Indicators can be found in authentication logs and access logs and can include:

- Multiple failed login attempts
- Unusual login times or locations
- Unauthorized attempts to access sensitive data
- Attempts to elevate user privileges on a system

4.4.B
Determine controls for detecting attacks against a device.

4.4.B.1
Performance is a criterion for determining a detection method. Detection tools use system memory and processing power and can impact the performance of a device. Anomaly-based detection tools use more system resources than signature-based tools. Signature-based detection is a better option for devices with less powerful system resources. Many embedded devices do not have enough system resources to run any detection tools on the device.

4.4.B.2
Cost is a criterion for determining a detection method. Organizations that purchase detection software need to consider the cost of purchasing enough software licenses for the number of devices they need to monitor. Some organizations purchase an endpoint detection and response (EDR) service from a third-party vendor. Although these services are expensive, they provide a holistic, unified approach to threat detection for an organization's devices; they typically include a centralized alert platform for monitoring possible attacks on devices.

4.4.B Determine controls for detecting attacks against a device.	**4.4.B.3** Sensitivity or criticality of the device is a criterion for determining a detection method. Devices that store or process sensitive information or provide critical services are more likely to be targeted by adversaries and benefit from a hybrid-detection model to offer maximum protection, when possible.
4.4.C Evaluate the impact of a device detection method.	**4.4.C.1** Speed and performance are factors in evaluating the impact of a detection method. Signature-based detection is faster than anomaly-based detection in general, and that effect is compounded on devices, which often lack the processing power to effectively run anomaly-based detection tools. Implementing resource-intensive detection tools on devices can degrade device performance. **4.4.C.2** Phase of the attack is a factor in evaluating the impact of a detection method. To carry out actions on a device, adversaries must first bypass a combination of physical- or network-layer protective, deterrent, and detective security controls. Detecting and stopping an attack at the device level can prevent adversaries from accessing sensitive data or disrupting critical services. **4.4.C.3** False positives versus ease of bypassing detection is a factor in evaluating the impact of a detection method. Most device-level detection tools are signature-based, and signature-based detection has a low rate of false positives. However, signature-based detection is easier for adversaries to bypass.
4.4.D Apply detection techniques to identify indicators of password attacks by analyzing log files.	**4.4.D.1** Online password attacks can be detected in authentication logs. A single user attempting many wrong passwords is an indicator of an online password attack. If a user:password hash database has been compromised, all the user passwords in the database should be considered insecure and all users should be forced to reset their passwords. **4.4.D.2** If an authorized user is logging in from a different location or IP address than expected, or at a different time than normal, this can be an indicator that the user's password has been compromised.

4.4.D
Apply detection techniques to identify indicators of password attacks by analyzing log files.

4.4.D.3
An indicator of password spraying is many users trying to log in within seconds of each other from one IP address or from unusual IP addresses.

4.4.D.4
An indicator of credential stuffing is a series of default user:password combinations being attempted on a device in quick succession, often from the same IP address.

4.4.D.5
Offline password attacks can't be detected, because the attack takes place on the adversary's computer.

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AP CYBERSECURITY

UNIT 5

Securing Applications and Data



~30
CLASS PERIODS

UNIT 5 ~30 CLASS PERIODS

Securing Applications and Data

Developing Understanding

Data is the foundation of the digital world. Every movie or song that is streamed, every website visited, and every financial transaction made online is recorded as digital data. Stealing, modifying, or denying access to data is often the end goal of an adversary. In this unit, students learn how adversaries commonly attack data and applications. Students learn how to set access controls to limit who has what type of access to data. They also learn how to use cryptography to protect the confidentiality and integrity of data both in storage and while it is being transmitted. Additionally, students learn how adversaries attack applications, what to look for in logs as evidence of an attack, and some mitigations that can help limit or stop an attack.

Building Cybersecurity Skills

In this final unit, students practice assessing risk to data and learn about the vulnerabilities and attacks particular to data. Students learn why some data are more valuable than others and how the perceived value of the data impacts their risk assessment. Students also learn how to protect data using tools like cryptography and access controls. Finally, students practice detecting attacks on data by reviewing logs for indicators of compromise (IoCs).

Unit Scenarios

The scenarios for this unit are designed to connect the knowledge and skills students gain to realistic workplace tasks. The scenarios are paired with relevant student activities. Teachers may use their own scenarios in addition to, or in lieu of, those provided here.

SCENARIO 5A:
Protecting Sensitive Data

As an employee on the security team of Vitahealth Solutions , a pharmaceutical company, you have been tasked with protecting the company's proprietary research and development (R&D) on its new product Strype. The directories and files that contain the research are on an air-gapped computer. Only members of the R&D team and select members of the IT team have access to that computer. Your task is to secure the research by setting the access controls for the directories and files.

You will log into the computer that contains the proprietary research and set access according to the following criteria:

- All members of the R&D team should have full access to the /RandD directory while other users should be able to access and read the directory.
- All members of the R&D team should have full access to the /RandD/Research directory while other users should have no access to the directory.
- Only the head researcher should have read, write, and execute access to the /RandD/Formula directory, the R&D team should have read and execute access, and everyone else should have no access.

SCENARIO 5B:
Sending Encrypted Messages

You are a security engineer working for LightningGrid, a utility company that owns power generating plants across the United States. You are working on a classified project with another security engineer at a plant on the other side of the country. It is critical that you and your colleague have a method for communicating securely. You need to use PGP encryption to set up a secure communication channel.

Your teacher will randomly pair you with another student who will be your partner for this scenario, and you will each represent one of the security engineers in the scenario. You will use PGP encryption to establish a secure digital communication channel with each other.

You will:

- Use a tool to generate an asymmetric key pair
- Share your public key with your partner
- Send your partner an encrypted secret message
- Receive and decrypt a secret message from your partner

UNIT AT A GLANCE

Topic	Learning Objectives	Scenario Connections	Class Periods
5.1 Application and Data Vulnerabilities and Attacks	**5.1.A** Explain how adversaries can exploit application and file vulnerabilities to cause loss, damage, disruption, or destruction. **5.1.B** Explain how application attacks exploit vulnerabilities. **5.1.C** Assess and document risks from application and data vulnerabilities.		5
5.2 Protecting Applications and Data: Managerial Controls and Access Controls	**5.2.A** Explain how the state or classification of data impacts the type and degree of security applied to that data. **5.2.B** Identify managerial controls related to application and data security. **5.2.C** Determine an appropriate access control model to protect applications and data. **5.2.D** Configure access control settings on a Linux-based system.	**5A Protecting Sensitive Data** ▪ Configure access control settings for directories and files.	7
5.3 Protecting Stored Data with Cryptography	**5.3.A** Explain how encryption can be used to protect files. **5.3.B** Apply symmetric encryption algorithms to encrypt and decrypt data.		4
5.4 Asymmetric Cryptography	**5.4.A** Determine the appropriate asymmetric key to use when sending or receiving encrypted data. **5.4.B** Explain why the length of a key impacts the security of encrypted data. **5.4.C** Apply asymmetric encryption algorithms to encrypt and decrypt data.	**5B Sending Encrypted Messages** ▪ Generate an asymmetric key pair. ▪ Encrypt a message and send it. ▪ Decrypt a received message.	5
5.5 Protecting Applications	**5.5.A** Identify the application security principles of secure by design and security by default. **5.5.B** Explain how user input sanitization protects applications.		2
5.6 Detecting Attacks on Data and Applications	**5.6.A** Explain how to detect attacks on data. **5.6.B** Determine controls for detecting attacks against applications or data. **5.6.C** Evaluate the impact of a method for detecting attacks against an application or data. **5.6.D** Identify whether a file has been altered by verifying its hash. **5.6.E** Apply detection techniques to identify and report indicators of application attacks by analyzing log files.		7

SUGGESTED SKILLS

1

Analyze Risk

TOPIC 5.1
Application and Data Vulnerabilities and Attacks

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
5.1.A Explain how adversaries can exploit application and file vulnerabilities to cause loss, damage, disruption, or destruction.	5.1.A.1 An adversary can read any unencrypted files if they have access to the device or drive storing the files. 5.1.A.2 Computers have standard users and administrative users. Administrative users have access to control system settings and can typically access any files or applications on a system. If regular users are given administrative privileges on a computer, and an adversary can compromise a user's account, then the adversary will have elevated privileges on the system. 5.1.A.3 When access control settings are weakly configured, many users often have permission to view and sometimes even edit files on a system. Adversaries can take advantage of weak access control settings to steal or destroy files or disrupt an application.
5.1.B Explain how application attacks exploit vulnerabilities.	5.1.B.1 Applications are programs that run instructions on computers; they are executable data. Some applications run locally on a user's computer, while other applications, like web applications, run on a server and are accessed by users through a network.

5.1.B
Explain how application attacks exploit vulnerabilities.

5.1.B.2
Many applications take user input through open-ended input fields where users can type characters (e.g., letters, numbers, punctuation). Developers should include user input checks in their application, such as numeric input when asked for a number of items, to ensure that the user input matches what is expected; the application should reject input outside of the expected parameters. This process of verifying that user input meets expected criteria before processing it is called data validation. Applications that fail to validate user input are vulnerable to injection-type attacks, where adversaries insert unexpected character strings in input fields to alter the behavior of a program.

5.1.B.3
Structured query language (SQL) is a computer language used to request information from databases and make changes to databases or entries in databases. Applications that query a database using unvalidated or unsanitized input from users are vulnerable.

5.1.B.4
An SQL-injection attack places SQL commands and control characters into a user-input field in an application, which can lead to a breach of confidentiality by causing the application to return more information than it should, or a breach of integrity by modifying or deleting data in the database.

5.1.B.5
Websites are written using hypertext markup language (HTML), and many websites use Javascript to create dynamic content on websites or web applications. Because Javascript commands run in the browser of the user visiting the website, those commands can access sensitive data stored in the browser like usernames, passwords, and cryptographic keys.

5.1.B.6
A cross site scripting (XSS) attack injects malicious code into a website that a user's browser then executes. The malicious code can be embedded in a link the user clicks (a Type I or Reflected XSS attack) or it can be inserted onto a website through a comment field, forum post, or visitor log, which would affect any user visiting that website (a Type II or Stored XSS attack).

5.1.B
Explain how application attacks exploit vulnerabilities.

5.1.B.7
When applications take user input, that input is written to a buffer. A buffer is a designated section of computer memory with a fixed size. If the amount of data the user enters exceeds the size of the buffer, it can overflow into adjacent memory locations and overwrite other parts of the computer's memory.

5.1.B.8
A buffer overflow attack feeds more data into memory than was allotted, which can cause a system to crash or to execute code outside the scope of a program's security policy, effectively allowing the adversary to perform unauthorized actions on a computer, such as accessing, modifying, or deleting files.

5.1.B.9
The files that run web applications are stored in directories on servers. When users access web applications, their browsers send GET requests using hypertext transfer protocol (HTTP). A GET request accesses a file somewhere in the filesystem of the server.

5.1.B.10
In a directory traversal attack, adversaries modify URLs and GET requests to attempt to access sensitive data (e.g., usernames and passwords) on a server's file system.

ILLUSTRATIVE EXAMPLE
A web server stores images for a website it hosts in the `/var/www/images/` directory. An adversary modifies a URL requesting an image to `../../../etc/passwd`. The `..` moves one directory up in the file system; so the three consecutive `..` returns the path to the root, and from there the adversary is attempting to access the `passwd` file that would return a list of all the authorized usernames on the device.

5.1.C
Assess and document risks from application and data vulnerabilities.

5.1.C.1
Data security risks can involve a compromise of confidentiality when unauthorized persons can access sensitive data, integrity when data can be manipulated or altered from its intended state, and availability when data can be destroyed or encrypted to prevent others from accessing it.

5.1.C
Assess and document risks from application and data vulnerabilities.

5.1.C.2
High risks from data vulnerabilities often involve highly sensitive data (e.g., data that is governed by laws or regulations) that could be compromised through a highly likely exploit.

ILLUSTRATIVE EXAMPLE
The company developing the next jet engine that will be used by the Air Force in its planes is storing the technical specifications for the engine on an unencrypted drive.

5.1.C.3
Moderate risks from data vulnerabilities often involve sensitive data not having strong enough encryption or strict enough access controls.

ILLUSTRATIVE EXAMPLE
A company stores its customers' PII in a spreadsheet, and the spreadsheet is encrypted using a small key.

5.1.C.4
Low risks from data vulnerabilities often involve less sensitive information being encrypted with shorter keys or having access controls that are not strict enough.

ILLUSTRATIVE EXAMPLE
An organization's CEO stores his private memos to his executive staff on a company share drive that is unencrypted and has no access controls.

SUGGESTED SKILLS

2

Mitigate Risk

TOPIC 5.2

Protecting Applications and Data: Managerial Controls and Access Controls

Required Course Content

LEARNING OBJECTIVE

5.2.A

Explain how the state or classification of data impacts the type and degree of security applied to that data.

ESSENTIAL KNOWLEDGE

5.2.A.1

Organizations implement specific security controls to comply with legal requirements based on the types of data they collect, store, process, and transmit.

5.2.A.2

Data can be classified by their state.

- Data at rest are stored on a drive. It is important to protect the physical drive storing the data from destruction or theft. Data at rest can also be encrypted so that if an adversary steals it, they can't immediately read the data.
- Data in transit are being sent from one device to another. If the data are being transferred over physical media (e.g., cables) it is important to protect the media. Data in transit can also be encrypted so that if an adversary intercepts it, they can't immediately read the data.
- Data in use are being processed by software or a person. Access controls can be used to limit who or what has the ability to use data in different ways (e.g., view or edit). Data must be unencrypted to be used.

5.2.A.3

Organizations often categorize data according to their sensitivity and prioritize a higher degree of security for more sensitive information.

5.2.A.4

Laws and regulations can require certain types of data to be stored, transmitted, and handled according to specific rules.

5.2.A
Explain how the state or classification of data impacts the type and degree of security applied to that data.

- Personally identifiable information (PII) is any data that allows someone to be identified and includes (but is not limited to): name, signature, phone number, address, biometric data (e.g., fingerprints), social security number, date of birth, and email address. The protection of this data is covered by many laws but most notably The Privacy Act of 1974 and for children under the age of 13 the Children's Online Privacy Protection Act of 1998.
- Protected health information (PHI) is any data related to an individual's health, treatment, payment for healthcare at any time and includes (but is not limited to): test results, treatment records, hospital records, doctor visit notes, and health provider payment records. The protection of PHI is included in the Health Insurance Portability and Accountability Act of 1996.
- Payment card information (PCI) is the data collected by organizations to process payments via cards (e.g., credit cards) and includes the following: name, account number, expiration date, address, and CVV code. The protection of this data is regulated by the Payment Card Industry Data Security Standard (PCI-DSS).

5.2.A.5
Organizations that collect regulated data will label them and have policies that comply with the legal or regulatory requirements for the safe storage, transmission, and handling of these data.

5.2.B
Identify managerial controls related to application and data security.

5.2.B.1
A cryptography policy will describe the acceptable encryption protocols and key parameters for an organization and may include:

- A list of encryption algorithms approved for specific uses
- Minimum or maximum key lengths
- Cryptographic key-generation requirements and parameters
- Cryptographic key-storage requirements

5.2.B
Identify managerial controls related to application and data security.

5.2.B.2
A web application security policy will outline the requirements and parameters for testing and mitigating web application vulnerabilities in an organization, and it may include:

- Parameters for when an application is subject to a security assessment
- Timelines for remediating vulnerabilities based on level of risk
- Parameters for how an application security assessment is to be carried out (e.g., using specific tools or according to specific frameworks)

5.2.C
Determine an appropriate access control model to protect applications and data.

5.2.C.1
Access control enforces which users or applications (called subjects) can access, modify, add, or remove (called operations) which files or applications (called objects). Access control models describe how to determine which subjects have what type of access to which objects.

5.2.C.2
Role-based access control (RBAC) assigns every subject to a role and defines which roles have which types of access to which objects.

ILLUSTRATIVE EXAMPLE
An example of a role at a company might be "accountant," and one type of object could be the payroll software. Role-based access could be used to ensure that only subjects who are assigned to the role of "accountant" have access to the payroll software object.

5.2.C.3
Rule-based access control (RuBAC) checks a set of rules to determine what type of access a subject should have for a specific object and then allows or denies types of access based on the rules. This access control model is typically layered on top of another access control model.

ILLUSTRATIVE EXAMPLE
There is a rule that prohibits subjects (even those who would normally have access) from accessing a certain database (the object) outside of local working hours. When a subject attempts to access the database, even if they are authorized to access it, they will be denied access if it is outside the time designated by the rule.

5.2.C
Determine an appropriate access control model to protect applications and data.

5.2.C.4
Discretionary access control (DAC) gives individual subjects the ability to set the type of access that other subjects have on objects they own. In DAC models some subjects are designated as administrators or super users, and they have the ability to override the access controls established by other subjects.

ILLUSTRATIVE EXAMPLE
Bob creates a file (an object) and decides to give Alice permission to edit the file, to give Frank permission to view the file only, and to deny everyone else access to the file altogether.

5.2.C.5
Mandatory access control (MAC) follows strict rules for which types of access each subject level has for objects that are above their level, at their level, or below their level. Subject and object levels are assigned by an external administrator.

5.2.C.6
The Bell-LaPadula model is a MAC model that is often used by governments and military organizations to control the security of information. This model has the following two important properties:

i. The Simple Security Property states that subjects may not read objects that are above their level.
ii. The * (Star) Security Property states that subjects may not write to objects below their level.

These rules taken together are often summarized as "write up, read down" (WURD).

5.2.C.7
The principle of least privilege is the idea that entities should be given exactly as much access as they need to perform their function and no more.

5.2.D
Configure access control settings on a Linux-based system.

5.2.D.1
Authorization is when an entity is granted permission to have a certain type of access to a resource. Access controls are put in place to control which users have what types of access to which data.

5.2.D
Configure access control settings on a Linux-based system.

5.2.D.2
There are three types of access to a file in Linux that can be set, and they always come in the following order:

i. Read access allows a user to view the contents of a file.
ii. Write access allows a user to make changes to a file.
iii. Execute access allows a user to run a binary file such as a program.

These are abbreviated **`rwx`**, respectively. If a user only has read and execute permissions (not write), then it would display as **`r-x`**. The **`-`** symbol indicates the absence of that permission.

5.2.D.3
There are three default entities for which permissions are set and always in this order: (1) the file owner, (2) the file group, and (3) all other users. The three sets are displayed with no spaces (e.g., **`rwxrwxrwx`**).

5.2.D.4
To view the current permission settings for a file, use the command **`ls -l`** , which will show the current settings for the default entities. If there is a **`+`** symbol at the end of the permissions, this means that other permissions have been set for that file and it can be viewed with the **`getfacl`** command.

5.2.D.5
To modify the permission settings for a file, use the **`chmod`** command. This command can be used with the numeric method or the symbolic method.

5.2.D.6
To use **`chmod`** in the numeric method the syntax is **`chmod ### filename.`**

Each of the three **`###`** represents one of the three entities mentioned above (the owner, the group, other nongroup users).

- The first **`#`** = the owner
- The second **`#`** = the group
- The third **`#`** = other nongroup users

The permission for each entity is determined by adding up the values for the types of access to be granted:

- **`0`** = no permissions
- **`1`** = execute
- **`2`** = write
- **`4`** = read

5.2.D
Configure access control settings on a Linux-based system.

Therefore **3** sets permission to write and execute, **5** sets permission to read and execute, **6** sets permission to read and write, and **7** sets permission to read, write, and execute.

ILLUSTRATIVE EXAMPLES

- The command **`chmod 750 test`** would set the permissions for the owner to read, write, and execute, for the group to read and execute, and for everyone else to no access at all.
- The command **`chmod 543 test`** would set the permissions for the owner to read and execute, for the group to read only, and for everyone else to write and execute.
- The command **`chmod 777 test`** would set the permissions for all three entities to read, write, and execute for the file test.

5.2.D.7

To use **`chmod`** in the symbolic method the syntax is **`chmod entity +(or –) permission filename.`**

The entities are the user owner, the group, and other nongroup users. Each entity is represented with a single letter.

- **`u`** = user owner
- **`g`** = group
- **`o`** = others
- **`a`** = all

Permission can be either added or removed to any combination of entities.

- **`+`** = add the permission
- **`–`** = remove the permission

The permissions that can be set are **`read, write,`** and **`execute.`**

- **`r`** = read
- **`w`** = write
- **`x`** = execute

Entities and permissions can be combined in a single command.

To add the read and execute permissions for the group and user owner for a file called **`testfile,`** the command would be **`chmod ug+rx testfile.`**

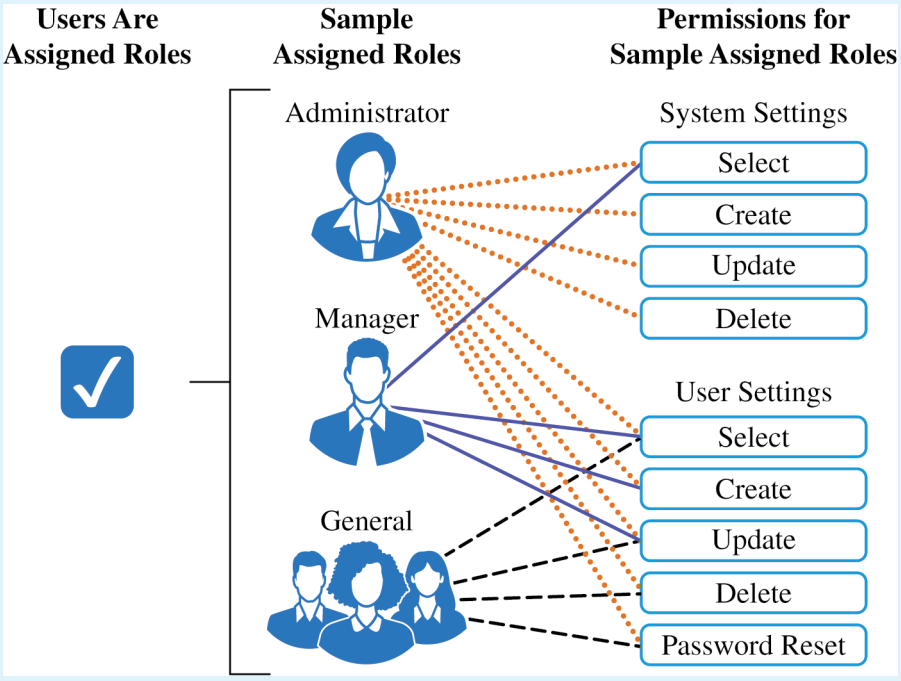


FIGURE 5.2A: Access Control Model – Role-Based Access Control (RBAC)

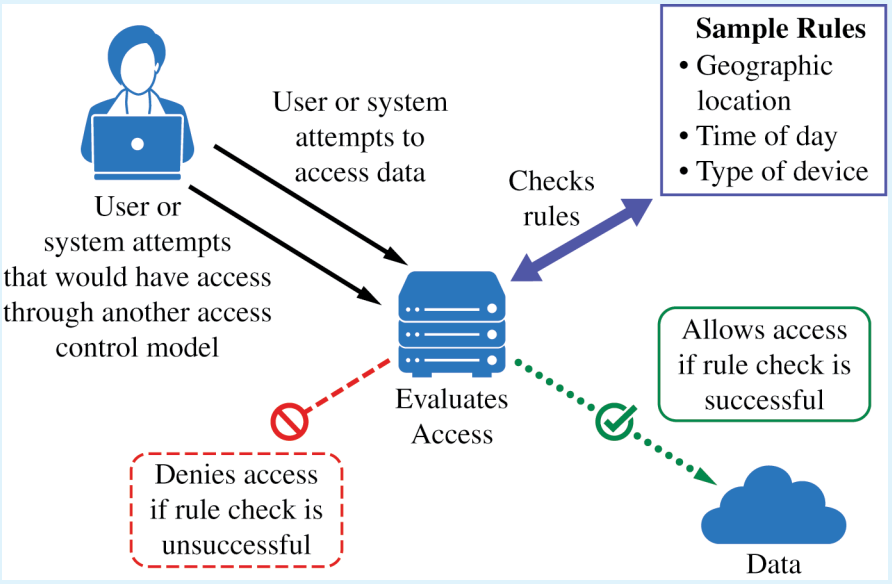


FIGURE 5.2B: Access Control Model – Rule-Based Access Control (RuBAC)

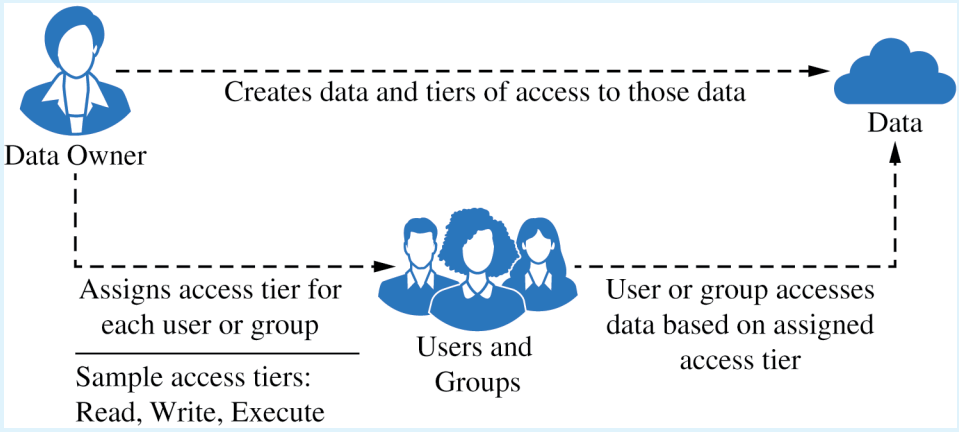


FIGURE 5.2C: Access Control Model – Discretionary Access Control (DAC)

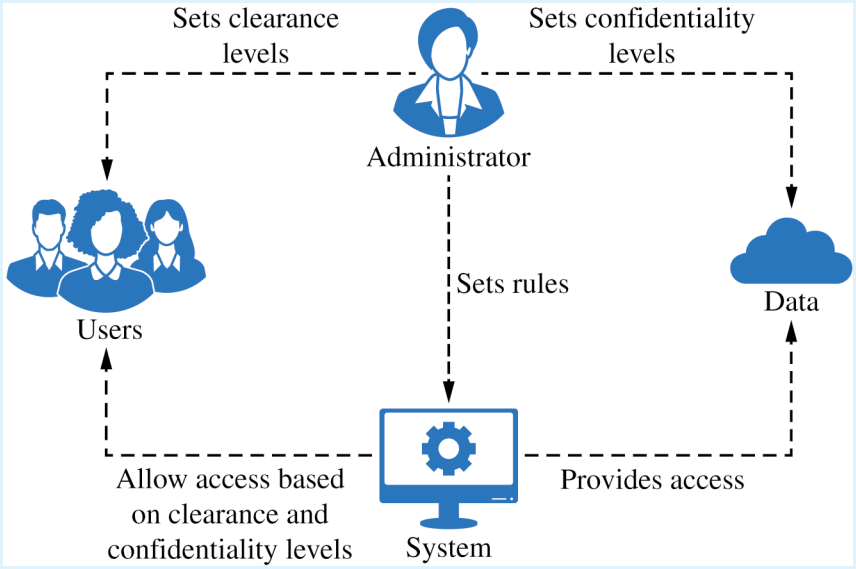


FIGURE 5.2D: Access Control Model – Mandatory Access Control (MAC)

SUGGESTED SKILLS

2

Mitigate Risk

TOPIC 5.3
Protecting Stored Data with Cryptography

Required Course Content

LEARNING OBJECTIVE

5.3.A

Explain how encryption can be used to protect files.

ESSENTIAL KNOWLEDGE

5.3.A.1

The purpose of cryptography is to hide information. A cryptographic algorithm defines a process for encrypting and decrypting information. Encryption is the process of hiding the information, and decryption is the process of reversing the encryption to retrieve the original information.

5.3.A.2

An encryption algorithm defines a process for combining the information to be encrypted with a predefined key. The information to be encrypted is called the plaintext. The output of the encryption algorithm is called the ciphertext.

5.3.A.3

The number of possible keys that can be used in an encryption algorithm is called the keyspace. The larger the keyspace, the longer it will take an adversary to discover the correct key by random chance.

5.3.A.4

Cryptographic algorithms are classified by whether they use one key or two keys.

- Symmetric encryption algorithms use the same key to encrypt and decrypt information.
- Asymmetric encryption algorithms use two different keys—one to encrypt information and the other to decrypt information.

5.3.A
Explain how encryption can be used to protect files.

5.3.B
Apply symmetric encryption algorithms to encrypt and decrypt data.

5.3.A.5
Cryptographic algorithms are also classified by whether they process information one bit at a time or in fixed-size chunks of bits.

- Block encryption handles information in fixed-size chunks called blocks, producing an output block for each input block.
- Stream encryption handles input information continuously, producing output one element at a time.

5.3.B.1
Computer-based encryption algorithms operate on binary data. The most common symmetric encryption algorithm is the Advanced Encryption Standard (AES). AES encryption is used to secure Wi-Fi transmissions, internet browsing, file encryption on disks, and hardware-level encryption on processors.

5.3.B.2
AES is a symmetric key block cipher that encrypts data in 128-bit blocks (16 bytes). AES can operate with keys of varying lengths. Longer keys produce more secure encryption but require more time to encrypt and decrypt.

5.3.B.3
Symmetric encryption and decryption can be performed using the command line, specialized software, or web-based tools.

- On a command line interface, users can encrypt or decrypt with OpenSSL.
- Specialized software like AES Crypt is an open source tool that can encrypt and decrypt files.
- There are many web-based tools for encrypting and decrypting files.

5.3.B.4
Using OpenSSL in a CLI, a user can encrypt and decrypt a file using the following commands (note that the encryption key is derived from the password provided):

- To encrypt a file named test with AES using a 128-bit key, use the command: `openssl enc -aes-128-cbc -e -in test -k password -out test.enc`
- To decrypt the encrypted file using the same key, use the command: `openssl enc -aes-128-cbc -d -in test.enc -k password -out text`

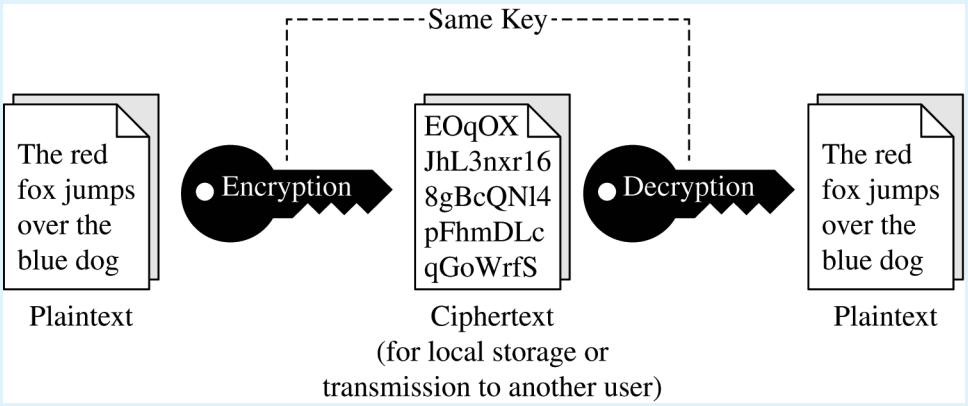


FIGURE 5.3: Symmetric Encryption Algorithms

Symmetric encryption involves a single key encrypting and decrypting data. This helps ensure confidentiality between sender and receiver.

TOPIC 5.4
Asymmetric Cryptography

SUGGESTED SKILLS

2

Mitigate Risk

Required Course Content

LEARNING OBJECTIVE

5.4.A

Determine the appropriate asymmetric key to use when sending or receiving encrypted data.

ESSENTIAL KNOWLEDGE

5.4.A.1

Asymmetric encryption allows users to communicate securely without prearranging a shared secret key.

5.4.A.2

When using asymmetric encryption, each entity that will be receiving data must first generate a key pair. Key pairs are binary strings of equal length that are generated at the same time through a mathematical process. One key is designated as the public key and the other as the private key. The keys are mathematical inverses of each other—each key reverses its partner. Either key can be used to encrypt information, but only the other key in the key pair will then be able to decrypt it.

5.4.A.3

Once the receiver generates the key pair, the private key must be stored securely. If the private key is exposed, shared, stolen, corrupted, or compromised the key pair must be deleted and a new key pair must be generated, because the security of the encryption algorithm rests on the security of the private key. The public key is published for anyone to view and use.

5.4.A.4

To send information securely to someone, the sender will use the receiver's public key to encrypt the data and send it. Only the receiver who has the private key will be able to decrypt and read the information.

5.4.B
Explain why the length of a key impacts the security of encrypted data.

5.4.B.1
Longer keys result in larger keyspaces. For binary keys, an n-bit length key has a keyspace of 2^n.

5.4.B.2
Using an application to randomly guess an n-bit length encryption key means that on average an adversary will be able to guess the correct key in $2^n/2$ or 2^{n-1} guesses.

5.4.B.3
Although longer keys are more secure, they also require more time to encrypt and decrypt messages.

5.4.B.4
Computational processing power and efficiency continue to improve, allowing software to guess keys faster. Key-length recommendations for both symmetric and asymmetric encryption algorithms are periodically increased to account for increased processing power.

5.4.B.5
Key-length comparison is only valid when comparing keys for the same cryptographic algorithm.

ILLUSTRATIVE EXAMPLES
- An AES 256-bit key is more secure than an AES 128-bit key.
- An RSA 4096-bit key is more secure than an RSA 2048-bit key.
- RSA and AES keys cannot be directly compared to one another in determining the level of security.

5.4.C
Apply asymmetric encryption algorithms to encrypt and decrypt data.

5.4.C.1
Common asymmetric encryption algorithms include RSA and elliptic curve cryptography (ECC). Asymmetric algorithms are used in many applications, including digital signatures and digital certificates.

5.4.C
Apply asymmetric encryption algorithms to encrypt and decrypt data.

5.4.C.2
As with symmetric encryption, asymmetric encryption and decryption can be performed using the command line, specialized software, or web-based tools.

- On a command line interface, users can encrypt or decrypt with OpenSSL.
- Specialized software like RSA Encryption Tool is an open source tool that can encrypt and decrypt files.
- There are many web-based tools for encrypting and decrypting files.

5.4.C.3
In a CLI, a user can generate an asymmetric key pair and encrypt or decrypt files as necessary.

- To generate a 2048-bit RSA key pair and save the key to a file named **`rsa.pem`** use the command:
  `openssl genrsa -out rsa.pem 2048`
- To extract the public key from **`rsa.pem`** into a file named **`public.pem,`** use the command:
  `openssl rsa -pubout -in rsa.pem -outform PEM -out public.pem`
- To encrypt the file **`test`** using RSA encryption and the key file **`public.pem,`** use the command:
  `openssl pkeyutl -encrypt -pubin -inkey public.pem -in test -out test.enc`
- To decrypt the **`test.enc`** file using the **`rsa.pem`** file, run the command:
  `openssl pkeyutl -decrypt -inkey rsa.pem -in test.enc -out test`

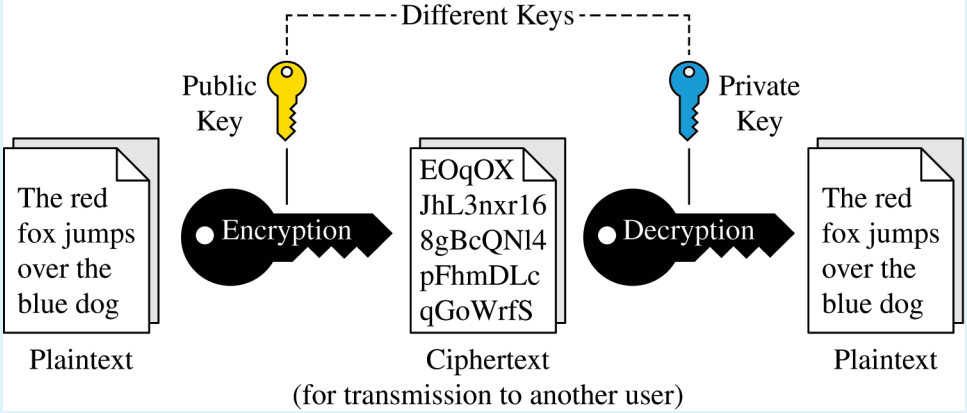


FIGURE 5.4: Asymmetric Encryption Algorithms

Asymmetric encryption involves two keys: a public and a private key. In this encryption method, data encrypted with the public key can only be decrypted by the corresponding private key. This helps ensure secure communication and data integrity.

TOPIC 5.5
Protecting Applications

SUGGESTED SKILLS

2

Mitigate Risk

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
5.5.A Identify the application security principles of secure by design and security by default.	**5.5.A.1** Secure by design is an initiative that encourages companies to include security in all phases of product development including design. When organizations implement secure by design, security is a design principle not just a technical feature. **5.5.A.2** Secure by design includes three design principles: i. Companies should take ownership of customer security outcomes. Companies should build products that meet the security needs of their customers. ii. Companies should embrace radical transparency and accountability. Sharing relevant security-related product news and updates quickly increases security for everyone. iii. Companies should build organizational structure and leadership to implement secure by design. Companies need leaders who are focused on security and have a security-first posture. **5.5.A.3** Secure by design includes the concept of secure by default, which is the idea that security features for software and devices should be enabled by default. Devices and software should be secure to use out of the box, with security features already enabled.

5.5.B
Explain how user input sanitization protects applications.

5.5.B.1
When users enter input into an application, the application typically encases that input in special characters to process it. The characters that encase the user input are called control characters and include the single quote, the double quote, and the semicolon.

5.5.B.2
When creating a program that takes user input, programmers should use a function to verify that user input meets their expected criteria and does not include any control characters that could be used to manipulate the system. This verification function can sanitize user input by removing potentially malicious characters, or it can give the user an error and force the user to provide different input. This can protect against many application attacks, including:

- SQL injection attacks
- XSS attacks
- Directory traversal attacks

TOPIC 5.6
Detecting Attacks on Data and Applications

SUGGESTED SKILLS

3

Detect Attacks

Required Course Content

LEARNING OBJECTIVE

5.6.A

Explain how to detect attacks on data.

ESSENTIAL KNOWLEDGE

5.6.A.1

Devices track and log when data are accessed and by whom. The process of recording and monitoring user activities is called accounting. Analysis of these logs can reveal malicious activity when an adversary attempts to access, copy, move, or delete data. Suspicious activity can include:

- Accessing files that aren't typically accessed
- Accessing files or applications outside of a user's normal patterns (including time of day, location, and device type)
- Attempts to delete or copy sensitive files

5.6.A.2

A honeypot is a file that appears as if it contains valuable data (e.g., credit card information, PII, passwords), but the data in the file are fake. A system can alert defenders if someone attempts to access the honeypot. Since the honeypot is a fake file, there is no legitimate reason to be accessing it, and any attempted access would be an indicator of malicious activity.

5.6.A.3

Cryptographic hash functions can generate a digest for data and can reveal if data have been altered. If a file has changed unexpectedly, this can be a sign of malicious activity.

5.6.B Determine controls for detecting attacks against applications or data.	**5.6.B.1** Cost is a criterion in determining detective controls. Detective controls like honeypots and using hash values to check data integrity are inexpensive. Some organizations invest in third-party data loss prevention (DLP) services, which monitor data access, usage, and transmission by users throughout the organization to detect suspicious activity; DLP services provide strong detection capabilities at a higher cost.
	5.6.B.2 Sensitivity or criticality of data or applications is a criterion in determining detective controls. More sensitive or critical data or applications are more likely targets of an adversary and should be monitored more closely.
	5.6.B.3 Classification of data is a criterion in determining detective controls. Data that have been classified as private, educational, healthcare, or financial often have legal or regulatory detection and monitoring requirements.
5.6.C Evaluate the impact of a method for detecting attacks against an application or data.	**5.6.C.1** To operate at an effective speed, log analysis needs to be augmented with some automation. Honeypots offer near instantaneous detection capabilities.
	5.6.C.2 Some DLP tools, honeypots, and realtime automated log analysis provide alerts as an attack is happening. These tools allow for a prompt response that can stop an attack before it does more harm. Retrospective log analysis and the use of cryptographic hashes to verify data integrity identify attacks after they have occurred.
	5.6.C.3 False negatives can occur in applications and data attack detection. Cryptographic hash functions only detect if data have been altered. An adversary could view and steal data without altering it, and a cryptographic hash function would not detect this. Honeypots cannot detect adversaries that do not attempt to access them.

5.6.D
Identify whether a file has been altered by verifying its hash.

5.6.D.1
Cryptographic hash functions can help identify changes in a file because they are repeatable: the same input always produces the same output for a given hash function.

5.6.D.2
Hashes can be calculated using the command line on a computer, a website, or specialized software.

- In Windows Powershell, if a user wanted to generate the SHA256 hash for a file named **`testfile`**, they would use the command:
  `Get-FileHash testfile -Algorithm SHA256`
- In BASH the same could be accomplished with the command:
  `sha256sum testfile`
- In zsh, the common command line terminal on Apple computers, this could be accomplished with the command:
  `shasum -a 256 testfile`

5.6.D.3
A file can be hashed and its hash output recorded. Then it can be hashed again later, and the second hash output can be compared to the previous hash output for the same file. If a file's hash changes, then the file was altered between when the first and second hashes were generated.

5.6.E
Apply detection techniques to identify and report indicators of application attacks by analyzing log files.

5.6.E.1
SQL injection attacks can be detected by reviewing application and server logs of user input for SQL control words and symbols such as:

- A single or double quote character:
  `` ` , ` ``
- Boolean conditions like **`OR 1=1`**
- A double dash (which indicates a comment in SQL): `--`
- SQL control words (always in capital letters) like **`WHERE, IN, FROM`**

5.6.E.2
XSS attacks can be detected by reviewing user input for suspicious tags, particularly the **`<script>...</script>`** tag.

5.6.E
Apply detection techniques to identify and report indicators of application attacks by analyzing log files.

5.6.E.3
For web applications, buffer overflows can be detected by checking the amount of data the user is sending to the web application in their request. The fields commonly checked are the URL length, cookie length, query string length, and total request length. Long strings in any of these fields can be an indicator of an attempted buffer overflow attack.

5.6.E.4
Directory traversal attacks can be detected by reviewing application and server logs. `HTTP GET` requests that include paths with sequences of `../` are indicators of an adversary attempting a directory traversal.

AP CYBERSECURITY



Exam Information

Exam Overview

The AP Cybersecurity Exam assesses student understanding of the skills and learning objectives outlined in the course framework. The exam is **2 hours and 10 minutes** long and includes **60 multiple-choice questions** and **1 free-response question**.

Section	Question Type	Number of Questions	Exam Weighting	Timing
I	Multiple-Choice Questions	60	70%	80 Minutes
II	Free-Response Questions	1	30%	50 Minutes

How Student Learning Is Assessed on the AP Exam

Section I: Multiple-Choice

The multiple-choice section of the AP Cybersecurity Exam includes 60 multiple-choice questions. All five units of the course are assessed in the multiple-choice section of the AP Cybersecurity Exam. The assessment is organized around course skills with the following weighting.

Units of Instruction	Approximate Exam Weighting for Multiple-Choice Section
Skill Category 1: Analyze Risk	25–40%
Skill Category 2: Mitigate Risk	25–40%
Skill Category 3: Detect Attacks	25–40%

Section II: Free-Response

The second section of the AP Cybersecurity Exam includes one free-response question.

Device Security Analysis will provide students with several simulated sources about a single digital device. Sources may include security policies, firewall configurations, file-system permissions, and log files. The question will assess students' ability to analyze the provided sources to identify security issues, detect evidence of attacks, describe how configuration or permission changes would affect the device and users, and evaluate how security controls, such as firewalls or automated systems, influence network traffic and device behavior. Students will be expected to cite evidence from the provided sources and explain their reasoning when describing attacks, permission settings, or the impact of policy or configuration modifications. The suggested time for this question is 50 minutes. Skill Categories 2 and 3 are assessed.

Task Verbs Used in Free-Response Questions

The following **task verbs** are commonly used in free-response questions:

Identify: Provide information about cybersecurity concepts or evidence from the given sources.

Explain: Provide reasons that support a solution or that account for how an outcome occurs, using specific evidence to validate your conclusion.

Describe: Provide information about a cybersecurity process or outcome.

Determine: Using the given sources, provide a specific result by applying appropriate criteria or reasoning.

Write: Express in print form a proper command that has the indicated effect.

Sample Exam Questions

The sample exam questions that follow illustrate the relationship between the course framework and the AP Cybersecurity Exam and serve as examples of the types of questions that appear on the exam. After the sample questions is a table that shows which skill(s) and learning objective(s) each question assesses. The table also provides the answers to the multiple-choice questions.

Section I: Multiple-Choice Questions

The following are examples of the kinds of multiple-choice questions found on the exam.

1. A cybersecurity analyst recently completed a review of a hotel's security. Consider the following information from their report.
   - The hotel's Wi-Fi extends to the parking area, allowing outsiders potential access to the network.
   - Open network ports in the conference center connect to the hotel's internal network and could enable spoofing of a legitimate device.
   - Guest feedback tablets in the lobby use a shared Wi-Fi network, exposing nonsensitive customer satisfaction data.
   - Model numbers of printers and the firmware versions the printers are running are visible on the internal network, revealing some information about devices on the network.

   Which of the following risks would the cybersecurity analyst most likely document as a high risk?

   (A) The hotel's Wi-Fi extending to the parking area

   (B) Open network ports in the conference center

   (C) Guest feedback tablets using a shared Wi-Fi network

   (D) The model numbers of printers and the firmware versions the printers are running being visible

2. A school district wants to ensure that only the school principal (**kmurray**) can edit faculty evaluation reports and to limit permissions for everyone else. The district's system administrator wants to set the following permission for the file **Oak_Park_HS**, which contains the faculty evaluations.

```
-rw-r----- kmurray staff 2048 Sep 18 10:45 Oak_Park_HS
```

Which of the following commands can be used to set the permissions shown?

(A) `chmod 444 Oak_Park_HS`
(B) `chmod 640 Oak_Park_HS`
(C) `chmod 740 Oak_Park_HS`
(D) `chmod 777 Oak_Park_HS`

3. Consider the following email.

From: Management
To: Security Manager

Subject: New Access Rules for Transaction System

Thank you for implementing access restrictions on our internal applications.

We are now interested in applying additional security rules that automatically limit user access based on specific conditions. For example, access to the transaction system should only be allowed during business hours and from devices connected to the corporate network.

Thanks!

Which of the following access control models best meets the request in the email?

(A) DAC
(B) MAC
(C) RBAC
(D) RuBAC

4. A network technician is unable to access a server using port 443 from a machine with an IP address of 192.168.45.37.

   Consider the following access control list (ACL) for the server's firewall.

Rule Number	Allow/Deny	Direction	Protocol	Port	Source
1	Allow	Inbound	TCP	22	ALL
2	Allow	Inbound	TCP	80	ALL
3	Deny	Inbound	TCP	443	192.168.0.0 - 192.168.255.255
4	Allow	Inbound	ICMP	ALL	ALL
5	Allow	Inbound	TCP	3306	ALL
6	Deny	Inbound	TCP	3389	ALL
7	Allow	Inbound	TCP	443	ALL
8	Allow	Inbound	TCP	587	ALL
9	Deny	Inbound	TCP	8140	192.168.45.0 - 192.168.45.255
10	Deny	Inbound	ALL	ALL	ALL

   Which of the following changes to the firewall would allow the network technician to access the server?

   (A) Swap firewall rule 1 with firewall rule 10

   (B) Swap firewall rule 3 with firewall rule 4

   (C) Swap firewall rule 3 with firewall rule 7

   (D) Swap firewall rule 4 with firewall rule 7

5. A system administrator runs two hashing functions on four files. Consider the following outputs for the two hashing functions.

Function 1 outputs

```
file1.txt - 8d8e115e5ebc50c8e03930beac6802a94ef4f36ab
file2.txt - 79a7d08081d12ecf123d63845e38c14c09956ee79
file3.txt - 02db6aefd093c317f8cf78a2fbe52a31b58a6bc5e
file4.txt - bcd3cf9d8527f711031d0d908d84cbb0df97ce90b
```

Function 2 outputs

```
file1.txt - 804537a7adfa4e1bce4d72d0b212a80af2dae3a5e
file2.txt - ba429665c8b95d05a963ee89fded2c7f18892d13e
file3.txt - 804537a7adfa4e1bce4d72d0b212a80af2dae3a5e
file4.txt - 7fa2901ebbb731eb283487afc033e45dae210a89e
```

Which of the following statements is supported by the file hashes?

(A) The files **`file1.txt`** and **`file3.txt`** are exact copies of each other.

(B) Function 1 is more secure than Function 2.

(C) Function 1 and Function 2 are the same hashing function.

(D) The files **`file1.txt`** and **`file3.txt`** have a collision in one hashing function.

6. The security manager at a hospital is planning to upgrade the hospital's physical security system to ensure that only authorized personnel can access areas containing sensitive medical equipment and patient records. Because these areas require a high level of security, the manager wants an authentication method that is unique to each individual and extremely difficult for an adversary to duplicate or spoof. Which of the following authentication methods is best suited for these areas?

   (A) Authentication token

   (B) Password

   (C) Retina scan

   (D) Access card

7. Which of the following best describes how offline password attacks work?

   (A) Adversaries attempt user:password combinations in an active authentication portal.

   (B) Adversaries intercept communication as it travels across a network and read the password in transit.

   (C) Adversaries exploit weak access controls to directly retrieve plaintext passwords stored in a database.

   (D) Adversaries use automated tools to hash many potential passwords and compare them to a captured hash.

Questions 8 through 10 refer to the following.

Consider the following email that was identified and reported as a phishing attempt.

From: Human Resources
To: All Employees

Subject: Final Reminder — Deadline Today!

Our records indicate that your employee profile is incomplete. In order to remain in compliance with company-wide HR standards, all staff must confirm their personal information by the end of the day. Failure to respond by this deadline may result in suspension of payroll access until your profile is verified.

Please note: Over 92% of employees have already completed this verification, and you are among the last to finalize your record.

To confirm your employee file, reply to this email with the following details:

1. Personal phone number
2. Pet's name (for verification)
3. Date of birth

We appreciate your cooperation in keeping our records accurate and ensuring continued access to employee services.

Thank you,

Human Resources

8. Which of the following shows how the email uses urgency to pressure the recipient into responding?
   (A) The recipient is warned that they must confirm their personal information by the end of the day.
   (B) The recipient is warned that failure to comply could result in payroll suspension.
   (C) The recipient is encouraged to help human resources keep their records accurate.
   (D) The recipient is told that the message comes from a trusted internal department.

9. How does the email's claim that "Over 92% of employees have already completed the verification" attempt to pressure the recipient into responding to the email?

   (A) By framing the request as routine HR communication that seems safe, showing the use of familiarity

   (B) By implying that the opportunity to comply is limited and may soon be lost, showing the use of scarcity

   (C) By presenting the request as coming from those in power and intimidating the recipient, showing the use of authority

   (D) By applying social pressure and making the recipient believe most coworkers have already acted, showing the use of consensus

10. Which of the following is the most likely impact if the recipient responds to this email with the requested information?

    (A) An adversary could use the recipient's personal details to impersonate them.

    (B) An adversary could use the recipient's device as a foothold and move laterally on the network compromising other devices.

    (C) An adversary could infect the recipient's device with malicious code hidden in the reply email.

    (D) An adversary could disrupt the entire payroll system by disabling access for all employees.

11. A natural gas company's help desk receives reports from employees that the company's website is intermittently crashing when they try to log in. The cybersecurity analyst reviews the server's access logs and finds the following entries.

```
[22/Oct/2025:10:11:02] "GET /index.html HTTP/1.1" 200 4521
[22/Oct/2025:10:11:07] "GET /about.html HTTP/1.1" 200 3890
[22/Oct/2025:10:11:10] "GET ../../../../etc/passwd HTTP/1.1" 403 721
[22/Oct/2025:10:11:12] "GET ../../../../etc/shadow HTTP/1.1" 403 654
```

    Which of the following application attacks is indicated in the log file?

    (A) Buffer overflow attack

    (B) Cross site scripting attack

    (C) Directory traversal attack

    (D) SQL injection attack

12. The system administrator at a high school receives an alert that there may have been multiple unauthorized login attempts to the school's online grading system. To investigate, the administrator decides to review the authentication logs. Which of the following best describes how authentication logs can be used to determine whether unauthorized login attempts have occurred?

    (A) The logs record which password was used in each login attempt, which allows the administrator to verify account ownership.

    (B) The logs record all login activity, which allows the administrator to reconstruct when and how login attempts occurred.

    (C) The logs record the location of each user attempting to log in, which allows the administrator to identify login attempts from other geographic regions.

    (D) The logs record the type of device attempting to log in, which allows the administrator to block unauthorized devices.

13. The network administrator for a manufacturing facility has implemented a signature-based network detection system. Which of the following is a potential impact of using this network detection method instead of anomaly-based detection?

    (A) More false negative alerts

    (B) Higher operating costs

    (C) Slower detection time

    (D) More alert fatigue

14. Consider the following lines from a log file.

```
2025-09-25 08:01:14 ARP Reply: 192.168.1.13 is-at 00:01:5e:00:fc:16
2025-09-25 09:14:15 ARP Reply: 192.168.1.13 is-at 00:3b:cc:5e:ee:01
```

    Which of the following attack types is indicated in the log file?

    (A) ARP poisoning attack

    (B) DNS poisoning attack

    (C) Evil-twin attack

    (D) MAC flooding attack

15. Which of the following best describes the length of a cryptographic hash function output?

    (A) The length of the output is longer than the input due to the hashing process.

    (B) The length of the output is fixed regardless of the length of the input.

    (C) The length of the output varies based on the length of the input.

    (D) The length of the output is shorter than the length of the input.

16. A state's National Guard base is documenting cybersecurity risks from physical vulnerabilities. Which of the following would be classified as a moderate risk?

    (A) An unlocked trailer containing non-networked office equipment that cannot be used to access sensitive systems

    (B) A locked warehouse with noncritical computers that could be a foothold to access other network resources

    (C) A publicly accessible touchscreen directory for visitors that contains no sensitive data and is unlikely to be exploited

    (D) A main server room that contains sensitive systems and information and does not have sufficiently restricted or controlled access

Questions 17 through 20 refer to the following.

Consider the following article.

> *Small Town Bank Disrupts Attempted Cyber Attack on Customer Database*
>
> Fairgrove Community Bank, a local financial institution serving residents of central Kentucky, reported that it successfully stopped a cyber intrusion attempt earlier this week aimed at its customer database.
>
> The attack was detected on Tuesday afternoon when automated security systems flagged unusual database queries originating from the bank's online loan application form. Investigators determined that the form was being used to input malicious code.
>
> "One of the strings the adversary submitted included `' OR '1'='1';--`," said James Holloway, a network administrator at Fairgrove Community Bank. "That's a common trick pulled from online tutorials."
>
> Holloway said the attacker did not succeed in accessing any customer data, but the attempt revealed a flaw in the bank's web application.
>
> Fairgrove Community Bank's security team has since patched the vulnerability. No data was compromised, and banking operations continued without interruption.
>
> "This wasn't some advanced adversary," Holloway added. "They were copying code from the internet and testing to see if anything would work. But even simple attacks like this can work if we don't implement best practices."
>
> Fairgrove Community Bank says it is conducting a full audit of its customer-facing applications to ensure proper protections are in place.

17. Which of the following best describes the adversary in this scenario?

    (A) Cyberterrorist

    (B) Script kiddie

    (C) State actor

    (D) Insider

18. Which of the following types of attacks occurred when the adversary submitted a string that included `' OR '1'='1';--`?

    (A) SQL injection attack

    (B) Buffer overflow attack

    (C) Cross site scripting attack

    (D) Directory traversal attack

19. Which of the following security controls would most likely prevent an attack like this in the future?

    (A) Encryption

    (B) Stateful firewall

    (C) Input sanitization

    (D) Access control list

20. Which of the following best explains how the adversary attempted to manipulate the bank's customer database through the online loan application form?

    (A) When user input is fed into a server's file system, HTTP requests can access sensitive data.

    (B) When user input contains executable scripts, those scripts can run in the user's browser and access sensitive data.

    (C) When user input exceeds the size of the designated memory, it can allow the adversary to access, modify, and delete files.

    (D) When user input from a web form is fed directly into a database query, an adversary can inject control characters that can allow an adversary to view or modify the contents of a database.

21. An organization only allows their users to log into a system if they are physically in one of the following time zones (a time zone is a region where everyone uses the same clock time).

    - Eastern time zone
    - Central time zone
    - Mountain time zone
    - Pacific time zone

    Which of the following authentication factors is being used to verify the identity of the users?

    (A) Biometric factor

    (B) Knowledge factor

    (C) Location factor

    (D) Possession factor

22. A hospital's security manager has implemented an automated network security tool with the following functions.
    - The tool analyzes network traffic for signs of malicious activity so the security team can quickly spot potential threats.
    - The tool generates an alert when suspicious or malicious traffic is detected because the hospital wants to be notified right away if an attack is attempted.
    - The tool does not take direct action to block or stop the traffic itself because the hospital wants administrators to decide how to respond to threats.

    Which of the following security systems did the security manager implement?

    (A) Data loss prevention system

    (B) Network intrusion prevention system

    (C) Network intrusion detection system

    (D) Security information and event management system

Section II: Free-Response Question

The following is an example of the free-response question found on the exam.

Device Security Analysis

The following sources all come from the same device and are captured in a risk assessment for this device.

Source 1

The device's IP address is 192.168.1.10.

Device Firewall Settings

Rule Number	Action	Source	Destination	Direction	Port Number	Protocol
1	Deny	172.45.66.184	192.168.1.10	Inbound	22	SSH
2	Allow	ALL	192.168.1.10	Inbound	21	FTP
3	Allow	ALL	192.168.1.10	Inbound	80	HTTP
4	Allow	ALL	192.168.1.10	Inbound	445	SMB
5	Allow	ALL	192.168.1.10	Inbound	443	HTTPS
6	Allow	ALL	192.168.1.10	Inbound	22	SSH
7	Allow	172.45.66.184	192.168.1.10	Inbound	3306	MySQL
8	Allow	ALL	192.168.1.10	Inbound	3389	RDP
9	Allow	192.168.1.50	192.168.1.10	Inbound	5900	VNC
10	Deny	ALL	ALL	Inbound	ALL	ALL

Source 2

```
sudo tail -n 30 /var/log/app/network_app.log

1 - Nov 10 09:00:11 ubuntu sudo: jprice : TTY=pts/0 ;
PWD=/home/jprice ; USER=root ; COMMAND=/usr/bin/
less/var/log/syslog

2 - Nov 10 09:00:15 ubuntu sudo: pam_unix(sudo:
session): session opened for user root by
jprice(uid=1000)

3 - Nov 10 09:00:35 ubuntu apt-get[1345]: Get:1
http://archive.ubuntu.com jammy InRelease [265 kB]

4 - Nov 10 09:00:46 ubuntu apt-get[1345]: Get:2
http://security.ubuntu.com jammy-security InRelease
[110 kB]

5 - Nov 10 09:00:55 ubuntu apt-get[1345]: Fetched
375 kB in 19s (19.7 kB/s)

6 - Nov 10 09:01:00 ubuntu apt-get[1345]: Reading
package lists... Done

7 - Nov 10 09:01:01 ubuntu sudo: pam_unix(sudo:
session):
session closed for user root

8 - Nov 10 09:02:14 ubuntu jprice: executed command:
'ufw status verbose'

9 - Nov 10 09:02:14 ubuntu jprice: executed command:
'systemctl status apache2'

10- Nov 10 09:02:16 ubuntu jprice: executed command:
'tail –n /var/log/auth.log'

11 - Nov 10 09:03:10 ubuntu jprice: executed
command: 'systemctl status apache2'

12 - Nov 10 09:03:35 ubuntu systemd[1]: Starting
Daily apt download activities...

13 - Nov 10 09:03:36 ubuntu systemd[1]: Finished
Daily apt download activities.

14 - Nov 10 09:04:00 ubuntu jprice: executed
command: 'ss -tuln'

15 - Nov 10 09:04:01 ubuntu jprice: executed
command: 'cat/etc/ufw/user.rules'

16 - Nov 10 09:05:11 ubuntu jprice: executed
command: 'journalctl -xe'

17 - Nov 10 09:05:32 ubuntu jprice: executed
command: 'df -h'

18 - Nov 10 09:05:50 ubuntu jprice: executed
command: 'du -sh/var/log'
```

```
19 - Nov 10 09:06:02 ubuntu jprice: executed
command: 'top -n 1'

20 - Nov 10 09:06:33 ubuntu jprice: executed
command: 'curl -I http://localhost'

21 - Nov 10 09:06:33 ubuntu sudo:
pam_unix(sudo:session): session opened for user root
by jprice(uid=1000)

22 - Nov 10 09:06:34 ubuntu sudo:
pam_unix(sudo:session): session closed for user root

23 - Nov 10 09:07:01 ubuntu CRON[1773]:
pam_unix(cron:session): session opened for user root
by (uid=0)

24 - Nov 10 09:07:01 ubuntu CRON[1773]:
pam_unix(cron:session): session closed for user root

25 - Nov 10 09:07:45 ubuntu jprice: executed
command: 'ip addr'

26 - Nov 10 09:07:47 ubuntu jprice: executed
command: 'netstat - tulnp'

27 - Nov 10 09:08:10 ubuntu jprice: executed
command: 'ufw status verbose'

28 - Nov 10 09:08:11 ubuntu systemd[1]: Reloading
firewall rules (ufw.service)...

29 - Nov 10 09:08:11 ubuntu systemd[1]: Reloaded
firewall rules (ufw.service).

30 - Nov 10 09:08:20 ubuntu jprice: executed
command: 'exit'
```

Source 3

```
sudo tail -n 30 /var/log/auth.log

1 - Nov 10 14:11:43 ubuntu sshd[1123]: Server
listening on 0.0.0.0 port 22.

2 - Nov 10 14:11:43 ubuntu sshd[1123]: Server
listening on :: port 22.

3 - Nov 10 14:21:01 ubuntu vsftpd[2184]: Failed login
for invalid user admin from 203.0.113.25 port 21 ftp

4 - Nov 10 14:21:02 ubuntu vsftpd[2186]: Failed login
for invalid user root from 203.0.113.25 port 21 ftp

5 - Nov 10 14:21:03 ubuntu vsftpd[2188]: Failed login
for invalid user test from 203.0.113.25 port 21 ftp

6 - Nov 10 14:21:04 ubuntu vsftpd[2190]: Failed login
for invalid user guest from 203.0.113.25 port 21 ftp

7 - Nov 10 14:21:05 ubuntu vsftpd[2192]: Failed login
for invalid user ubuntu from 203.0.113.25 port 21 ftp
```

```
8 - Nov 10 14:21:06 ubuntu vsftpd[2194]: Failed login
for invalid user deploy from 203.0.113.25 port 21 ftp

9 - Nov 10 14:21:07 ubuntu vsftpd[2196]: Failed
login for invalid user support from 203.0.113.25
port 21 ftp

10 - Nov 10 14:21:08 ubuntu vsftpd[2198]: Failed
login for invalid user admin1 from 203.0.113.25 port
21 ftp

11 - Nov 10 14:21:09 ubuntu vsftpd[2200]: Failed
login for invalid user oracle from 203.0.113.25 port
21 ftp

12 - Nov 10 14:21:10 ubuntu vsftpd[2202]: Failed
login for invalid user ftp from 203.0.113.25 port 21
ftp

13 - Nov 10 14:22:14 ubuntu sshd[2234]: Connection
closed by authenticating user jprice 192.168.1.50
port 22 [preauth]

14 - Nov 10 14:22:15 ubuntu sshd[2234]: Accepted
password for jprice from 192.168.1.50 port 22 ssh2

15 - Nov 10 14:22:15 ubuntu sshd[2234]:
pam_unix(sshd:session): session opened for user
jprice by (uid=0)

16 - Nov 10 14:25:47 ubuntu sudo: jprice : TTY=pts/0 ;
PWD=/home/jprice ; USER=root ; COMMAND=/usr/bin/apt
update

17 - Nov 10 14:25:47 ubuntu sudo:
pam_unix(sudo:session): session opened for user root
by jprice(uid=1000)

18 - Nov 10 14:25:48 ubuntu sudo:
pam_unix(sudo:session):session closed for user root

19 - Nov 10 14:28:02 ubuntu sshd[2331]: Connection
closed by 203.0.113.25 [preauth]

20 - Nov 10 14:29:01 ubuntu CRON[2345]:
pam_unix(cron:session): session opened for user root
by (uid=0)

21 - Nov 10 14:29:01 ubuntu CRON[2345]:
pam_unix(cron:session): session closed for user root

22 - Nov 10 14:30:17 ubuntu kernel: [UFW BLOCK]
IN=eth0 OUT= SRC=203.0.113.25 DST=192.168.1.10
PROTO=TCP PORT=25 SYN

23 - Nov 10 14:30:18 ubuntu sshd[2369]: Failed
password for invalid user user from 203.0.113.25
port 22 ssh2

24 - Nov 10 14:30:18 ubuntu sshd[2370]: Received
disconnect from 203.0.113.25 port 49151:11: Bye Bye
[preauth]
```

```
25 - Nov 10 14:30:18 ubuntu kernel: [UFW BLOCK]
IN=eth0 OUT= SRC=203.0.113.25 DST=192.168.1.10
PROTO=TCP PORT=77 SYN

26 - Nov 10 14:31:55 ubuntu systemd-logind[99]: New
session 7 of user jprice.

27 - Nov 10 14:31:55 ubuntu systemd: Started Session
7 of user jprice.

28 - Nov 10 14:31:55 ubuntu sudo: jprice : TTY=pts/0 ;
PWD=/home/jprice ; USER=root ; COMMAND=/usr/bin/
journalctl -xe

29 - Nov 10 14:31:55 ubuntu sudo:
pam_unix(sudo:session): session opened for user root
by jprice(uid=1000)

30 - Nov 10 14:31:56 ubuntu sudo:
pam_unix(sudo:session): session closed for user root
```

Source 4

```
sudo tail -n 30 /var/log/nginx/access_log

1 - 192.168.1.50 - jprice [10/Nov/2025:09:02:14
-0500] "GET/index.html HTTP/1.1" 200 4212 "-"
"Mozilla/5.0 (Ubuntu)"

2 - 192.168.1.50 - jprice [10/Nov/2025:09:02:15
-0500] "GET /assets/css/style.css HTTP/1.1" 200 1024
"-" "Mozilla/5.0 (Ubuntu)"

3 - 192.168.1.50 - jprice [10/Nov/2025:09:02:15
-0500] "GET /assets/js/main.js HTTP/1.1" 200 2876
"-" "Mozilla/5.0 (Ubuntu)"

4 - 192.168.1.50 - jprice [10/Nov/2025:09:02:16
-0500] "GET /images/logo.png HTTP/1.1" 200 2048 "-"
"Mozilla/5.0 (Ubuntu)"

5 - 192.168.1.50 - jprice [10/Nov/2025:09:02:17
-0500] "GET /about.html HTTP/1.1" 200 3198 "-"
"Mozilla/5.0 (Ubuntu)"

6 - 192.168.1.50 - jprice [10/Nov/2025:09:02:18
-0500] "GET /contact.html HTTP/1.1" 200 2951 "-"
"Mozilla/5.0 (Ubuntu)"

7 - 192.168.1.50 - jprice [10/Nov/2025:09:02:20
-0500] "POST /contact_form HTTP/1.1" 200 87
"https://example.local/contact.html" "Mozilla/5.0
(Ubuntu)"

8 - 192.168.1.50 - jprice [10/Nov/2025:09:02:21
-0500] "GET /dashboard HTTP/1.1" 200 4981 "-"
"Mozilla/5.0 (Ubuntu)"
```

```
9 - 192.168.1.55 - - [10/Nov/2025:09:03:10 -0500]
"GET /api/user/profile?id=12 HTTP/1.1" 200 614 "-"
"curl/7.81.0"

10 - 192.168.1.55 - - [10/Nov/2025:09:03:11
-0500] "GET /api/data/list HTTP/1.1" 200 1187 "-"
"curl/7.81.0"

11 - 192.168.1.55 - - [10/Nov/2025:09:03:12 -0500]
"POST /api/user/update HTTP/1.1" 200 152 "-"
"curl/7.81.0"

12 - 10.0.0.5 - admin [10/Nov/2025:09:04:01
-0500] "GET /admin/login HTTP/1.1" 200 4329 "-"
"Mozilla/5.0 (Windows NT 10.0)"

13 - 10.0.0.5 - admin [10/Nov/2025:09:04:02 -0500]
"POST /admin/login HTTP/1.1" 302 112 "https://
example.local/admin/login" "Mozilla/5.0 (Windows NT
10.0)"

14 - 10.0.0.5 - admin [10/Nov/2025:09:04:03 -0500]
"GET /admin/dashboard HTTP/1.1" 200 6275 "-"
"Mozilla/5.0 (Windows NT 10.0)"

15 - 203.0.113.45 - - [10/Nov/2025:09:04:11 -0500]
"GET ../../../../etc/passwd HTTP/1.1" 400 234 "-"
"curl/7.68.0"

16 - 203.0.113.45 - - [10/Nov/2025:09:04:12 -0500]
"GET ../../../etc/shadow HTTP/1.1" 403 312 "-"
"curl/7.68.0"

17 - 203.0.113.45 - - [10/Nov/2025:09:04:13 -0500]
"GET ../../../var/www/html/config.php.bak HTTP/1.1"
404 198 "-" "curl/7.68.0"

18 - 192.168.1.55 - - [10/Nov/2025:09:04:15 -0500]
"GET /api/status HTTP/1.1" 200 94 "-" "curl/7.81.0"

19 - 192.168.1.50 - jprice [10/Nov/2025:09:04:16
-0500] "GET /logout HTTP/1.1" 302 51 "-"
"Mozilla/5.0 (Ubuntu)"

20 - 192.168.1.50 - jprice [10/Nov/2025:09:04:17
-0500] "GET /login.html HTTP/1.1" 200 3811 "-"
"Mozilla/5.0 (Ubuntu)"

21 - 192.168.1.50 - jprice [10/Nov/2025:09:05:00
-0500] "GET /favicon.ico HTTP/1.1" 200 428 "-"
"Mozilla/5.0 (Ubuntu)"

22 - 192.168.1.50 - jprice [10/Nov/2025:09:05:22
-0500] "GET /docs/index.html HTTP/1.1" 200 2491 "-"
"Mozilla/5.0 (Ubuntu)"

23 - 192.168.1.55 - - [10/Nov/2025:09:05:23 -0500]
"GET /api/docs HTTP/1.1" 200 682 "-" "curl/7.81.0"

24 - 192.168.1.50 - jprice [10/Nov/2025:09:05:25
-0500] "GET /help HTTP/1.1" 200 4122 "-"
"Mozilla/5.0 (Ubuntu)"
```

```
25 - 192.168.1.55 - - [10/Nov/2025:09:05:26 -0500]
"GET /api/user/profile?id=14 HTTP/1.1" 200 637 "-"
"curl/7.81.0"

26 - 10.0.0.5 - admin [10/Nov/2025:09:05:27 -0500]
"GET /admin/settings HTTP/1.1" 200 5214 "-"
"Mozilla/5.0 (Windows NT 10.0)"

27 - 10.0.0.5 - admin [10/Nov/2025:09:05:28
-0500] "POST /admin/update HTTP/1.1" 200 164 "-"
"Mozilla/5.0 (Windows NT 10.0)"

28 - 192.168.1.50 - jprice [10/Nov/2025:09:05:29
-0500] "GET /assets/js/analytics.js HTTP/1.1" 200
1193 "-" "Mozilla/5.0 (Ubuntu)"

29 - 192.168.1.50 - jprice [10/Nov/2025:09:05:30
-0500] "GET / HTTP/1.1" 200 4231 "-" "Mozilla/5.0
(Ubuntu)"

30 - 192.168.1.50 - jprice [10/Nov/2025:09:05:31
-0500] "GET /images/banner.jpg HTTP/1.1" 200 3087
"-" "Mozilla/5.0 (Ubuntu)"
```

Source 5

```
ls -l /home/jprice/Documents

-rw-r--r--  1 jprice jprice   2143 Nov  08  09:15  report.txt

-rw-------  1 jprice jprice   1024 Nov  02  09:01  secrets.key

-rwxr-xr-x  1 jprice jprice   8576 Nov  10  11:02  backup.sh

-r--r-----  1 jprice admin    3421 Nov  06  11:53  config.cfg

-rw-rw-r--  1 jprice devteam  5012 Nov  10  09:04  notes.md

-rwx------  1 jprice jprice   7744 Nov  10  06:17  deploy_script

-rw-r-----  1 jprice admin    2088 Nov  09  09:36  database.ini

-rwxrwx---  1 jprice devteam  9281 Nov  04  01:27  run_tests.sh

-rw-r--rw-  1 jprice shared   3999 Nov  01  12:08  public_data.csv
```

Source 6

Acceptable Use Policy

Required Activities:

- Users must keep the operating system and installed software up to date.

Permitted Activities:

- Users may connect peripheral devices such as keyboards, mice, monitors, and printers as needed for daily work.

Prohibited Activities:

- Users may not connect external drives, USB storage devices, or other removable media unless explicitly authorized.
- Users may not modify system configurations, security settings, or access controls without authorization.
- Users may not access social media websites on this device.

Device Security Analysis

Use the given information to respond to parts A, B, C, D, and E. Label any subparts (e.g., i and ii) that may be present.

Part A

Consider the policy for the device in Source 6.

i. **Explain** how one part of the policy helps protect the device.

ii. **Explain** how one rule in the current policy could be modified to make the device more secure. Include a specific example in your response.

Part B

In the authorization log, there is evidence of a password attack in rows 3–12.

i. **Describe** the evidence in the log file that indicates a password attack. Include specific entries from the log file in your response.

ii. **Identify** the IP address of the adversary.

Part C

Consider all the sources from the device.

i. **Explain** how the permission settings for one file in the `/home/jprice/Documents` directory determine the level of access for that file for the owner, group, and all other users on the system. Include the name of the file in your response.

ii. Other than removing all permissions from all users, **describe** one way the permission settings for one file on the system could be configured to restrict access for some users on the device. Include the name of the file in your response.

iii. Using the explanation from part C (ii), **write** one or more `chmod` commands that set the permissions described.

Part D

Consider all the sources from the device.

i. **Explain** how one connection attempt on the device was blocked by the device's firewall. Include evidence from a log file in your response.

ii. Other than allowing all traffic for all services, **describe** a modification to one firewall rule that would allow the connection attempt identified in part D (i).

iii. Other than allowing the connection attempt identified in part D (i), **describe** one impact of your modification from part D (ii) on incoming or outgoing network traffic on the device.

Part E

Apart from the password attack identified in part B, there is evidence of another attack on the device. Consider all the sources from the device.

i. **Determine** the type of attack evidenced in a log file.

ii. **Describe** specific information in the log file that indicates the attack named in part E (i).

iii. **Describe** one way an automated system could halt this type of attack in real time.

iv. This attack could be mitigated by an automated system, such as a firewall, IDS, IPS, or AI. **Identify** a different countermeasure that could mitigate, prevent, or deter the attack.

Answer Key and Question Alignment to Course Framework

Multiple-Choice Question	Answer	Skill	Learning Objective
1	B	1.C	3.1.C
2	B	2.D	5.2.D
3	D	2.B	5.2.C
4	C	2.C	3.4.B
5	D	1.A	4.2.A
6	C	2.B	4.2.C
7	D	1.B	4.2.B
8	A	1.A	1.1.A
9	D	1.B	2.1.A
10	A	1.C	1.1.C
11	C	3.D	5.6.E
12	B	3.A	4.4.A
13	A	3.C	3.5.D
14	A	3.D	3.5.E
15	B	2.A	4.2.A
16	B	1.D	2.2.C
17	B	1.A	2.1.B
18	A	3.D	5.6.E
19	C	2.B	5.5.B
20	D	1.B	5.1.B
21	C	2.A	4.2.C
22	C	3.A	3.5.A

Free-Response Question	Skills	Learning Objectives
Device Security Analysis	2.A, 2.B, 2.C, 2.D, 3.B, 3.D	3.1.A, 3.4.B, 3.4.D, 3.5.A, 3.5.E, 4.1.C, 4.2.D, 4.3.A, 4.3.C, 4.4.A, 4.4.D, 5.1.B, 5.2.D, 5.5.B, 5.6.E

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Scoring Guidelines

Device Security Analysis — 14 points

Use the given information to respond to parts A, B, C, D, and E. Label any subparts (e.g., i and ii) that may be present.

Part A

Consider the policy for the device in Source 6.

i. **Explain** how one part of the policy helps protect the device.
ii. **Explain** how one rule in the current policy could be modified to make the device more secure. Include a specific example in your response.

Part B

In the authorization log, there is evidence of a password attack in rows 3–12.

i. **Describe** the evidence in the log file that indicates a password attack. Include specific entries from the log file in your response.
ii. **Identify** the IP address of the adversary.

Part C

Consider all the sources from the device.

i. **Explain** how the permission settings for one file in the `/home/jprice/Documents` directory determine the level of access for that file for the owner, group, and all other users on the system. Include the name of the file in your response.
ii. Other than removing all permissions from all users, **describe** one way the permission settings for one file on the system could be configured to restrict access for some users on the device. Include the name of the file in your response.
iii. Using the explanation from part C (ii), **write** one or more chmod commands that set the permissions described.

Part D

Consider all the sources from the device.

i. **Explain** how one connection attempt on the device was blocked by the device's firewall. Include evidence from a log file in your response.
ii. Other than allowing all traffic for all services, **describe** a modification to one firewall rule that would allow the connection attempt identified in part D (i).
iii. Other than allowing the connection attempt identified in part D(i), **describe** one impact of your modification from part D (ii) on incoming or outgoing network traffic on the device.

Part E

Apart from the password attack identified in part B, there is evidence of another attack on the device. Consider all the sources from the device.

i. **Determine** the type of attack evidenced in a log file.
ii. **Describe** specific information in the log file that indicates the attack named in part E (i).
iii. **Describe** one way an automated system could halt this type of attack in real time.
iv. This attack could be mitigated by an automated system, such as a firewall, IDS, IPS, or AI. **Identify** a different countermeasure that could mitigate, prevent, or deter the attack.

Model Responses

Part A

i. Not allowing users to connect removable media devices helps protect the device against malware that could be installed on it. Because the organization does not have control over external devices, they cannot guarantee that no malware will automatically be installed when they are plugged into the device.

ii. The AUP could require the system to check for updates within a certain time frame, such as weekly. If they force the system to check for updates weekly, this will ensure that all patches are installed in a timely fashion.

Part B

i. There are multiple failed login attempts within seconds of each other all from the same device. Row 3 is the first failed login at 14:21:01, and 9 seconds later there are 10 failed login attempts ending on row 12 at 14:21:10.

ii. 203.0.113.25

Part C

i. In the run_tests.sh file, the owner of the file and the group devteam have all permissions (read, write, and execute) for the file because the first and second groupings have rwx, while all other users on the system have no permissions for the file because the last grouping has ---.

ii. To harden the report.txt file, they could remove the read permission from both the group and all other users for this system.

iii. "chmod g-r report.txt" and then "chmod o-r report.txt"

Part D

i. Since firewall rule 10 denies all traffic to port 25 due to the absence of an allow rule, when the connection attempt from IP 203.0.113.25 occurs on line 22 in the auth log, the attempt to access port 25 is blocked.

ii. Rule 2 of the firewall could change the port number from 21 to 25.

iii. Changing the port in rule 2 to 25 from 21 would stop all inbound FTP/port 21 traffic to the device.

Part E

i. Directory traversal attack

ii. In lines 15–17 of the web application log (source 4), there are attempts of "../..", which is the classic sign of a directory traversal attack. They are attempting to go back in the file structure of the system where the web application is hosted—where they could try to access parts of the system that they should not have access to.

iii. An automated system could notice the malicious signs of a directory traversal attack and shut down the IP address from accessing the machine. So, in this case, it would stop the IP address of 203.0.113.45 from accessing the device when it recognizes the "../.." in the URL.

iv. The system could sanitize the user inputs to not allow any "../.." in the URL submitted by the user.

Scoring Guidelines for Question: Device Security Analysis

Reporting Category	Scoring Criteria	
Part A (i) **(0–1 points)** **Point 1**	**0 points** Does not explain how any part of the policy helps protect the device.	**1 point** Accurately **explains** how one part of the policy helps protect the device.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Are vague or unrelated to the policy. ▪ Describe something not in the policy. ▪ Do not clearly connect the policy to improved security. ▪ Identify something in the policy without explaining how it protects the device.	**Responses that earn this point:** ▪ Explain how a part of the acceptable use policy protects the device.
	Examples that do not earn this point: ▪ "Long passwords are good." ▪ "Users should avoid downloading games." ▪ "The policy keeps the device safe."	**Examples that earn this point:** ▪ "Users need to keep their operating system and software up to date because this ensures all known vulnerabilities are patched, preventing adversaries from exploiting them on the device." ▪ "Keeping the operating system and software up to date ensures known vulnerabilities are patched, reducing the risk of adversaries exploiting those vulnerabilities on the device."

Reporting Category	Scoring Criteria	
Part A (ii) **(0–1 points)** **Point 2**	**0 points** Does not explain a modification to the current policy or describes a modification that would not improve security.	**1 point** Accurately **explains** how one rule in the current policy could be modified to make the device more secure, including a specific example in the response.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Suggest adding a new rule instead of modifying an existing rule. ▪ Suggest a modification that would not enhance security. ▪ Do not provide evidence from a log file. ▪ Identify or describe without explaining.	**Responses that earn this point:** ▪ Propose a modification to a policy rule and accurately explain how this helps make the device more secure.
	Examples that do not earn this point: ▪ "Allow social media during lunch breaks." ▪ "Let users plug in USB devices if they think it's safe."	**Examples that earn this point:** ▪ "Modifying the removable media rule to include blocking wireless external storage, such as Bluetooth file transfers, would help prevent wireless Bluetooth attacks because it eliminates an additional attack vector." ▪ "Requiring automatic OS updates instead of manual updates ensures updates are applied without user intervention, helping keep the system up to date and reducing exposure to known vulnerabilities."

Reporting Category	Scoring Criteria	
Part B (i) **(0–1 points)** **Point 3**	**0 points** Does not describe evidence of a password attack in the authorization log or identifies the attack but does not include evidence from a log file.	**1 point** Accurately **describes** valid evidence in the log file that indicates a password attack, including specific entries from a log file in the response.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Mention entries unrelated to failed authentication attempts. ▪ Describe normal logins.	**Responses that earn this point:** ▪ Describe multiple failed password attempts from the same IP address in quick succession.
	Examples that do not earn this point: ▪ "Row 14 shows a successful login." ▪ "There was a CRON job run at 14:29."	**Examples that earn this point:** ▪ "Rows 3–12 show repeated failed FTP login attempts for many usernames within seconds."

Reporting Category	Scoring Criteria	
Part B (ii) **(0–1 points)** **Point 4**	**0 points** Does not identify the correct IP address or port in the password attack.	**1 point** Accurately **identifies** the indicated IP address or port in the password attack.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Provide any IP address other than 203.0.113.25. ▪ Identify multiple IP addresses. ▪ Provide a port.	**Responses that earn this point:** ▪ Identify IP address 203.0.113.25 as the adversary in the attack.
	Examples that do not earn this point: ▪ "113.25" ▪ "203.0.113.25 and 6.117.89.203"	**Examples that earn this point:** ▪ "203.0.113.25" ▪ "IP address 203.0.113.25"

Reporting Category	Scoring Criteria	
Part C (i) **(0–1 points)** **Point 5**	**0 points** Does not accurately explain file permissions or identifies incorrect user or group permissions.	**1 point** Accurately **explains** how the permission settings for one file in the indicated directory determine the level of access for that file for the owner, group, and all other users on the system, including the name of the file in the response.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Misread the permission bits. ▪ Describe permissions for a file not in the stimulus. ▪ Do not list the name of the file. ▪ Identify or describe without explaining.	**Responses that earn this point:** ▪ Explain the correct permissions for owner, group, and others for a chosen file and identify the file.
	Examples that do not earn this point: ▪ "Everyone can read notes.md." ▪ "deploy_script is open to all users." ▪ "The owner can read and write, the group can read, and all other users have no permissions."	**Examples that earn this point:** ▪ "For backup.sh, the owner has read, write, and execute permissions because the permissions are rwx, while the group and others have read and execute permissions indicated by r-x." ▪ "For secrets.key, only the owner has read and write permissions, as shown by rw-, while the group and others have no permissions since no permission bits are set." ▪ "File: report.txt Owner: read and write since the first group is rw- Group: read only since the second group is r-- Others: read only since the last group is r--"

<table>
<tr><th>Reporting Category</th><th colspan="2">Scoring Criteria</th></tr>
<tr><td rowspan="5">Part C (ii)
(0–1 points)
Point 6</td><td>0 points
Does not describe a valid configuration change to the permissions of one file to modify access for users on this device.</td><td>1 point
Accurately describes one way the permission settings for one file on the system could be configured to appropriately modify access (by granting or removing permissions) for some users on the device, including the name of the file in the response.</td></tr>
<tr><td colspan="2">Decision Rules and Scoring Notes</td></tr>
<tr><td>Responses that do not earn this point:
Suggest removing all permissions for a file on this system.
Suggest removing all access for the owner.
Do not identify the file name.</td><td>Responses that earn this point:
Suggest removing one or more permissions from a file that it currently has.
Suggest removing read, write, or execute access appropriately.</td></tr>
<tr><td>Examples that do not earn this point:
“Remove execute permission from report.txt for owner.”
“Remove all permissions so no one can access it.”
“Give write permissions to all users on secrets.key.”</td><td>Examples that earn this point:
“Remove read access for the group and others on report.txt to keep it private to the owner.”
“Remove execute permission for the owner on deploy_script.”</td></tr>
<tr><td colspan="2">Additional notes:
The file explained in part C (i) does not have to be the same file discussed in part C (ii) to earn the point.</td></tr>
</table>

<table>
<tr><th>Reporting Category</th><th colspan="2">Scoring Criteria</th></tr>
<tr><td rowspan="5">Part C (iii)
(0–1 points)
Point 7</td><td>0 points
Does not write a valid chmod command or the command does not match the permissions described in part C (ii).</td><td>1 point
Accurately writes one or more chmod commands that would set the permissions described in part C (ii).</td></tr>
<tr><td colspan="2">Decision Rules and Scoring Notes</td></tr>
<tr><td>Responses that do not earn this point:
Have incorrect command syntax.
Have permissions that do not match the configuration to restrict access described in part C (ii).</td><td>Responses that earn this point:
Use correct syntax, such as <code>chmod 600 filename</code>, or symbolic modes matching the response in part C (ii).</td></tr>
<tr><td>Examples that do not earn this point:
“chmod -rw------- deploy.sh”
“chmod 777 secrets.key”</td><td>Examples that earn this point:
“chmod 200 run_tests.sh”
“sudo chmod go-r report.txt”</td></tr>
<tr><td colspan="2">Additional notes:
Correct responses may begin with <code>sudo</code>, but <code>sudo</code> is not required to earn the point.
The response may still earn the point for part C (iii) if it did not earn the point for part C (ii) as long as the chmod command accurately sets the permissions described in part C (ii).</td></tr>
</table>

<table>
<tr><th>Reporting Category</th><th colspan="2">Scoring Criteria</th></tr>
<tr><td rowspan="5">Part D (i)
(0–1 points)
Point 8</td><td>0 points
Does not explain how a connection attempt was blocked or identifies an event unrelated to the firewall.</td><td>1 point
Accurately explains how one connection attempt on the device was blocked by the device's firewall, including evidence from a log file in the response.</td></tr>
<tr><td colspan="2">Decision Rules and Scoring Notes</td></tr>
<tr><td>Responses that do not earn this point:
Reference a login failure not caused by the firewall.
Indicate a successful login attempt.
Indicate multiple attempts being blocked where at least one attempt is incorrect.
Do not provide evidence from a log file.
Identify or describe without explaining.</td><td>Responses that earn this point:
Correctly identify a line from a log file and a firewall rule that would prevent the attempt in the log file, and explain why it would be prevented.
Indicate how more than one connection attempt is being blocked by the firewall.</td></tr>
<tr><td>Examples that do not earn this point:
"User admin failed login because of a wrong password."
"SSH from 192.168.1.50 was blocked."</td><td>Examples that earn this point:
"Source 3 line 22 shows a blocked TCP SYN packet to port 25 from 203.0.113.25 because no firewall rule allows traffic on port 25."
"In line 25 of the auth log, a connection attempt to port 77 is blocked by the firewall, as access to port 77 is not permitted."</td></tr>
</table>

<table>
<tr><th>Reporting Category</th><th colspan="2">Scoring Criteria</th></tr>
<tr><td rowspan="5">Part D (ii)
(0–1 points)
Point 9</td><td>0 points
Does not describe a valid change to a firewall rule or suggests a modification that does not allow the connection attempt identified in part D (i).</td><td>1 point
Accurately describes a modification to one firewall rule that would allow the connection attempt identified in part D (i).</td></tr>
<tr><td colspan="2">Decision Rules and Scoring Notes</td></tr>
<tr><td>Responses that do not earn this point:
Suggest adding another deny rule to the firewall.
Suggest altering an unrelated firewall rule.
Suggest allowing a modification that would allow all traffic for all services.</td><td>Responses that earn this point:
Suggest a change that would allow the connection attempt from part D (i).</td></tr>
<tr><td>Examples that do not earn this point:
“Change rule 3 from allow to deny.”
“Disable the firewall.”</td><td>Examples that earn this point:
“Modify rule 8 to allow port 25 before the final deny-all rule.”</td></tr>
<tr><td colspan="2">Additional notes:
The response may still earn the point for part D (ii) if it did not earn the point for part D (i).</td></tr>
</table>

Reporting Category	Scoring Criteria	
Part D (iii) **(0–1 points)** **Point 10**	**0 points** Does not describe the impact of the modification suggested in part D (ii).	**1 point** Correctly **describes** one impact of the modification suggested in part D (ii) on incoming or outgoing network traffic on the device.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Do not include an accurate impact of the firewall change. ▪ Include an incorrect impact of the firewall change. ▪ Only references the connections in part D (i) or part D (ii) being impacted. ▪ Reference a different change than was recommended in part D (ii).	**Responses that earn this point:** ▪ Describe an impact of implementing the modification to the firewall as described in part D (ii).
	Examples that do not earn this point: ▪ "It would block all adversaries." ▪ "It would stop brute force attempts." ▪ "It would allow the connection that was blocked originally by the firewall."	**Examples that earn this point:** ▪ "Allowing port 25 would permit email traffic into the device but could expose the system to SMTP-based attacks."

Reporting Category	Scoring Criteria	
Part E (i) **(0–1 points)** **Point 11**	**0 points** Does not determine the type of attack.	**1 point** Accurately **determines** the type of attack evidenced in a log file.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Identify a type of attack not supported by the evidence. ▪ Indicate multiple attack types where at least one attack is incorrect. ▪ Indicate a password attack.	**Responses that earn this point:** ▪ Identify directory traversal as the type of attack.
	Examples that do not earn this point: ▪ "Ping flood attack" ▪ "DDoS attack" ▪ "ARP poisoning and directory traversal"	**Examples that earn this point:** ▪ "There is evidence of a directory traversal attack." ▪ "Directory traversal"

Reporting Category	Scoring Criteria	
Part E (ii) **(0–1 points)** **Point 12**	**0 points** Does not describe how specific entries indicate the attack using evidence from the log or gives a description unrelated to the log.	**1 point** Accurately **describes** specific information in the log file that indicates the attack named in part E (i).
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Do not include evidence from the log. ▪ Incorrectly interpret a directory traversal attack.	**Responses that earn this point:** ▪ Describe how the attack is indicated using evidence from source 4 lines 15–17 that show attempts, like "../../../../etc/passwd".
	Examples that do not earn this point: ▪ "The attacker sent a POST request, which shows they were trying to hack the server." ▪ "There is a lot of traffic, which indicates an attack." ▪ "The system blocked port 25, which indicates a traversal attack."	**Examples that earn this point:** ▪ "In source 4 line 15, the request includes '../../../../etc/passwd', which is a path traversal sequence attempting to reach system files outside the web root." ▪ "Lines 15–17 show attempts to access sensitive files like '/etc/passwd' and '/etc/shadow' using repeated '../', which is a signature of directory traversal attacks."

Reporting Category	Scoring Criteria	
Part E (iii) **(0–1 points)** **Point 13**	**0 points** Does not describe how an automated system could halt this type of attack.	**1 point** Accurately **describes** one way an automated system could halt this type of attack in real time.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Reference making changes to the system prior to the attack. ▪ Indicate an action that would not stop the attack.	**Responses that earn this point:** ▪ Correctly state that an automated system would notice the malicious traffic and give a way to stop this traffic. ▪ Correctly state more than one way an automated system would stop this attack immediately.
	Examples that do not earn this point: ▪ "The device could install updates to stop the attack." ▪ "The system should deny social media so attackers can't get in."	**Examples that earn this point:** ▪ "An IPS could detect repeated '../' patterns and block 203.0.113.45 immediately." ▪ "An intrusion prevention system could monitor for attempts to access protected files, like /etc/passwd, and immediately drop the connection and blacklist the IP."

Reporting Category	Scoring Criteria	
Part E (iv) **(0–1 points)** **Point 14**	**0 points** Does not identify a valid countermeasure or provides one already listed in the prompt.	**1 point** Accurately **identifies** a countermeasure other than firewall, IDS, IPS, or AI that could mitigate, prevent, or deter the attack.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Identify a firewall, IDS, IPS, or AI-based countermeasure. ▪ Do not identify a countermeasure that would stop this type of attack.	**Responses that earn this point:** ▪ Identify sanitizing inputs. ▪ Indicate not allowing "../.." patterns as a way to stop this type of attack.
	Examples that do not earn this point: ▪ "Install an IDS." ▪ "Disable Telnet from the device as it is outdated."	**Examples that earn this point:** ▪ "The application could sanitize user input to remove all '../' sequences before processing."



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EAST PENN SCHOOL DISTRICT

Course Name Intro to AI with Vibe Coding

Unit Title Unit 1 - Intro to AI and Ethics

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

PA BCIT Standards:

15.4.12.A- Influence of Emerging Technologies: Apply the creative and productive use of emerging technologies for educational and personal success.

15.4.12.B- Digital Citizenship: Evaluate the impact of social, legal, ethical, and safe behaviors on digital citizenship.

15.3.12.T- Electronic Communication/Digital Citizenship: Demonstrate application of digital citizenship in work and personal situations.

15.3.12.E- Communication/Research: Evaluate chosen print and electronic resources for advanced research.

CSTA Standards:

HS-ALG-PS-05- Algorithms & Design: Evaluate AI-generated

Transfer

Students will be able to independently use their learning to...(make purpose-takeaway in 5 years)

- ❏ Leverage AI and emerging technologies as tools for solving authentic problems, creating meaningful products, and making informed decisions—while critically evaluating their accuracy, limitations, ethics, and impact on people.

Meaning

UNDERSTANDINGS

Students will understand that...

- ❏ Artificial intelligence systems generate outputs from patterns in data; their responses can appear convincing without being accurate, complete, or unbiased.
- ❏ Responsible AI use requires human judgment, verification, privacy awareness, and attention to the possible effects of AI-generated content on individuals and communities.
- ❏ Bias can enter AI systems through training data, design choices, and use contexts, so AI outputs should be examined critically rather than accepted at face value.
- ❏ Generative AI can create realistic synthetic media and misinformation, making source evaluation and media literacy increasingly important.

ESSENTIAL QUESTIONS

Students will keep considering...

- ❏ What is artificial intelligence, and what makes an AI system different from a human thinker or a traditional computer program?
- ❏ How does the way an AI system is trained influence what it produces?
- ❏ When should we trust an AI-generated response, and how can we determine whether it is reliable?
- ❏ How can bias, hallucinations, deepfakes, and misinformation cause harm?
- ❏ What responsibilities do users, developers, schools, businesses, and society have when using AI?

output to assess bias, accuracy, and potential harms.	❑ Ethical decisions about AI involve balancing benefits and innovation with safety, fairness, transparency, accountability, and potential harm.	
	Acquisition(need to align with above and standards)	
	Students will know... ❑ Core meaning and common characteristics of artificial intelligence. ❑ Basic idea that generative AI produces outputs by using patterns learned from training data. ❑ Meaning of training data and the relationship between data quality and AI output. ❑ Definitions and examples of bias, hallucination, misinformation, and deepfake/synthetic media. ❑ Safe and responsible AI-use practices, including protecting personal or sensitive information and verifying important claims. ❑ Major ethical concerns connected to AI, including fairness, accuracy, privacy, transparency, accountability, and misuse.	*Students will be skilled at...* ❑ Explaining AI concepts using appropriate introductory vocabulary and concrete examples. ❑ Analyzing AI-generated content for possible bias, hallucinations, misinformation, or other reliability concerns. ❑ Evaluating training-data examples and identify ways incomplete or unbalanced data could affect results. ❑ Verifying AI-generated claims using appropriate evidence or trusted sources rather than relying on the output alone. ❑ Applying safe and responsible decision-making when interacting with AI tools. ❑ Identifying features or warning signs of deepfakes and misleading AI-generated media. ❑ (In an AI ethics scenario) supporting a position with reasons, evidence, and consideration of consequences.

EAST PENN SCHOOL DISTRICT

Course Name Intro to AI with Vibe Coding

Unit Title Unit 2 - Intro to AI Models

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

PA BCIT Standards:

15.4.12.A- Influence of Emerging Technologies: Apply the creative and productive use of emerging technologies for educational and personal success.

15.4.12.H- Programming: Use programming languages to develop logical thinking and problem-solving skills.

15.6.12.M- Emerging Technologies in Careers: Evaluate the impact of emerging technologies on various career paths and provide examples of industry certifications within the field.

CSTA Standards:

HS-ALG-ML-06- Machine Learning: Justify the selection of a type of AI algorithm to accomplish a task.

This fits the distinction among

Transfer

Students will be able to independently use their learning to...(make purpose-takeaway in 5 years)

- ❑ Leverage AI and emerging technologies as tools for solving authentic problems, creating meaningful products, and making informed decisions—while critically evaluating their accuracy, limitations, ethics, and impact on people.

Meaning

UNDERSTANDINGS

Students will understand that...

- ❑ AI is a broad field containing different kinds of systems and models designed for different purposes; generative and predictive AI solve different types of problems.
- ❑ Large language models generate language by learning statistical patterns from large amounts of data, and the quality of interaction depends partly on how users communicate their goals and constraints.
- ❑ Machine learning systems improve or make predictions by learning from data or feedback rather than by relying only on explicitly programmed rules.
- ❑ Supervised, unsupervised, and reinforcement learning use different forms of data or feedback and are appropriate for different tasks.

ESSENTIAL QUESTIONS

Students will keep considering...

- ❑ How are human intelligence and artificial intelligence similar and different?
- ❑ When is generative AI more appropriate than predictive AI, and vice versa?
- ❑ How do large language models produce responses, and what are their limitations?
- ❑ How does prompt design influence the usefulness of an AI response?
- ❑ How do supervised, unsupervised, and reinforcement learning differ?
- ❑ How are AI models trained, tested, and used in real-world industries?
- ❑ Who is responsible for the behavior and impact of an AI model?

generative/predictive AI and different approaches to machine learning. **HS-ALG-ML-07-** Machine Learning: Evaluate training data by examining its source, quality, representativeness, potential biases, and privacy implications. **HS-ALG-ML-08-** Machine Learning: Develop a machine learning model for a chosen task using appropriate data and tools. **S1-AIN-DD-01-** Artificial Intelligence Specialty: Analyze AI systems to differentiate the types of problems they address. **S1-AIN-DD-02-** Artificial Intelligence Specialty: Modify AI system training data to improve fairness and accuracy in outputs. **S1-AIN-HR-09-** Artificial Intelligence Specialty: Analyze the potential biases and limitations of AI systems.	❑ AI models are human-created systems: people make choices about goals, data, training, testing, deployment, and use, and those choices influence model behavior. ❑ Training data and model design can introduce or amplify bias; evaluating a model requires attention to both performance and the people or contexts affected by its use.	
	Acquisition(need to align with above and standards)	
	Students will know... ❑ Distinctions among artificial intelligence, machine learning, generative AI, predictive AI, and large language models. ❑ Basic purpose and behavior of large language models. ❑ Elements of an effective prompt, including clear intent, relevant context, details, constraints, and desired output. ❑ Basic machine-learning lifecycle: defining a task, gathering/preparing data, training, testing/evaluating, and using or refining a model. ❑ Characteristics of supervised learning, unsupervised learning, and reinforcement learning. ❑ Examples of AI-model applications across industries. ❑ Roles people play in building AI systems and the influence of human decisions throughout development. ❑ How biased, incomplete, or unrepresentative training data can affect model outcomes.	*Students will be skilled at...* ❑ Classify examples as generative or predictive AI and justify the classification. ❑ Compare AI approaches and select an appropriate type of model or learning method for a stated problem. ❑ Construct and revise prompts to produce more relevant and useful AI outputs. ❑ Explain, at an introductory level, how a machine-learning model moves from data to learned patterns and outputs. ❑ Distinguish supervised, unsupervised, and reinforcement learning from scenarios or examples. ❑ Train or interact with a simple model and interpret how changes in examples, labels, or feedback influence its behavior. ❑ Investigate an industry use of AI and explain its purpose, benefits, limitations, and possible risks. ❑ Examine a training set or model outcome for potential bias and recommend improveme

Course Name Intro to AI with Vibe Coding

Unit Title Unit 3 - Intro to Vibe Coding and Design

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

PA BCIT Standards:

15.4.12.A- Influence of Emerging Technologies: Apply the creative and productive use of emerging technologies for educational and personal success.
15.4.12.G- Software/Applications: Create an advanced digital project using sophisticated design and appropriate software/applications.
15.4.12.H- Programming: Use programming languages to develop logical thinking and problem-solving skills.
15.4.12.K- Digital Media: Evaluate advanced multimedia work products and make recommendations based on the evaluation.

CSTA Standards:
HS-PRO-RD-18- Programming: Evaluate AI-generated code for

Transfer

Students will be able to independently use their learning to...(make purpose-takeaway in 5 years)

- ❑ Leverage AI and emerging technologies as tools for solving authentic problems, creating meaningful products, and making informed decisions—while critically evaluating their accuracy, limitations, ethics, and impact on people.

Meaning

UNDERSTANDINGS
Students will understand that...

- ❑ Vibe coding uses natural-language communication with AI to help create software, but effective results still depend on clear human intent, evaluation, and revision.
- ❑ Prompting for code is a design and communication skill: specific goals, context, constraints, and descriptive language help translate an idea into a usable digital product.
- ❑ AI-generated code is a starting point rather than a finished product; developers improve it through testing, diagnosis, debugging, manual editing, and repeated iteration.
- ❑ Understanding enough of the underlying webpage structure to inspect and edit content gives creators greater control over AI-generated work.
- ❑ Good web design is centered on users: usability, accessibility, visual choices,

ESSENTIAL QUESTIONS
Students will keep considering...

- ❑ How can we communicate an idea clearly enough for an AI coding tool to build what we intend?
- ❑ What makes a prompt effective for creating or revising a website?
- ❑ When an AI-generated website does not work as intended, how do we determine what to change?
- ❑ Why should a vibe coder understand and manually edit at least some HTML rather than rely entirely on AI?
- ❑ What makes a website usable and accessible for different users?
- ❑ How do color, typography, layout, and design descriptors influence a user's experience?
- ❑ How can prototypes, user testing, and iteration lead to a better final product?

accuracy, reliability, and alignment with program requirements. **HS-PRO-TR-19-** Testing & Refining: Evaluate a computing technology's alignment with design specifications and responsible design values, including its correctness, effectiveness, and user experience. **HS-PRO-TR-20-** Testing & Refining: Refine a computing technology based on user feedback, testing results, and responsible design values to improve its effectiveness and impact. **HS-ALG-IM-09-** Human-Centered Design: Design a computing technology using human-centered design principles.	and feedback should shape how a site is built and revised. ❑ Prototypes and user testing reduce uncertainty by allowing designers to test ideas, compare alternatives, and improve a product before or during full implementation.	
	Acquisition(need to align with above and standards)	
	Students will know... ❑ Vibe coding as an iterative process of describing, generating, testing, evaluating, and revising with AI. ❑ Qualities of effective prompts for coding and design: clarity, specificity, context, constraints, examples, and desired behavior or appearance. ❑ Purpose of iteration and debugging in improving AI-generated code. ❑ Basic role of HTML text/content in a webpage and the idea that generated code can be manually edited. ❑ Core user-experience concepts, including usability, clarity, consistency, navigation, and user testing. ❑ Core accessibility considerations for websites and the goal of making digital content usable by more people. ❑ How color, fonts, layout, and descriptive design vocabulary communicate style and affect readability. ❑ Purpose of prototypes and the value of comparing design alternatives before finalizing a solution.	*Students will be skilled at...* ❑ Translate a creative idea or user need into a detailed natural-language prompt for an AI coding environment. ❑ Iteratively revise prompts based on observed output rather than restarting without analysis. ❑ Test an AI-generated webpage, identify mismatches or errors, and describe the problem precisely enough to support a fix. ❑ Use AI to diagnose and correct errors while evaluating whether the proposed fix actually solves the problem. ❑ Manually edit webpage text/content in HTML to customize an AI-generated site. ❑ Recreate or approximate a target website/design by analyzing visible features and expressing them as design requirements. ❑ Evaluate a website from a user-experience perspective and recommend specific improvements. ❑ Identify accessibility barriers and use AI and/or an accessibility checker to improve a webpage. ❑ Use design vocabulary to specify colors, typography, visual style, and layout. ❑ Create and compare prototypes, conduct basic user testing, interpret feedback, and revise a design.

EAST PENN SCHOOL DISTRICT

Course Name Intro to AI with Vibe Coding

Unit Title Unit 4 - Capstone Website Project

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

PA BCIT Standards:

15.4.12.G- Software/Applications: Create an advanced digital project using sophisticated design and appropriate software/applications.

15.4.12.H- Programming: Use programming languages to develop logical thinking and problem-solving skills.

15.4.12.K- Digital Media: Evaluate advanced multimedia work products and make recommendations based on the evaluation.

15.3.12.W- Communication: Collaborate via electronic communication with peers, educators, and/or professionals to meet organizational goals.

CSTA Standards:

HS-PRO-RD-18- Programming: Evaluate AI-generated code for accuracy, reliability, and alignment with program

Transfer

Students will be able to independently use their learning to...(make purpose-takeaway in 5 years)

- ❏ Leverage AI and emerging technologies as tools for solving authentic problems, creating meaningful products, and making informed decisions—while critically evaluating their accuracy, limitations, ethics, and impact on people.

Meaning

UNDERSTANDINGS

Students will understand that...

- ❏ Successful digital products begin with understanding the client or user's needs before choosing features or generating code.
- ❏ Specifications and wireframes translate a client's goals into a shared plan that guides development and reduces ambiguity.
- ❏ AI can accelerate website creation, but the developer remains responsible for interpreting requirements, making design decisions, testing the product, and ensuring the result meets the client's needs.
- ❏ Professional development is iterative and collaborative: interviews, product meetings, feedback, testing, and revision are part of producing a useful final product.
- ❏ A finished website should be evaluated not only by whether it works, but also

ESSENTIAL QUESTIONS

Students will keep considering...

- ❏ How do we turn a client's goals and ideas into clear website requirements?
- ❏ What questions should a developer ask before beginning to design or build?
- ❏ How can a wireframe help a client and developer reach a shared understanding of the product?
- ❏ How should a vibe coder decide what to delegate to AI and what requires human judgment or manual revision?
- ❏ How do we know when a website is ready to present to a client?
- ❏ How should client feedback, testing, accessibility, and design principles influence revisions?
- ❏ What can a retrospective teach us about our development process?

requirements. **HS-PRO-TR-19-** Testing & Refining: Evaluate a computing technology's alignment with design specifications and responsible design values, including its correctness, effectiveness, and user experience. **HS-PRO-TR-20-** Testing & Refining: Refine a computing technology based on user feedback, testing results, and responsible design values to improve its effectiveness and impact. **HS-ALG-IM-09-** Human-Centered Design: Design a computing technology using human-centered design principles.	by how well it satisfies specifications, communicates effectively, supports users, and reflects responsible design choices. ❑ Reflection on process and product helps developers identify what worked, what changed, and how they would improve future projects.	
	Acquisition(need to align with above and standards)	
	Students will know... ❑ Purpose of client interviews and product meetings in identifying goals, audience, content, features, style, and constraints. ❑ Meaning and purpose of project specifications and acceptance criteria. ❑ Purpose of a wireframe as a pre-build representation of page structure, content, and interface elements. ❑ An iterative client-development workflow: interview, define requirements, plan/wireframe, generate/build, test, gather feedback, revise, present, and reflect. ❑ Relevant Unit 3 design principles, including UX, accessibility, visual design, prototyping, testing, and iteration. ❑ Role of AI prompting and debugging in creating a website that conforms to stated specifications. ❑ Purpose of a project retrospective in evaluating both the final product and the process used to create it.	*Students will be skilled at...* ❑ Conduct or participate in a client interview and ask purposeful follow-up questions. ❑ Synthesize interview information into clear website specifications and priorities. ❑ Create a wireframe that reflects the client's goals before generating the website. ❑ Write and refine AI coding prompts that incorporate client requirements, content, style, constraints, and desired functionality. ❑ Build and customize an AI-assisted website to match agreed-upon specifications. ❑ Test the website for functionality, usability, accessibility, and consistency with client requirements. ❑ Collect, interpret, and prioritize client or peer feedback, then make justified revisions. ❑ Explain design and development decisions to a client or audience using appropriate terminology. ❑ Present a completed website and demonstrate how it addresses the client's stated needs. ❑ Conduct a retrospective that identifies successes, challenges, changes made during development, and next steps for improvement.

EAST PENN SCHOOL DISTRICT

Course Name Advanced Media Production

Unit Title Unit 1: Foundations of Visual Storytelling & Media Production

<table>
<tr><th colspan="3">STAGE 1 | DESIRED RESULTS</th></tr>
<tr><th>Standards</th><th colspan="2">Transfer</th></tr>
<tr><td rowspan="5">3.5.9-12.Q - Implement and critique principles, elements, and factors of design.
3.5.9.12.U - Define and evaluate a design's purpose.
3.5.9-12.P - Apply a broad range of design skills to a design thinking process.
3.5.9-12.OO - Use project management tools, strategies, and processes in planning, organizing, and controlling work.
3.5.9-12.QQ - Implement quality control as a planned process to ensure that a product, service, or system meets established criteria.</td><td colspan="2">Students will independently adapt media-production skills to create purposeful visual and written communication across audiences, contexts, and real-world needs, making intentional technical, design, and editorial choices.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>UNDERSTANDINGS
Students will understand that...
• EU1: Visual identity emerges from intentional choices in imagery, typography, color, composition, editing, and written communication for an audience and purpose.
• EU2: Media skills transfer across purposes and contexts when creators adapt their choices to new needs.
• EU3: Creators must represent people, events, and information accurately while making editorial choices and considering multiple perspectives.
• EU4: Experimentation, critique, and revision strengthen communication; technology alone does not create meaning.
• EU5: Professional production depends on planning, organization, collaboration, communication, and deadlines.</td><td>ESSENTIAL QUESTIONS
Students will keep considering...
• How do media creators make people care about a story?
• How do purpose and audience influence the choices a creator makes?
• What makes an image or piece of media feel intentional rather than accidental?
• How does a creator develop a recognizable visual identity?
• How can skills developed for one media problem be adapted to solve another?
• How do we make creative choices while still representing people, events, and information accurately?
• What responsibilities do media creators have when documenting real people and events?</td></tr>
<tr><td colspan="2">Acquisition</td></tr>
<tr><td>Students will know...
• Composition, hierarchy, typography, color, and</td><td>Students will be skilled at...
• Composing, selecting, and editing original</td></tr>
</table>

	visual consistency • Exposure, camera operation, and candid/event photography • Audience, purpose, and relationships between images and copy • Interviewing, identification, captions, and headline conventions • Verified facts, unknowns, source credibility, and quote attribution • Copyright, image sourcing, and ethical editing • File naming, metadata, backups, and deadlines • Critique vocabulary and the media-production process	photographs • Combining design and written copy in Canva • Explaining intentional Visual Identity choices • Verifying facts and distinguishing unknowns • Interviewing and collecting accurate names, facts, and quotes • Writing headlines, captions, and supporting copy • Crediting sources and using imagery appropriately • Organizing and submitting files on deadline • Using critique to revise and document individual work • Adapting skills across personal and yearbook contexts

EAST PENN SCHOOL DISTRICT

Course Name Advanced Media Production

Unit Title Unit 2 — Storytelling, Audience & Promotion

<table>
<tr><th colspan="3">STAGE 1 | DESIRED RESULTS</th></tr>
<tr><th>Standards</th><th colspan="2">Transfer</th></tr>
<tr><td rowspan="2">Applicable source curriculum standards
3.5.9-12.P — Apply a broad range of design skills to a design thinking process.
3.5.9-12.QQ — Implement quality control as a planned process to ensure that a product, service, or system meets established criteria.
3.5.9-12.H — Evaluate ways that technology and engineering can impact individuals, society, and the environment.
3.5.9-12.N — Analyze and use relevant and appropriate design thinking processes to solve technological and engineering problems.
3.5.9-12.Q — Implement and critique principles, elements, and factors of design.</td><td colspan="2">Students will be able to independently use their learning to...
T1. Communicate meaningful stories through writing, photography, video, audio, and design.
T2. Make creative decisions based on audience, message, platform, and desired response.
T3. Gather, verify, and attribute information through research, observation, and interviewing to create ethical media.
T4. Plan, produce, critique, revise, and prepare media for publication using a professional workflow.
T5. Apply storytelling and promotion skills in new personal, academic, professional, and yearbook contexts.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td></td><td>UNDERSTANDINGS
Students will understand that...
EU1. Effective media begins with story, purpose, and audience; techniques serve those decisions.
EU2. Creators shape meaning through what they include, emphasize, sequence, or omit.
EU3. Accurate information, human details, purposeful interviews, and ethical representation strengthen storytelling.
EU4. Platforms require different techniques while the central message remains coherent.</td><td>ESSENTIAL QUESTIONS
Students will keep considering...
EQ1. How do media creators shape a story to connect with a specific audience?
EQ2. How does purpose influence what we write, photograph, film, design, and publish?
EQ3. What makes someone stop, look, listen, or care?
EQ4. How can we tell someone else's story accurately while making creative decisions?
EQ5. How does storytelling change when the goal is to inform, entertain, document, or persuade?
EQ6. How do creators know whether their media worked?</td></tr>
</table>

	EU5. Marketing combines story, visual identity, audience awareness, and persuasive writing to encourage a response. EU6. Planning, experimentation, critique, revision, and reflection improve creative work.	
	Acquisition(need to align with above and standards)	
	Students will know... K1. Story elements: setup, desire or goal, conflict or challenge, change, and result or resolution; not every nonfiction story requires a dramatic conflict. K2. Relationships among story, purpose, audience, platform, hook, message, and call to action. K3. Open and follow-up interview questions, active listening, recording and note-taking, attribution, verification, and ethical representation. K4. Characteristics of headlines, expanded captions, profiles, scripts, voice-over, social copy, and promotional writing. K5. Video composition, orientation, stability, movement, shot types and sequences; A-roll, B-roll, dialogue, natural sound, music, and lighting. K6. Storyboards, shot lists, sequencing, pacing, continuity, audio levels, graphics, and platform-specific exports. K7. Audience segmentation, branding, campaign consistency, distribution planning, and evidence of audience response. K8. Accuracy, privacy, permission, copyright, music rights, accessibility, and misleading manipulation in publishing.	**Students will be skilled at...** S1. Researching a personally meaningful subject and identifying a central story, audience, purpose, and hook. S2. Preparing and documenting interviews; selecting accurate quotes and details; checking names, facts, and attribution. S3. Writing and revising headlines, captions, profiles, scripts, voice-over, promotional copy, and calls to action. S4. Planning a storyboard and shot list; capturing purposeful sequences, usable dialogue, natural sound, and supporting footage. S5. Editing image, sound, text, and graphics for clarity, continuity, pacing, meaning, and horizontal or vertical delivery. S6. Creating at least three coordinated campaign pieces and explaining each medium and distribution choice. S7. Testing drafts with an audience, giving critique, revising, meeting deadlines, and documenting individual contributions. S8. Transferring an independently developed skill to usable yearbook content or promotion and explaining evidence of growth.

EAST PENN SCHOOL DISTRICT

Course Name Advanced Media Production

Unit Title Unit 3 — Editorial Design & Publication

<table>
<tr><th colspan="3">STAGE 1 | DESIRED RESULTS</th></tr>
<tr><th>Standards</th><th colspan="2">Transfer</th></tr>
<tr><td rowspan="4">Applicable source standards
3.5.9-12.Q — Implement and critique principles, elements, and factors of design.
3.5.9-12.OO — Use project management tools, strategies, and processes in planning, organizing, and controlling work.
3.5.9-12.QQ — Implement quality control as a planned process to ensure that a product, service, or system meets established criteria.</td><td colspan="2">Students will be able to independently use their learning to...
T1. Combine typography, imagery, and writing to communicate a story for a specific audience.
T2. Apply design systems to organize clear, coherent publications across new contexts.
T3. Gather and verify information, examine representation, and make responsible editorial and image-editing decisions.
T4. Manage production through research, experimentation, planning, critique, revision, and quality control.
T5. Transfer a personally developed design skill to an authentic yearbook need and explain its effect.</td></tr>
<tr><th colspan="2">Meaning</th></tr>
<tr><td>UNDERSTANDINGS
Students will understand that...
EU1. Design shapes what readers notice, understand, and remember.
EU2. Typography communicates through both words and the visual form of letterforms.
EU3. Image manipulation changes context and emphasis; editable techniques support revision and responsible representation.
EU4. Images and writing strengthen a story when they contribute complementary information.
EU5. Consistent design systems unify publications while allowing individual stories to differ.
EU6. Coverage choices determine whose experiences are represented; verification and revision improve publication quality.</td><td>ESSENTIAL QUESTIONS
Students will keep considering...
EQ1. How can a page guide a reader without explaining how to read it?
EQ2. How can the appearance of a word communicate its meaning?
EQ3. How does removing a background or combining images change the story a viewer perceives?
EQ4. What should images and words each contribute to a story?
EQ5. How can a publication feel unified while making room for different stories?
EQ6. Whose story is being told, and whose perspective is missing?
EQ7. What makes a publication ready for its audience?</td></tr>
<tr><th colspan="2">Acquisition(need to align with above and standards)</th></tr>
</table>

	Students will know... K1. Hierarchy, reading order, dominance, contrast, white space, columns, grids, margins, gutters, and caption placement. K2. Type anatomy, spacing, scale, arrangement, readability, and the distinction between editable text and graphic letterforms. K3. Selections, editable layer masks, transparency, refined edges, hair and negative spaces, layer order, and type/image composition. K4. Headlines, leads, body copy, expanded captions, credits, attribution, and secondary coverage forms. K5. Page plans, style consistency, theme connections, production responsibilities, and editorial versus technical proofs. K6. Accuracy, representation, image rights, responsible manipulation, and output requirements confirmed with the adviser/publisher.	**Students will be skilled at...** S1. Researching examples, setting a personal learning goal, sketching alternatives, and testing techniques. S2. Turning typography into purposeful graphics while retaining an editable text version. S3. Isolating a photographic subject in Photoshop with a refined layer mask and integrating it with type. S4. Selecting images and writing/revising accurate headlines, copy, captions, and credits. S5. Gathering missing perspectives and designing a secondary coverage package from verified information. S6. Applying a consistent grid/type system across a small publication and assigned yearbook content. S7. Critiquing, revising, proofing, preparing appropriate files, and documenting individual contribution and transfer.

EAST PENN SCHOOL DISTRICT

Course Name Advanced Media Production

Unit Title Unit 4 — Commercial Photography & Advertising

STAGE 1 | DESIRED RESULTS		
Standards	**Transfer**	
Applicable source standards 3.5.9-12.Q — Implement and critique principles, elements, and factors of design. 3.5.9-12.X — Implement the best possible solution to a design using an explicit process. 3.5.9-12.OO — Use project management tools, strategies, and processes in planning, organizing, and controlling work. 3.5.9-12.QQ — Implement quality control as a planned process to ensure that a product, service, or system meets established criteria.	**Students will be able to independently use their learning to…** T1. Create intentional photographs and persuasive writing for a defined audience and purpose. T2. Develop and test a media solution through research, experimentation, critique, and revision. T3. Respond to a client brief with coordinated media that meet agreed requirements. T4. Represent products and organizations accurately and make responsible choices about claims, imagery, and attribution. T5. Manage individual production and transfer a personally developed skill to an authentic yearbook need.	
	Meaning	
	UNDERSTANDINGS Students will understand that… EU1. Lighting, staging, and composition shape how viewers perceive a subject. EU2. Persuasive media connect a credible message with an audience's needs and context. EU3. Images, typography, and copy work together to guide attention and action. EU4. Audience feedback helps creators improve communication when it is interpreted against the intended purpose. EU5. Client work requires negotiation among creative choices, requirements, resources, and deadlines. EU6. Effective advertising depends on accurate representation as well as visual appeal.	**ESSENTIAL QUESTIONS** Students will keep considering… EQ1. How does the way we photograph something change its perceived value? EQ2. What makes a message persuasive to a particular audience? EQ3. What should an image communicate, and what should the words add? EQ4. How can we tell whether an advertisement communicates its intended message? EQ5. How do creators reconcile their ideas with a client's needs? EQ6. Where is the boundary between making a product appealing and misrepresenting it?
	Acquisition(need to align with above and standards)	

	Students will know... K1. Light direction, softness, reflection, diffusion, exposure, color consistency, backgrounds, props, and product composition. K2. Audience research, observable needs, message, medium, placement, and limits of demographic assumptions. K3. Headline, benefit-focused copy, supporting evidence, call to action, and visual hierarchy. K4. Editable retouching, masks, type/image integration, image rights, credits, and responsible representation. K5. Creative briefs, client questions, concept pitches, schedules, feedback, revisions, and delivery requirements. K6. Audience testing, qualitative feedback, success criteria, and editorial/technical proofing.	**Students will be skilled at...** S1. Researching a product and audience, verifying claims, and writing a focused creative brief. S2. Planning and testing lighting, staging, and composition to create coordinated original photographs. S3. Editing photographs with retained originals and explaining the effect of retouching decisions. S4. Writing and revising headlines, supporting copy, calls to action, pitches, and client questions. S5. Integrating photography, graphics, and typography into advertisements suited to a medium. S6. Testing message comprehension and using evidence to revise a design. S7. Managing a client project, adapting media across formats, proofing deliverables, and documenting individual yearbook transfer.

EAST PENN SCHOOL DISTRICT

Course Name Advanced Media Production

Unit Title Unit 5 — Independent Media Capstone & Portfolio

STAGE 1 | DESIRED RESULTS

Standards

Applicable source standards

3.5.9-12.Q — Implement and critique principles, elements, and factors of design.

3.5.9-12.X — Implement the best possible solution to a design using an explicit process.

3.5.9-12.OO — Use project management tools, strategies, and processes in planning, organizing, and controlling work.

3.5.9-12.QQ — Implement quality control as a planned process to ensure that a product, service, or system meets established criteria.

Source: current Units 1/4 (Q), Unit 4 (X), and Unit 3 (OO, QQ).

Evidence: design decisions, production plans, critique/revision, proofs, and evaluation against agreed criteria.

Transfer

Students will be able to independently use their learning to...

T1. Integrate media techniques and substantial writing to communicate for a defined audience and purpose.

T2. Research unfamiliar approaches, experiment, and manage a sustained project from proposal through delivery.

T3. Use critique, audience feedback, verification, and quality control to improve media work.

T4. Apply independently developed skills to a shared publication or distribution need while fulfilling individual responsibilities.

T5. Select evidence of growth, explain creative decisions, and identify how learning transfers to future work.

Meaning

UNDERSTANDINGS

Students will understand that...

EU1. Purpose and audience guide the selection and integration of media techniques.

EU2. Independent learning requires inquiry, experimentation, realistic planning, and adaptation.

EU3. Revision improves communication when creators evaluate work against meaningful criteria.

EU4. Images and writing communicate responsibly when information, sources, and representation are examined.

EU5. Shared production depends on accountable individual contributions and coordinated decisions.

ESSENTIAL QUESTIONS

Students will keep considering...

EQ1. What do I want an audience to understand, feel, or do, and which media choices will help?

EQ2. How can I learn what a project requires when I do not yet know how to do it?

EQ3. How do I know when my work is ready for its audience?

EQ4. How can I balance creative ambition with time, resources, and publication responsibilities?

EQ5. What does responsible contribution to a shared publication look like?

EQ6. What evidence best demonstrates my growth and ability to transfer learning?

	EU6. A portfolio demonstrates growth through selected evidence and explanation of decisions.	
	Acquisition(need to align with above and standards)	
	Students will know... K1. Audience, purpose, scope, success criteria, and relationships among photography, design, video, writing, and promotion. K2. Research strategies, source evaluation, experimentation, milestones, feedback cycles, and revision records. K3. Writing forms appropriate to media: interview questions, scripts, narration, headlines, copy, captions, credits, and instructions. K4. Accuracy, attribution, image/audio rights, representation, and editorial/technical proofing. K5. Supplement coverage and production needs, distribution communication, role assignments, and adviser-confirmed procedures. K6. Portfolio selection, process evidence, presentation, reflection, and transfer.	**Students will be skilled at...** S1. Defining a personally meaningful project and pitching a feasible proposal with measurable success criteria. S2. Researching examples, testing techniques, troubleshooting, and revising a production plan. S3. Integrating multiple course skills into a sustained media product with substantial writing. S4. Gathering and verifying information, critiquing drafts, and completing editorial/technical proofs. S5. Producing assigned supplement content or usable distribution materials and documenting individual contribution. S6. Selecting portfolio evidence, explaining before/after decisions, presenting work, and evaluating transfer.

EAST PENN SCHOOL DISTRICT

Course Name Farm to Table

Unit Title: Understanding Food Sources

STAGE 1 | DESIRED RESULTS
Context and relevance for student learning

Standards

11.1.9-12.A: Predict factors that affect food safety and security from production through consumption.
11.1.9-12.B: Evaluate the role of government agencies in safeguarding our food supply.
11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and pricing to menu planning.
11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods
11.2.9-12.A: Develop a global view to weigh consumer and design decisions with the parameters of sustainability, socioeconomic, and cultural contexts.
11.2.9-12.D: Compare and contrast the selection of goods by applying safe and effective consumer strategies.

Transfer

Students will be able to independently use their learning to...

- ❑ Plan, source, and prepare balanced, seasonal meals using sustainable local ingredients.

Meaning

UNDERSTANDINGS
Students will understand...

- ❑ Where food comes from directly impacts its flavor, cost, and quality in the kitchen.
- ❑ Food labels require careful reading to separate certified standards from marketing terms.
- ❑ The benefits of buying produce during its peak season.
- ❑ Recipes and techniques can be adjusted based on what ingredients are fresh and available.
- ❑ Proper storage and smart kitchen habits reduce food waste and save money

ESSENTIAL QUESTIONS
Students will keep considering...

- ❑ How to distinguish real food certifications from marketing claims on packaging?
- ❑ How can consumers distinguish real food certifications from marketing claims on packaging?
- ❑ Why does cooking with seasonal ingredients make financial and culinary sense?
- ❑ How does food preparation change when substituting off-season or store-bought produce?

Acquisition (Skills and Knowledge)

Students will know...

- ❑ Proper storage techniques to keep ingredients fresh after purchasing
- ❑ How food sourcing impacts cost, freshness, and quality
- ❑ The differences between official, regulated food labels and unregulated marketing terms.

Students will be skilled at...

- ❑ Reading food packaging and produce labels to determine sourcing origins.
- ❑ Choosing fresh ingredients based on quality, seasonality, and price.

Course Name Farm to Table

Unit Title: Produce and Seasonality

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

11.1.9-12.A: Predict factors that affect food safety and security from production through consumption.

11.1.9-12.B: Evaluate the role of government agencies in safeguarding our food supply.

11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and pricing to menu planning.

11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods

11.2.9-12.A: Develop a global view to weigh consumer and design decisions with the parameters of sustainability, socioeconomic, and cultural contexts.

11.2.9-12.D: Compare and contrast the selection of goods by applying safe and effective consumer strategies.

Transfer

Students will be able to independently use their learning to...

- ❏ Plan, source, and prepare balanced, seasonal meals using sustainable local ingredients.

Meaning

UNDERSTANDINGS

Students will understand that...

- ❏ Fresh, seasonal ingredients taste better, last longer, and cut down on reliance on processed foods
- ❏ Cooking with seasonal produce requires flexible recipe planning to get the best quality for the lowest price

ESSENTIAL QUESTIONS

Students will keep considering...

- ❏ How do food labels and sourcing change what you choose to buy and cook?
- ❏ In what ways do seasonal availability and regional agriculture dictate how to plan, prepare, and enjoy fresh food?

Acquisition (Skills and Knowledge)

Students will know...

- ❏ How growing seasons affect local produce flavor, availability, and price.
- ❏ Basic storage techniques that extend the shelf life and quality of fresh ingredients.
- ❏ How cooking from scratch gives you control over flavor and ingredients
- ❏ Practical ways to reduce food waste, such as using scraps and repurposing ingredients across multiple meals.

Students will be skilled at...

- ❏ Inspecting fresh, local produce for peak seasonality and quality.
- ❏ Adapting basic recipes by substituting seasonal produce as harvests change.
- ❏ Applying core cooking methods to build flavor using fresh, whole ingredients.

EAST PENN SCHOOL DISTRICT

Course Name Farm to Table

Unit Title: Proteins and Preparation

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

11.1.9-12.A: Predict factors that affect food safety and security from production through consumption.
11.1.9-12.B: Evaluate the role of government agencies in safeguarding our food supply.
11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and menu pricing to menu planning.
11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods.
11.2.9-12.A: Develop a global view to weigh consumer and design decisions with the parameters of sustainability, socioeconomic, and cultural contexts.
11.2.9-12.D: Compare and contrast the selection of goods and services by applying safe and effective consumer strategies.

Transfer

Students will be able to independently use their learning to...

- ❏ Plan, source, and prepare balanced, seasonal meals using sustainable local ingredients.

Meaning

UNDERSTANDINGS

Students will understand that...

- ❏ Different cuts and types of protein require specific cooking techniques, storage, and handling.
- ❏ Where protein comes from directly affects its price, taste, and quality.

ESSENTIAL QUESTIONS

Students will keep considering...

- ❏ How do you choose the right cooking method for different cuts and types of protein?
- ❏ How do sourcing practices impact protein quality, flavor, and cost?

Acquisition (Skills and Knowledge)

Students will know...

- ❏ The main characteristics and categories of plant and animal proteins.
- ❏ How animal diet and sourcing practices affect quality, fat content, and flavor.
- ❏ How to identify cooking methods for a variety of proteins.
- ❏ How to stretch protein budgets using scrap utilization and waste reduction.

Students will be skilled at...

- ❏ Executing specified cooking techniques based on the protein cut or type.

EAST PENN SCHOOL DISTRICT

Course Name Farm to Table

Unit Title: Seasonal Meal Planning

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

11.1.9-12.A: Predict factors that affect food safety and security from production through consumption.

11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and menu pricing to menu planning.

11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods.

11.2.9-12.D: Compare and contrast the selection of goods and services by applying safe and effective consumer strategies.

Transfer

Students will be able to independently use their learning to...

- ❑ Plan, source, and prepare balanced, seasonal meals using sustainable local ingredients.

Meaning

UNDERSTANDINGS

Students will understand that...

- ❑ Planning a complete menu requires balancing flavor, texture, nutrition, seasonal sourcing, and cost.
- ❑ Applying proper cooking techniques helps turn basic seasonal ingredients into full meals.
- ❑ Balanced menus can be designed around available seasonal ingredients without sticking strictly to a recipe

ESSENTIAL QUESTIONS

Students will keep considering...

- ❑ How do sourcing, seasonality, and cooking techniques come together to build a balanced menu?
- ❑ How does reducing food waste save money while helping the environment?

Acquisition (Skills and Knowledge)

Students will know...

- ❑ How to plan a balanced seasonal menu and estimate total food costs
- ❑ Advanced culinary techniques for prepping, cooking, and finishing complete dishes.
- ❑ How to assess current food inventory and adjust recipes based on available ingredients.

Students will be skilled at...

- ❑ Designing and costing out balanced, seasonal menus using local and available ingredients.
- ❑ Executing intermediate and advanced cooking techniques to prepare complete meals.
- ❑ Tasting, adjusting seasoning, and managing prep timing for complete dishes

EAST PENN SCHOOL DISTRICT

Course Name: Baking and Pastry Arts

Unit Title: Fundamentals of Baking

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

11.1.9-12.A: Predict factors that affect food safety and security from production through consumption.

11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and menu pricing to menu planning.

11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods.

11.1.9-12.G: Analyze the relevance of scientific principles to food processing, preparation, and packaging.

Transfer

Students will be able to independently use their learning to...

- ❏ use core pastry techniques and baking science to confidently bake, evaluate, and fix recipes on their own
- ❏ measure, scale, and execute standard baking recipes accurately and safely

Meaning

UNDERSTANDINGS

Students will understand....

- ❏ Baking is a precise science where minor changes in measurements or technique directly impact the final product
- ❏ Every core ingredient plays a specific role in creating the structure, flavor, and texture of a baked good

ESSENTIAL QUESTIONS

Students will keep considering...

- ❏ How is baking different from cooking and why does precision matter?
- ❏ How do individual ingredients affect the texture, structure, and outcome of a baked good?
- ❏ How does gluten development change the texture of a baked product?

Acquisition (Skills and Knowledge)

Students will be skilled at...

- ❏ Using kitchen tools and equipment safely and correctly
- ❏ Scaling recipes up or down to adjust recipe yield
- ❏ Reading, interpreting, and executing standard baking recipes
- ❏ Measuring liquid and dry ingredients accurately using volume and weight tools

Students will know...

- ❏ The functional roles of core baking ingredients
- ❏ The principles of gluten development and factors that affect it

EAST PENN SCHOOL DISTRICT

Course Name: Baking and Pastry Arts

Unit Title: Quick Breads and Cookies

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and menu pricing to menu planning.

11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods.

11.1.9-12.G: Analyze the relevance of scientific principles to food processing, preparation, and packaging.

Transfer

Students will be able to independently use their learning to...

- ❑ use core pastry techniques and baking science to confidently bake, evaluate, and fix recipes on their own
- ❑ select and execute the proper mixing method and leavener to achieve a target texture, rise, or cookie spread

Meaning

UNDERSTANDINGS

Students will understand that...

- ❑ Mixing methods directly control gluten development, determining whether a product turns out tender, flaky, or tough
- ❑ Chemical leaveners require liquid, acid, or heat to make baked goods rise
- ❑ Fat and sugar dictate a cookie's shape, crunch, and moisture

ESSENTIAL QUESTIONS

Students will keep considering...

- ❑ How does the mixing method change the final texture of a baked good?
- ❑ What makes quick breads rise without using yeast?
- ❑ How do small changes in ingredients alter the shape and texture of cookies?

Acquisition (Skills and Knowledge)

Students will know...

- ❑ How chemical leaveners react in a recipe
- ❑ How fat, sugar, and flour affect structure, spread, and tenderness
- ❑ The procedural steps and ratios for the biscuit, muffin, and creaming methods

Students will be skilled at...

- ❑ Applying foundational mixing techniques based on recipe requirements
- ❑ Portioning and shaping batters and doughs evenly so items bake at the same rate
- ❑ Evaluating finished quick breads and cookies for proper rise, texture, color, and flavor

EAST PENN SCHOOL DISTRICT

Course Name: Baking and Pastry Arts

Unit Title: Yeast Breads

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and menu pricing to menu planning.

11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods.

11.1.9-12.G: Analyze the relevance of scientific principles to food processing, preparation, and packaging.

Transfer

Students will be able to independently use their learning to...

- ❏ use core pastry techniques and baking science to confidently bake, evaluate, and fix recipes on their own
- ❏ manage time, temperature, and fermentation to control dough development and produce quality yeast breads

Meaning

UNDERSTANDINGS

Students will understand that...

- ❏ Yeast is a living organism that needs specific conditions to grow and give bread its rise
- ❏ Kneading and resting dough creates the structure and texture of the bread
- ❏ Adding certain ingredients changes how yeast dough behaves and tastes

ESSENTIAL QUESTIONS

Students will keep considering...

- ❏ How do time and temperature control the outcome of yeast bread?
- ❏ How does fermentation create air, rise, and structure in dough?
- ❏ How do extra ingredients like sugar, fat, and salt change a basic dough recipe?

Acquisition (Skills and Knowledge)

Students will know...

- ❏ Environmental factors that activate, slow down, or destroy yeast
- ❏ Structural and ingredient differences between lean and enriched doughs
- ❏ The stages of yeast bread production
- ❏ How salt and sugar affect fermentation and gluten strength

Students will be skilled at...

- ❏ Handling yeast doughs through all key stages of preparation
- ❏ Determining dough readiness by testing dough growth and texture before baking
- ❏ Evaluating finished yeast breads for proper rise, crust, and crumb structure

EAST PENN SCHOOL DISTRICT

Course Name: Baking and Pastry Arts

Unit Title: Pies and Pastries

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and menu pricing to menu planning.

11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods.

11.1.9-12.G: Analyze the relevance of scientific principles to food processing, preparation, and packaging.

Transfer

Students will be able to independently use their learning to...

- ❏ use core pastry techniques and baking science to confidently bake, evaluate, and fix recipes on their own
- ❏ manage dough temperature, fat distribution, and moisture to prepare flaky crusts and delicate pastries

Meaning

UNDERSTANDINGS

Students will understand that...

- ❏ Cold fat and minimal handling are essential for flaky pastry layers
- ❏ Managing moisture and liquid is key to keeping pastries crisp and fully baked
- ❏ Steam and air act as leaveners to give pastries rise and texture

ESSENTIAL QUESTIONS

Students will keep considering...

- ❏ What makes a pastry flaky versus tender?
- ❏ Why is temperature control important when working with pastry dough?
- ❏ How do filling, crust, and temperature work together to create a successful pastry?

Acquisition (Skills and Knowledge)

Students will know...

- ❏ Characteristics of foundational pastry doughs
- ❏ How temperature, fat distribution, and steam create physical leavening and flaky layers

Students will be skilled at...

- ❏ Rolling, shaping, and blind-baking doughs
- ❏ Preparing, shaping, and piping pastry doughs
- ❏ Evaluating finished crusts and pastries for flakiness, color, and doneness

EAST PENN SCHOOL DISTRICT

Course Name: Baking and Pastry Arts

Unit Title: Cakes and Decorating

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and menu pricing to menu planning.

11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods.

11.1.9-12.G: Analyze the relevance of scientific principles to food processing, preparation, and packaging.

Transfer

Students will be able to independently use their learning to...

- ❑ use core pastry techniques and baking science to confidently bake, evaluate, and fix recipes on their own
- ❑ construct, level, and decorate stable, visually balanced cakes

Meaning

UNDERSTANDINGS

Students will understand that...

- ❑ The mixing method determines cake structure and moisture level
- ❑ Temperature control is necessary for stable icing, smooth fillings, and stacked assembly
- ❑ Visual presentation, clean finish work, and piping technique enhance overall dessert appeal and value

ESSENTIAL QUESTIONS

Students will keep considering...

- ❑ How does the mixing method affect cake texture and structure?
- ❑ How do temperature and assembly techniques create stability in decorated cakes?
- ❑ How do piping techniques and clean finish work enhance the overall appeal of a dessert?

Acquisition (Skills and Knowledge)

Students will know...

- ❑ Structural and ingredient differences between creamed and sponge cake types
- ❑ Key procedural steps for cake assembly, including leveling, crumb-coating, and icing
- ❑ How different piping techniques create specific borders and designs

Students will be skilled at...

- ❑ Mixing and baking uniform cake layers
- ❑ Leveling, filling, and crumb-coating a cake for decorating
- ❑ Piping basic borders and designs using buttercream

EAST PENN SCHOOL DISTRICT

Course Name Weightlifting

Unit Title Unit 1

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

10.9.9-12.B - Apply advanced non-locomotor skills in fitness routines, sports performance, and movement-based practices, including, but not limited to, strength conditioning and yoga.

10.10.9-12.A - Analyze personal movement and fitness data to optimize performance and prevent injury.

10.10.9-12.B - Analyze personal effort during physical activity using tools such as the talk test, heart rate monitoring, or rate of perceived exertion (RPE) to understand how these

Transfer

Students will be able to independently use their learning to...(make purpose-takeaway in 5 years)

- ❏ Create and implement a training plan that actually works for me.

Meaning

UNDERSTANDINGS

Students will understand that...

- ❏ Effective strength training is a feedback loop: plan, execute, measure, adjust — not a fixed program followed blindly.
- ❏ Data only becomes useful when it's interpreted — tracking numbers without analyzing patterns doesn't prevent injury or improve performance.
- ❏ Perceived effort (RPE) is a more reliable day-to-day guide than a fixed number on the bar, because readiness and recovery change constantly.
- ❏ Progress requires a deliberate, gradual increase in demand (progressive overload) balanced against recovery — training is a dose, not just an activity.
- ❏ A fitness plan is only as good as its fit to the individual's goal, current ability, and life constraints — and it should evolve as the person does.

ESSENTIAL QUESTIONS

Students will keep considering...

- ❏ How do I lift safely? In other words, what separates a "correct" lift from one that just moves the weight?
- ❏ What is my training actually telling me, and how would I know if I ignored it?
- ❏ Why might two people lifting the same weight be doing very different amounts of work?
- ❏ Why does form matter more as the weight gets heavier?
- ❏ Why doesn't doing the same workout every day make you stronger?
- ❏ What makes a fitness plan mine rather than just a plan?

factors influence health and quality of life now and in the future. 10.10.9-12.D - Analyze exercise principles and movement sequences to create plans that improve performance in self-selected lifetime activities. 10.10.9-12.F - Design and implement a personalized health and fitness plan that applies knowledge of health-related fitness and is differentiated for individual goals to monitor, analyze, and support progress toward a healthy lifestyle. 10.1.9-12.C - Evaluate personal physical activity patterns and apply fitness principles to support lifelong health and prevent disease.	**Acquisition(need to align with above and standards)** *Students will be able to...* ❑ Name and demonstrate the major movement patterns: squat, hinge, lunge, rotation, push, pull and gait. ❑ Execute proper setup, grip, and bar path for core lifts (back squat, deadlift, bench press, overhead press, row). ❑ Identify and self-correct common form breakdowns. ❑ Progress a lift from bodyweight/light-load technique work to loaded, full-range repetitions. ❑ Record and interpret training log data (weight, sets, reps, RPE, %1RM) session to session. ❑ Use video, teacher feedback and peer feedback to compare techniques against a form checklist. ❑ Identify patterns that signal overtraining or elevated injury risk ❑ Use data trends to justify an adjustment to load, volume, or exercise selection. ❑ Estimate and work within a percentage of one-rep max (%1RM). ❑ Use heart rate or RPE data to decide whether to progress, hold, or reduce load in a session. ❑ Explain the relationship between training intensity, recovery, and long-term health. ❑ Define progressive overload, specificity, overload, and periodization. ❑ Sequence a training week/cycle that balances muscle groups and recovery. ❑ Apply the FITT principle (frequency, intensity, time, type) to a strength program. ❑ Modify a training plan in response to progress, plateaus, or missed sessions. ❑ Set a specific, measurable personal training goal (e.g., strength, hypertrophy, endurance, general fitness). ❑ Design a multi-week program with appropriate exercise selection, load, volume, and rest. ❑ Track progress against the plan using logs ❑ Evaluate outcomes and revise the plan based on results. ❑ Evaluate personal training frequency/consistency against recommended guidelines. ❑ Explain how strength training complements cardiovascular activity in an overall fitness pattern. ❑ Execute dynamic warmup and cardiovascular activities, and explain how those activities complement strength training in an overall fitness pattern.

EMMAUS HIGH SCHOOL

PROGRAM OF STUDIES

Proposed Revisions
for the
2027-2028 School Year

GENERAL INFORMATION

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
A MESSAGE FROM THE PRINCIPAL **Replace Principal Letter**	**A MESSAGE FROM THE PRINCIPAL** Dear Emmaus High School Students and Families, Choosing courses is an exciting and important step in shaping each student's high school experience and preparing for the opportunities that follow graduation. The Emmaus High School Program of Studies is designed to help students and families make thoughtful, informed decisions as they plan for the 2027–2028 school year. Emmaus High School offers an outstanding range of learning experiences to meet the interests, strengths, and goals of every student. From Advanced Placement and dual-enrollment courses to career and technical education at LCTI, the arts, sciences, humanities, and many engaging electives, students have numerous opportunities to challenge themselves, explore new interests, and discover their talents. As you review this guide, I encourage students to think not only about graduation requirements but also about the experiences that will help them grow. The best course selections provide an appropriate level of academic challenge while allowing students to pursue their interests and maintain a healthy balance. Families are encouraged to have meaningful conversations about each student's strengths, aspirations, and plans for the future.

	While academic challenge and success are important, getting involved outside of the classroom is equally valuable. Athletics, clubs, music, theater, student leadership, and community service provide opportunities for students to build friendships, develop confidence, discover new interests, and feel connected to our school community. We encourage every student to find at least one activity that makes Emmaus High School feel like their school. Our Program of Studies also reflects our continued commitment to the EPSD Portrait of a Graduate. Through their coursework and school experiences, students develop essential skills such as critical thinking, communication, collaboration, creativity, and responsible decision-making. These skills will help prepare them to succeed in college, careers, and their communities. We also recognize that students are most successful when they feel supported. Emmaus High School offers a wide variety of academic, mental health, and social-emotional supports to help students navigate the challenges of high school. We are fortunate to have exceptional teachers, counselors, support staff, and administrators who genuinely care about our students and want them to be healthy, happy, and successful—not only during high school, but well beyond graduation. Our team is here to help students understand their options and create an academic plan that is both purposeful and personal. We encourage every student to ask questions, seek guidance, embrace new opportunities, and take an active role in planning their educational journey.

	At Emmaus High School, we are incredibly proud of the many pathways and experiences available to our students. We look forward to partnering with you as each student discovers their potential, pursues meaningful goals, and creates a high school experience filled with growth, connection, achievement, and success. Sincerely, Beth Guarriello Principal Emmaus High School

COURSE DESCRIPTIONS

ART DEPARTMENT

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
766 AP ART AND DESIGN Grade 11 & 12 ~~Students develop the skills that artists and designers use, and create a portfolio of work that is assessed to produce their AP score. Students upload images of their work over the course of the year, creating a digital portfolio. in AP Art and Design at EHS students choose a 3-D, 2-D, or Drawing Portfolio. AP Art and Design is an introductory college-level course that has an exam fee due in October. Students refine and apply artistic skills to ideas they investigate individually throughout the school year. course.https://apcentral.collegeboard.org/courses/about-ap-art-and-design~~ Prerequisite: Recommended 80% or better in any level 3 course. Portfolio review and approval required	**766 AP ART AND DESIGN** Grade 11 & 12 AP Art and Design is an introductory college-level course that has an exam fee due in October. In AP Art and Design at EHS students choose a 3-D, 2-D, or Drawing Portfolio. Students develop the skills that artists and designers use, and create a portfolio of work that is assessed and scored by the CollegeBoard. Students refine and apply artistic skills to ideas they investigate individually throughout the school year. Students upload images of their work over the course of the year, creating a digital portfolio. https://apcentral.collegeboard.org/courses/aboutap-art-and-design

	Prerequisite: Recommended 80% or better in any level 3 course AND portfolio review & approval required

BUSINESS & COMPUTER APPLICATIONS DEPARTMENT

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
648DC RETAIL MANAGEMENT 2 ***EXCERPT- Prerequisite change only*** ~~Prerequisite: Successful completion of Retail Management 1~~ Prerequisite: Successful completion of Marketing 1 OR Successful completion of AP Business with Personal Finance	**648DC RETAIL MANAGEMENT 2** ***EXCERPT- Prerequisite change only*** Prerequisite: Successful completion of Marketing 1 OR Successful completion of AP Business with Personal Finance

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
678DC MARKETING 2 ***EXCERPT- Prerequisite change only*** ~~Prerequisite: Successful completion of Marketing 1~~ Prerequisite: Successful completion of Marketing 1 or Successful completion of AP Business with Personal Finance	**678DC MARKETING 2** ***EXCERPT- Prerequisite change only*** Prerequisite: Successful completion of Marketing 1 or Successful completion of AP Business with Personal Finance

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
679 AP BUSINESS WITH PERSONAL FINANCE ***EXCERPT- Add to existing course description*** *This course will satisfy the Personal Finance .5 graduation requirement*	**679 AP BUSINESS WITH PERSONAL FINANCE** ***EXCERPT- Add to existing course description*** *This course will satisfy the Personal Finance .5 graduation requirement*

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
NEW COURSE	**INTRODUCTION TO AI AND VIBE CODING** Grades 9-12 This half-year course will inform and instruct students on the historical, ethical, and practical usage of the ever-changing artificial intelligence (AI) technology. Students will learn how artificial intelligence works and how to build websites and mobile apps using simple, everyday language, known as “vibe coding.” With the "vibe coding" approach, students can focus on big ideas and creative problem-solving while AI tools handle the complex line-by-line coding. (Fulfills STEM requirement for graduation) .5 credit

DRIVER EDUCATION DEPARTMENT- No changes

ENGLISH DEPARTMENT

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
950 SENIOR HUMANITIES, HONORS Grade 12 ~~This course will examine human endeavors from the perspectives of philosophy, culture, history, and aesthetics. Focusing on the Western Tradition, the course will endeavor to connect the cultural traditions, philosophies, and values of the time period to the art and literary texts produced. Furthermore, the course proposes to illustrate how the Western Tradition informs our current culture. Using a mix of ancient, medieval, and modern texts in a variety of mediums. The exploration of the Western Tradition will require reading, informal and expository writing, analytical thinking and problem-solving skills, and visual and musical literacy. The course requires a team approach for many activities, encouraging students to develop~~	**950 SENIOR HUMANITIES, HONORS** Grade 12 Senior Humanities Honors is an interdisciplinary exploration of the ideas, works, and questions that have shaped human experience. Drawing from literature, philosophy, history, art, music, and other forms of expression, students examine how people have understood themselves and their world across time.The course includes assigned summer reading requirements. Students will: • Read and discuss significant works from the ancient, medieval, and modern worlds • Explore philosophical, cultural, historical, and ethical questions

~~communication and collaborative skills. Each student will be required to complete a research paper, emphasizing a scholarly approach in which students practice skills such as thesis writing, finding and evaluating secondary sources, and synthesizing primary and secondary source information. Word study will focus on appropriate terminology specific to the disciplines of art, music, literature, and history. The course includes summer assignments for all disciplines: art, music, literature, and history. This course runs everyday for the full school year.~~ ~~Prerequisite: Admission by application~~ 1 Credit Social Studies 1 Credit English Senior Humanities Honors is an interdisciplinary exploration of the ideas, works, and questions that have shaped human experience. Drawing from literature, philosophy, history, art, music, and other forms of expression, students examine how people have understood themselves and their world across time.The course includes assigned summer reading requirements. Students will: • Read and discuss significant works from the ancient, medieval, and modern worlds • Explore philosophical, cultural, historical, and ethical questions • Analyze literature, art, music, and other forms of cultural expression • Develop sophisticated critical-thinking and problem-solving skills • Write analytically and reflectively across disciplines • Conduct interdisciplinary research and synthesize sources • Collaborate on complex projects and presentations • Develop visual, musical, and cultural literacy	• Analyze literature, art, music, and other forms of cultural expression • Develop sophisticated critical-thinking and problem-solving skills • Write analytically and reflectively across disciplines • Conduct interdisciplinary research and synthesize sources • Collaborate on complex projects and presentations • Develop visual, musical, and cultural literacy Course focus: Connecting literature, history, philosophy, art, and culture to explore enduring questions about the human experience. Prerequisite: Application required. 1 Credit Social Studies 1 Credit English

Course focus: Connecting literature, history, philosophy, art, and culture to explore enduring questions about the human experience. Prerequisite: Application required. 1 Credit Social Studies 1 Credit English	

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
ENCR LITERATURE STANDARDS ~~In this course, students will learn/review strategies and practice skills related to "Reading for Meaning" and "Analyzing and interpreting Literature" for both fiction and nonfiction texts.~~ ~~1 credit~~	**REMOVE COURSE**

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
910ENLABPF 9TH AND 10TH ENGLISH LAB ~~In this course, students will learn/review strategies and practice skills related to "Reading for Meaning" and "Analyzing and interpreting Literature" for both fiction and nonfiction texts. Students are placed in this course based on individual student data and scheduled as available. This course can be taken multiple times, as needed.~~ ~~1 credit~~	**REMOVE COURSE**

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
162 AP ENGLISH LANGUAGE AND COMPOSITION ***EXCERPT- Prerequisite change only*** Prerequisite: Recommendation of English department and recommended ~~84%~~ **80%** or better in Tenth Grade English, Honors Prerequisite: Recommendation of English department and recommended 80% or better in Tenth Grade English, Honors	**162 AP ENGLISH LANGUAGE AND COMPOSITION** ***EXCERPT- Prerequisite change only*** Prerequisite: Recommendation of English department and recommended 80% or better in Tenth Grade English, Honors

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
160 AP LITERATURE AND COMPOSITION ***EXCERPT- Prerequisite change only*** Prerequisite: Recommendation of English department and recommended ~~84%~~ **80%** or better in eleventh grade English Honors or AP Language and Composition Prerequisite: Recommendation of English department and recommended 80% or better in eleventh grade English Honors or AP Language and Composition	**160 AP LITERATURE AND COMPOSITION** ***EXCERPT- Prerequisite change only*** Prerequisite: Recommendation of English department and recommended 80% or better in eleventh grade English Honors or AP Language and Composition

ENGLISH LEARNERS (EL) DEPARTMENT- No changes

FAMILY CONSUMER SCIENCE DEPARTMENT

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
806 FOOD FUNDAMENTALS ***EXCERPT- Grade Level Change only*** GRADE ~~10-12~~ **9-12**	**806 FOOD FUNDAMENTALS** ***EXCERPT*- Grade Level Change only** GRADE 9-12

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
805 INTERNATIONAL FOODS ***EXCERPT- Prerequisite change only*** Prerequisite: ~~Recommended 75% or better in Creative Foods~~ Prerequisite: **Successful completion of Creative Food or Food Fundamentals**	**805 INTERNATIONAL FOODS** ***EXCERPT*- Prerequisite change only** Prerequisite: Successful completion of Creative Food or Food Fundamentals

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
NEW COURSE	**BAKING AND PASTRY ARTS** Grades 10-12 This course introduces students to the fundamental techniques, science, and artistry of baking and pastry. Through hands-on lab experiences, students will examine ingredient interaction, precise measurement techniques, and foundational methods behind successful baked goods. Key units of study include quick breads, cookies, yeast breads, cakes, pastries, pies, and plated desserts. Please be aware that there is potential exposure to common food allergens. Prerequisite: Successful completion of Creative Food or Food Fundamentals 0.5 credit

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
NEW COURSE	**FARM TO TABLE** Grades 10-12 In this course, students prepare seasonal dishes using fresh, locally sourced ingredients. Building on skills learned in Food Fundamentals, students focus on regional food choices, seasonal menu planning, and practical kitchen techniques. Activities emphasize safe food handling, cooking with local products, and understanding how regional food choices impact health and the community. Please be aware that there is potential exposure to common food allergens. Prerequisite: Successful completion of Creative Food or Food Fundamentals 0.5 Credit

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
812 ADVANCED FOODS PREPARATION ~~Grades 10-12~~ ~~Students will prepare, cook and serve meals that demonstrate a knowledge and understanding of the principles that guide meal planning including organization and management of time and budget, creativity, nutrition and safe food handling practices. Students will complete an in-depth study of foods and will analyze their food intake based on US dietary guidelines. Course includes a theory and lab component. Please be aware that there is potential exposure to common food allergens. ! Prerequisite: Recommended 75% or better in Creative Food~~ ~~0.5 credit~~	**REMOVE COURSE**

MATH & COMPUTER SCIENCE DEPARTMENT

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
NEW COURSE	**AP CYBERSECURITY** Grades 10-12 AP Cybersecurity is a broad introduction to the field of cybersecurity that aligns closely with a standard first-year college introductory cybersecurity course. Students learn about common threats and vulnerabilities and how those combine to create risk. Students study the ways that individuals and organizations manage risk and how risk can be mitigated through a defense-in-depth strategy. Students explore specific vulnerabilities, attacks, mitigations, and detection measures across a variety of domains, including physical spaces, computer networks, devices, and data and applications. Throughout the course, students consider the impact of cybersecurity on individuals, organizations, societies, and governments. (Fulfills STEM requirement for graduation) Prerequisite: Successful completion of Algebra 1 and either Programming 1 or AP Computer Science Principles 1 credit

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
364 AP STATISTICS ***EXCERPT- Prerequisite change only*** Prerequisite: Recommended 80% or better in Precalculus, CP OR recommended 70% or better in ~~Precalculus, Honors~~ **AP Precalculus**	**364 AP STATISTICS** ***EXCERPT- Prerequisite change only*** Prerequisite: Recommended 80% or better in Precalculus, CP OR recommended 70% or better in AP Precalculus

MUSIC DEPARTMENT

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
744 MUSIC THEORY 1 This course is offered to students who have been introduced to the elements of music in general music course work, but who desire to continue their study of music in a detailed, comprehensive program. The materials and structure of music are defined and analyzed; the content of the course challenges the student/musician to demonstrate musical literacy in their listening skills ~~and performance~~ skills. Activities include sight singing, melodic and rhythmic dictation and harmonic analysis. ~~This course is the prerequisite for Music Theory AP.~~ 0.5 CREDIT	**744 MUSIC THEORY 1** This course is offered to students who have been introduced to the elements of music in general music course work, but who desire to continue their study of music in a detailed, comprehensive program. The materials and structure of music are defined and analyzed; the content of the course challenges the student/musician to demonstrate musical literacy in their listening skills. Activities include sight singing, melodic and rhythmic dictation and harmonic analysis. 0.5 CREDIT

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
760 AP MUSIC THEORY ***EXCERPT- Prerequisite change only*** Prerequisite: ~~Successful completion of Music Theory 1, or by petition~~ **Teacher recommendation required**	**760 AP MUSIC THEORY** ***EXCERPT- Prerequisite change only*** Prerequisite: Teacher recommendation required

SCIENCE DEPARTMENT

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
410ADC OCEANOGRAPHY GRADES 10-12 OR CONCURRENT ENROLLMENT IN HONORS BIOLOGY ~~This course is a study of the physical, chemical and geological processes at work in the oceans and their effect on marine plants and animals. The history of oceanographic research, instrumentation, seafloor topography, seafloor spreading, the chemistry of seawater, waves, currents, tides and life in the sea are topics included in this course.~~ (Fulfills STEM requirement for graduation) **This course applies biology, chemistry, geology, and physics to our shorelines. Students will learn about the different ecosystems on our beaches, and how they help and are impacted by humans. Coral reefs, barrier islands, volcanic islands, and rocky shores are examples of these environments. Students will also learn how waves, currents, and tides support these ecosystems, and how humans can harness this energy as well.** (Fulfills STEM requirement for graduation) Note: Students may be able to take this course for undergraduate college credits through West Chester University's Dual Credit by Exam program. See page 11 for more information. 0.5 Credit	**410ADC OCEANOGRAPHY** GRADES 10-12 OR CONCURRENT ENROLLMENT IN HONORS BIOLOGY This course applies biology, chemistry, geology, and physics to our shorelines. Students will learn about the different ecosystems on our beaches, and how they help and are impacted by humans. Coral reefs, barrier islands, volcanic islands, and rocky shores are examples of these environments. Students will also learn how waves, currents, and tides support these ecosystems, and how humans can harness this energy as well. (Fulfills STEM requirement for graduation) Note: Students may be able to take this course for undergraduate college credits through West Chester University's Dual Credit by Exam program. See page 11 for more information. 0.5 Credit

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
419 INTRO TO BIOMECHANICS ~~Students will learn about forces and their effects on the body. This course will introduce concepts of position, velocity, and acceleration to mathematically describe aspects of motion. Students will apply concepts of Physics and Anatomy to analyze structures and forces used for movements. Students will engage in laboratory activities in which there would be real motion analysis of common activities such as walking, and jumping. (Fulfills STEM requirement for graduation)~~ ~~Prerequisite: 70% or better in Physics CP OR 70% or better in Anatomy/ Physiology and 70% or better in any Algebra 2~~ ~~0.5 Credit~~	**REMOVE COURSE**

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
474 PHYSICS C: ELECTRICITY AND MAGNETISM ***EXCERPT- Prerequisite change only*** Prerequisite: **Successful completion of** AP Physics C: Mechanics~~. Recommended 80% or better in Precalculus with a recommended~~ **OR** 80% or better in AP Physics 1 OR 90% ~~in~~ Honors Physics AND concurrent enrollment in Calculus	**474 PHYSICS C: ELECTRICITY AND MAGNETISM** ***EXCERPT- Prerequisite change only*** Prerequisite: Successful completion of AP Physics C: Mechanics OR 80% or better in AP Physics 1 OR 90% in Honors Physics AND concurrent enrollment in Calculus

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
NEW COURSE	**PRINCIPLES OF BIOMEDICAL SCIENCE** GRADES 9-11 PLTW Principles of Biomedical Science (PBS) is a full-year introductory course of the PLTW Biomedical Science pathway. Students explore concepts of biology and medicine to determine factors that led to the death of a fictional person. While investigating the case, students examine autopsy reports, investigate medical history, and explore medical treatments that might have prolonged the person's life. The activities and projects introduce students to human physiology, basic biology, medicine, and research processes while allowing them to design their own experiments to solve problems. Prerequisite: Successful completion of Biology 1, or concurrent enrollment in Biology 1, Honors 1 Credit

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
NEW COURSE	**HUMAN BODY SYSTEMS** GRADES 10-12 Human Body Systems provides foundational knowledge and skills in anatomy and physiology, clinical medicine, and laboratory research. Students examine the interactions of human body systems as they explore identity, power, movement, protection, and homeostasis. Exploring science in action, students build organs and tissues on a skeletal Maniken®; use data acquisition software to monitor body functions such as

	muscle movement, reflex and voluntary action, and respiration; and take on the roles of biomedical professionals to solve real-world medical cases. Prerequisite: Recommended 75% or better in Principles of Biomedical Science 1 Credit ***Note: We will not be offering this class in 27-28 because students need prerequisites first***

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
NEW COURSE	**MEDICAL INTERVENTIONS** GRADES 10-12 Medical Interventions allows students to investigate the variety of interventions involved in the prevention, diagnosis, and treatment of disease as they follow the lives of a fictitious family. A “How-To” manual for maintaining overall health and homeostasis in the body, the course explores how to prevent and fight infection, how to screen and evaluate the code in our DNA, how to prevent, diagnose, and treat cancer, and how to prevail when the organs of the body begin to fail. Through these scenarios, students are exposed to the wide range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics. Each family case scenario introduces multiple types of interventions, reinforces concepts learned in the previous two courses, and presents new content. Interventions may range from simple diagnostic tests to treatment of complex diseases and disorders. These interventions

	are showcased across the generations of the family and provide a look at the past, present, and future of biomedical science. Lifestyle choices and preventive measures are emphasized throughout the course as well as the important role that scientific thinking and engineering design play in the development of interventions of the future. Prerequisite: Recommended 75% or better in Principles of Biomedical Science 1 Credit ***Note: We will not be offering this class in 27-28 because students need prerequisites first***

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
NEW COURSE	**BIOMEDICAL INNOVATION** GRADES 11-12 Students in Biomedical Innovation apply their knowledge and skills to answer questions or solve problems related to the biomedical sciences. Students design innovative solutions for the health challenges of the 21st century as they work through progressively challenging open-ended problems, addressing topics such as clinical medicine, physiology, biomedical engineering, and public health. They have the opportunity to work on an independent project and may work with a mentor or advisor from a university, hospital, physician's office, or industry. Throughout the course, students are expected to present their work to an adult audience that may include representatives from the local business and healthcare community.

	Prerequisite: Successful completion of all previous PLTW Biomedical courses 1 Credit ***Note: We will not be offering this class in 27-28 because students need prerequisites first***

SOCIAL STUDIES DEPARTMENT

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
EXCERPT- Add as a note to each course description for the following: **234 ECONOMICS** **236DC PSYCHOLOGY** **237DC GOVERNMENT** **238DC SOCIOLOGY** ***Note: 11th grade students who have completed their American Studies and World Studies requirements may take this course.***	***EXCERPT- Add as a note to each course description for the following:*** **234 ECONOMICS** **236DC PSYCHOLOGY** **237DC GOVERNMENT** **238DC SOCIOLOGY** *Note: 11th grade students who have completed their American Studies and World Studies requirements may take this course.*

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
269 AP AFRICAN AMERICAN STUDIES Grades ~~11~~**10** -12 AP African American Studies is an interdisciplinary ~~elective~~ course that examines the diversity of African American experiences through direct encounters with rich and varied sources. Students explore key topics that extend from early African kingdoms to the ongoing challenges and achievements of the contemporary moment.**Upon completion of the course, students may take the AP African American Studies exam in May.**	**269 AP AFRICAN AMERICAN STUDIES** Grades 10 -12 AP African American Studies is an interdisciplinary course that examines the diversity of African American experiences through direct encounters with rich and varied sources. Students explore key topics that extend from early African kingdoms to the ongoing challenges and achievements of the contemporary moment.Upon completion of the course, students may take the AP African American Studies exam in May.

~~Note: Any 10th grade student who has successfully completed AP U.S. History may also be eligible to take this course as an elective.~~	

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
SSCR HISTORY STANDARDS ~~In this course, students will learn/review recurring themes in history and practice social studies skills (map reading, analyzing primary sources, etc).~~	**REMOVE COURSE**

SPECIAL EDUCATION DEPARTMENT

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
NEW COURSE	**EXECUTIVE SKILLS DEVELOPMENT** This course is designed to develop students' executive functioning skills, including organization, time management, planning, and self-monitoring, as a foundation for sustained academic achievement. Instruction is individualized to support the acquisition of core content skills while fostering effective, student-specific study habits. Students are introduced to a range of learning modalities in order to identify and apply the strategies best suited to their individual learning profiles, with an emphasis on skills that transfer across academic disciplines. 1 Credit

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
STUDY SKILLS ~~Through an emphasis on individual student core content skill acquisition, the study skills class will detail individualized instructional opportunities that expand executive functioning capacity, curate productive study habits, and explore multiple preferred modalities for learning through an individualized approach.~~ 1 Credit **This course is designed to help students develop effective study skills and strategies that promote confidence, independence, and success across content areas. Students are introduced to a variety of learning strategies and modalities to identify the methods that best support their individual learning needs. Through guided practice and individualized support, students build confidence in their ability to approach academic tasks, make informed choices, recognize strategies that work best for them, and increasingly manage their learning independently. Emphasis is placed on developing transferable skills, self-advocacy, and consistent study habits.** 1 Credit	**STUDY SKILLS** This course is designed to help students develop effective study skills and strategies that promote confidence, independence, and success across content areas. Students are introduced to a variety of learning strategies and modalities to identify the methods that best support their individual learning needs. Through guided practice and individualized support, students build confidence in their ability to approach academic tasks, make informed choices, recognize strategies that work best for them, and increasingly manage their learning independently. Emphasis is placed on developing transferable skills, self-advocacy, and consistent study habits. 1 Credit

TECH ED DEPARTMENT

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
908 POWER TECHNOLOGY 1 ~~This course is divided into three basic areas of study. The first area is external combustion engine theory and operation. A pulsating water engine boat is designed, fabricated, and tested with an emphasis on sheet metal fabrication skills. The second area of study is internal combustion engine theory and operation. A four cycle engine is disassembled; components and systems will be studied and evaluated, reassembled and test-run. The third area of study covers alternative forms of transportation through the design, fabrication, racing, and evaluation of an electric powered dragster. The material is presented through lectures, demonstrations, and hands-on lab activities. Careers and occupations in related fields are explored.~~ (Fulfills STEM requirement for graduation) **This course explores energy, power, and transportation systems through three basic areas of study. The first area is external combustion engine theory and operation. A pulsating water engine boat is designed, fabricated, and tested with an emphasis on sheet metal fabrication skills. The second area of study is internal combustion engine theory and operation. A four cycle engine is disassembled; components and systems will be studied and evaluated, reassembled and test-run. The third area of study covers alternative forms of transportation through the design, fabrication, racing, and evaluation of an electric powered dragster. The material is presented through lectures, demonstrations, and hands-on lab activities. Related careers and occupations will be explored.** (Fulfills STEM requirement for graduation) 0.5 Credit	**908 POWER TECHNOLOGY 1** This course explores energy, power, and transportation systems through three basic areas of study. The first area is external combustion engine theory and operation. A pulsating water engine boat is designed, fabricated, and tested with an emphasis on sheet metal fabrication skills. The second area of study is internal combustion engine theory and operation. A four cycle engine is disassembled; components and systems will be studied and evaluated, reassembled and test-run. The third area of study covers alternative forms of transportation through the design, fabrication, racing, and evaluation of an electric powered dragster. The material is presented through lectures, demonstrations, and hands-on lab activities. Related careers and occupations will be explored. (Fulfills STEM requirement for graduation) 0.5 Credit

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
909 POWER TECHNOLOGY 2 ~~This course is an extension of Power Technology 1. Self-directed areas of study may include alternative forms of energy and transportation, small engine maintenance and repair, and gear train analysis which will be presented in a hands-on problem solving approach. Students will fabricate and test an electric motor, focusing on electromagnet and electric motor theory and operation. The final project involves engineering teams designing, fabricating and testing an electric powered pulling tractor or hill climb vehicle. Sheet metal fabrication skills build on skills learned in Power Tech 1. Related careers and occupations will be explored~~. (Fulfills STEM requirement for graduation) **This course is an extension of Power Technology 1. Self-directed areas of study may include alternative forms of energy and transportation, small engine maintenance and repair, and gear train analysis which will be presented in a hands-on problem solving approach. Students will fabricate and test an electric motor, focusing on electromagnet and electric motor theory and operation. The final project involves engineering teams designing, fabricating and testing an electric powered pulling tractor or hill climb vehicle. Sheet metal fabrication skills build on skills learned in Power Technology 1. Related careers and occupations will be explored.** (Fulfills STEM requirement for graduation) Successful completion of Power Technology 1 0.5 Credit	**909 POWER TECHNOLOGY 2** This course is an extension of Power Technology 1. Self-directed areas of study may include alternative forms of energy and transportation, small engine maintenance and repair, and gear train analysis which will be presented in a hands-on problem solving approach. Students will fabricate and test an electric motor, focusing on electromagnet and electric motor theory and operation. The final project involves engineering teams designing, fabricating and testing an electric powered pulling tractor or hill climb vehicle. Sheet metal fabrication skills build on skills learned in Power Technology 1. Related careers and occupations will be explored. (Fulfills STEM requirement for graduation) Prerequisite: Successful completion of Power Technology 1 0.5 Credit

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
~~922~~ ADVANCED MEDIA ~~PORTFOLIO~~ PRODUCTION ~~This course is designed to provide the experienced student in the Communication Track an opportunity to specialize in one area. Emphasis is placed on offset lithography, screen printing, and digital composition, prepress and post press production. From designing and printing materials for school organizations to full multimedia productions for local businesses and organizations, this course will focus on designer/client relationships, project management and media production. (Fulfills STEM requirement for graduation)~~ ~~Prerequisite: Successful completion of Graphic Design~~ **GRADES 10-12** **This course provides experienced students with an opportunity to apply and expand their skills through authentic, multidisciplinary media production and specialized areas of study. Students will pursue specialized media projects based on individual interests in areas such as photography, graphic design, digital media, print production, video, marketing, copywriting, or other forms of visual and written communication. Through collaborative and independent projects, students develop skills in designer/client relationships, project management, creative problem solving, effective communication, content creation, and professional media production. Students will also be part of school-wide projects, including yearbook production, and other projects. Students will be collaborating in photography, graphic design, visual and written storytelling, copywriting, interviewing, editing, marketing, and publication while managing real-world production schedules and deadlines. (Fulfills STEM requirement for graduation)**	**ADVANCED MEDIA PRODUCTION** GRADES 10-12 This course provides experienced students with an opportunity to apply and expand their skills through authentic, multidisciplinary media production and specialized areas of study. Students will pursue specialized media projects based on individual interests in areas such as photography, graphic design, digital media, print production, video, marketing, copywriting, or other forms of visual and written communication. Through collaborative and independent projects, students develop skills in designer/client relationships, project management, creative problem solving, effective communication, content creation, and professional media production. Students will also be part of school-wide projects, including yearbook production, and other projects. Students will be collaborating in photography, graphic design, visual and written storytelling, copywriting, interviewing, editing, marketing, and publication while managing real-world production schedules and deadlines. (Fulfills STEM requirement for graduation) Prerequisite: Admission by application

Prerequisite: Admission by application	

WELLNESS/FITNESSDRIVERS ED DEPARTMENT

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
~~DE6~~ DE2 DRIVER EDUCATION Grades 10-12 only Driver Education is a required course usually taken in the sophomore year. Driver Education emphasizes personal and social problems related to the safe and efficient movement of traffic. Major aims are to emphasize the desirable role of the pedestrian and driver in traffic and to develop the knowledge and attitudes needed for safe use of traffic facilities~~. Students will take this course online, except when online instruction is not appropriate for a student's instructional needs. in such cases, the course will be offered in a face-to-face format.~~**Students will take this course in a face-to-face format, unless a student registers and is approved to take the course online.** 0.25 Credit	**DE2 DRIVER EDUCATION** Grades 10-12 only Driver Education is a required course usually taken in the sophomore year. Driver Education emphasizes personal and social problems related to the safe and efficient movement of traffic. Major aims are to emphasize the desirable role of the pedestrian and driver in traffic and to develop the knowledge and attitudes needed for safe use of traffic facilities. Students will take this course in a face-to-face format, unless a student registers and is approved to take the course online. 0.25 Credit

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
~~CE8~~ ADVANCED WELLNESS/FITNESS ~~This course provides an opportunity for qualified 11th and 12th grade students to participate in more comprehensive activity where individual interests and abilities can be developed in depth. Enrollment will be dependent upon the student's past achievements in wellness/ fitness and a recommendation of the wellness/fitness staff.~~ ~~0.5 Credit~~ **Grades 11-12** **This course is designed for students who thrive on competition and want to push their athletic performance to the next level. Building on foundational fitness and sport skills, students will engage in higher-intensity training, advanced strategy, and structured competitive play across a range of team and individual sports (e.g., basketball, volleyball, soccer, badminton and Tchoukball). This course can be used as the graduation required Wellness/Fitness 11/12 (CE5) course.** **Prerequisite: Teacher recommendation** **0.25 Credit**	**ADVANCED WELLNESS/FITNESS** Grades 11-12 This course is designed for students who thrive on competition and want to push their athletic performance to the next level. Building on foundational fitness and sport skills, students will engage in higher-intensity training, advanced strategy, and structured competitive play across a range of team and individual sports (e.g., basketball, volleyball, soccer, badminton and Tchoukball). This course can be used as the graduation required Wellness/Fitness 11/12 (CE5) course. Prerequisite: Teacher recommendation 0.25 Credit

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
CE9 LIFEGUARDING The primary purpose of the American Red Cross Lifeguarding course is to provide entry-level lifeguard participants with the knowledge and skills to prevent, recognize and respond to aquatic emergencies and to provide life-saving skills. At the conclusion of the course, students are eligible to take the American Red Cross Lifeguard test for a ~~nominal~~ fee ~~($37.80 in 2023)~~ **determined by The American Red Cross.** If a student fails to pass the Red Cross test and obtain their lifeguard certification (due to earning unsatisfactory marks on the Red Cross scoring rubrics), they may still pass this EHS course and earn credit for completing the course work. This course can be used as the graduation required aquatics course. ! Prerequisite: Students must be 15 years of age on or before the last scheduled session of the course, or they will be ineligible for obtaining their Red Cross Lifeguard certification. If a student is not successful on the first attempt at the prerequisite skills (distance test), they only have one more opportunity to meet the prerequisites after sufficient rest, prior to the first scheduled class session. If the student does not successfully perform any of the prerequisite skills, they are ineligible to participate in the class. 0.25 Credit	**CE9 LIFEGUARDING** The primary purpose of the American Red Cross Lifeguarding course is to provide entry-level lifeguard participants with the knowledge and skills to prevent, recognize and respond to aquatic emergencies and to provide life-saving skills. At the conclusion of the course, students are eligible to take the American Red Cross Lifeguard test for a fee determined by The American Red Cross. If a student fails to pass the Red Cross test and obtain their lifeguard certification (due to earning unsatisfactory marks on the Red Cross scoring rubrics), they may still pass this EHS course and earn credit for completing the course work. This course can be used as the graduation required aquatics course. ! Prerequisite: Students must be 15 years of age on or before the last scheduled session of the course, or they will be ineligible for obtaining their Red Cross Lifeguard certification. If a student is not successful on the first attempt at the prerequisite skills (distance test), they only have one more opportunity to meet the prerequisites after sufficient rest, prior to the first scheduled class session. If the student does not successfully perform any of the prerequisite skills, they are ineligible to participate in the class. 0.25 Credit

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
~~**CE6 MODIFIED WELLNESS/FITNESS**~~ ~~This course is offered to those students with limitations and in need of an individualized physical education program. Students will be admitted to the program after a screening by the Wellness/Fitness staff and school counselor of appropriate documentation.~~ ~~0.25 Credit~~	**REMOVE COURSE**

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
NEW COURSE	**WEIGHT TRAINING** Grades 11-12 This course introduces students to the fundamentals of safe and effective weight training. Students learn proper lifting technique, spotting procedures, and equipment safety while building strength using free weights, body weight and resistance machines. Emphasis is placed on developing sound training habits, including proper warm-up, form, and progression, so students can train safely and effectively both in and out of the weight room. Students will also learn basic principles of program design, such as sets, reps, and rest intervals, to help them build a foundation for lifelong strength training. By the end of the course, students will be able to demonstrate proper technique on core lifts and apply basic strength-training principles to their own fitness goals. This course can be used as the graduation required Wellness/Fitness 11/12 (CE5) course. 0.25 Credit

WORLD LANGUAGE DEPARTMENT

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
~~550~~ 550DC FRENCH 4 HONORS **~~552~~ 552DC GERMAN 4 HONORS** **~~554~~ 554DC SPANISH 4 HONORS** **~~524N~~ 524NDCSPANISH FOR NATIVE AND HERITAGE SPEAKERS** ***EXCERPT- Change course codes and add the following to existing course description*** **Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program**	**550DC FRENCH 4 HONORS** **552DC GERMAN 4 HONORS** **554DC SPANISH 4 HONORS** **524NDC SPANISH FOR NATIVE AND HERITAGE SPEAKERS** ***EXCERPT- Change course codes and add the following to existing course description*** Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
NEW COURSE	**FRENCH 3, HONORS** This course is an accelerated course designed to build upon the foundation of French 2 and prepare the student for French 4 Honors and the Advanced Placement program. In order to expand listening, speaking, reading, and writing skills, students will complete the normal French 3 curriculum, while working with authentic sources, giving short presentations, and completing required writing assignments. We will work towards the goal of communicating exclusively in French in the classroom. Prerequisite: Recommended 80% or better in French 2 (or teacher recommendation). 1 Credit

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
NEW COURSE	**GERMAN 3, HONORS** This course is an accelerated course designed to build upon the foundation of German 2 and prepare the student for German 4 Honors and the Advanced Placement program. In order to expand listening, speaking, reading, and writing skills, students will complete the normal German 3 curriculum, while working with authentic sources, giving short presentations, and completing required writing assignments. We will work towards the goal of communicating exclusively in German in the classroom. Prerequisite: Recommended 80% or better in German 2 (or teacher recommendation) 1 Credit

Edited POS 2026-2027	POS 2027-2028 Proposed Changes
NEW COURSE	**SPANISH 3, HONORS** This course is an accelerated course designed to build upon the foundation of Spanish 2 and prepare the student for Spanish 4, Honors and the Advanced Placement program. In addition to expanding listening, speaking, reading, and writing skills using textbook-related materials (such as ¡Avancemos! 2), students will work with authentic sources, give presentations, and complete required writing assignments. All classes will work towards the goal of communicating exclusively in Spanish in the classroom. Prerequisite: Recommended 80% or better in Spanish 2 (or teacher recommendation). 1 Credit

Summary of Program of Studies Changes (2027–2028)

New Courses Proposed	• **Introduction to AI and Vibe Coding** — Business & Computer Applications • **Baking and Pastry Arts** — Family Consumer Science • **Farm to Table** — Family Consumer Science • **AP Cybersecurity** — Math & Computer Science • **Principles of Biomedical Science** — Science PLTW Course • **Human Body Systems** - Science PLTW course *(Note: added to Program of Studies, but not offered in 2027–2028)* • **Medical Interventions** - Science PLTW course *(Note: added to Program of Studies, but not offered in 2027–2028)* • **Biomedical Innovations** - Science PLTW course *(Note: added to Program of Studies, but not offered in 2027–2028)* • **Executive Skills Development** — Special Education • **Weight Training** — Wellness/Fitness • **French 3 Honors** - World Language; approved in June • **German 3 Honors** - World Language; approved in June • **Spanish 3 Honors** - World Language; approved in June
Courses Being Removed	• **Literature Standards (ENCR)** — English • **9th and 10th English Lab (910ENLABPF)** — English • **Advanced Foods Preparation (812)** — Family Consumer Science • **Intro to Biomechanics (419)** — Science • **History Standards (SSCR)**— Social Studies • **Modified Wellness/Fitness (CE6)** — Wellness/Fitness
Recommendation and Prerequisite Changes	• **AP Art and Design (766)** — Art *(Prerequisite updated to recommended 80% in level 3 course AND portfolio review/approval)* • **Retail Management 2 (648DC)** — Business *(Prerequisite updated to Marketing 1 OR AP Business with Personal Finance)* • **Marketing 2 (678DC)** — Business *(Prerequisite updated to Marketing 1 OR AP Business with Personal Finance)* • **AP English Language and Composition (162)** — English *(Lowered recommended grade in 10th Grade English Honors from 84% to 80%)* • **AP Literature and Composition (160)** — English *(Lowered recommended grade in 11th Grade English Honors/AP Lang from 84% to 80%)* • **International Foods (805)** — Family Consumer Science *(Added Food Fundamentals as alternative prerequisite)* • **AP Statistics (364)** — Math *(Added AP Precalculus as prerequisite option)* • **AP Music Theory (760)** — Music *(Prerequisite updated to teacher recommendation required)* • **Physics C: Electricity and Magnetism (474)** — Science *(Prerequisite updated to AP Physics C: Mechanics OR 80% in AP Physics 1 OR 90% in Honors Physics AND concurrent Calculus, and removed Pre-Calculus prerequisite)*

Summary of Program of Studies Changes (2027–2028)

Grade Level Updates for Added Accessibility	• **Food Fundamentals (806)** — Family Consumer Science *(Expanded to Grade 9; now Grades 9–12)* • **AP African American Studies (269)** — Social Studies *(Expanded to Grade 10; now Grades 10–12)* • **Economics (234), Psychology (236DC), Government (237DC), Sociology (238DC)** — Social Studies *(Note added allowing 11th graders who completed American Studies and World Studies to enroll)*
Significantly Updated Course Descriptions or Graduation Designations	• **AP Business with Personal Finance (679)** — Business *(Description updated to specify satisfaction of 0.5 Personal Finance graduation requirement)* • **Senior Humanities, Honors (950)** — English *(Description streamlined to focus on interdisciplinary humanities exploration)* • **Music Theory 1 (744)** — Music *(Removed performance skills text and prerequisite reference for AP Music Theory)* • **Oceanography (410ADC)** — Science *(Description updated to focus on coastal ecosystems and West Chester University dual credit by exam)* • **Study Skills (LSStudy / ES Study)** — Special Education *(Description updated to emphasize executive functioning, independence, and self-advocacy)* • **Power Technology 1 & 2 (908/909)** — Tech Ed *(Descriptions updated to explicitly define energy, power, and transportation systems)* • **Advanced Media Production** - Tech Ed (*Name change to include more production work and expand student choice on projects)* • **Advanced Wellness/Fitness (CE8)** — Wellness/Fitness *(Description updated for competitive student-athletes; Prerequisite set to teacher recommendation; adjusted to 0.25 credit)* • **Lifeguarding (CE9)** — Wellness/Fitness *(Updated testing fee language to American Red Cross determination)*
Operational Changes	• **Driver Education (DE2)** — Wellness/Fitness/Driver Ed *(Shifted primary instruction format from online back to face-to-face classroom delivery)*

Required	All students in the course will interact with this text as part of the approved curriculum.
Teacher Choice	Teachers may choose supplementary text(s) or an additional anchor text to support student success in navigating the unit.
Student Choice	Students choose the text(s) to meet their needs in navigating the unit successfully.

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
SEL	SEL	K-12th	Panorama	Panorama	Required
SEL	SEL	K-5	Harmony	Harmony Academy	Required
SEL	SEL	6th-8th	Positivity Project (P2)	Positivity Project (P2)	Required
Counseling	SEL	K-8	Erin's Law Curriculum	Erin's Law Foundation Emily Kuhn , Abby Schaber, Rachel Anderson, Dr. Abbi M. Long	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
ELA	ELA	6	HMH *Into Literature* Grade 6	**25-26 PILOT**	Required
ELA	Reading	6	HMH *Into Literature* Grade 6	**25-26 PILOT**	Required
ELA			"The Veldt"	Ray Bradbury	Required
ELA	ELA	7	"The Monsters are Due on Maple Street"	Rod Serling	Required
ELA			*Hello, Universe*	Erin Entrada Kelly	Required
ELA			"The Landlady"	Roald Dahl	Required
ELA			"Wish You Were Here"	Frank Jones	Student Choice
ELA			"The Elevator"	William Slater	Student Choice
ELA			"The Monkey's Paw"	W.W. Jacobs	Teacher Choice
ELA			*The Christmas Carol (Drama Version)*	Various	Required
ELA			*The Crossover*	Kwame Alexander	Required
ELA			*House Arrest*	K. A. Holt	Required
ELA			*Anne Frank: The Diary of a Young Girl*	Adapted by Mark Falstein	Required
ELA	Reading	7	*Anne Frank's Diary: The Graphic Edition (Excerpts)*	Ari Folman	Teacher Choice
ELA			*Hidden Figures (Young Reader's Edition)*	Margot Lee Shetterly	Teacher Choice
ELA			*The Outsiders*	S. E. Hinton	Teacher Choice
ELA			*The Hobbit (Excerpts)*	J. R. R. Tolkein	Teacher Choice
ELA			*The Hunger Games*	Suzanne Collins	Teacher Choice
ELA			*Shadow and Bone (Excerpts)*	Leigh Bardugo	Teacher Choice
ELA			*Booked*	Kwame Alexander	Student Choice
ELA			*Rebound*	Kwame Alexander	Student Choice
ELA			*Full Cicada Moon*	Marilyn Hinton	Student Choice
ELA			*Brown Girl Dreaming*	Jacqueline Woodson	Student Choice
ELA			*Lifeboat 12*	Susan Hood	Student Choice
ELA			"Remarks by the President on America's Energy Security" and "Op Ed: President's Clean Energy Plan Must be Refocused"	Barack Obama and Staff Writer	Required
ELA			"The Power of Solar Energy"	Author Unknown	Teacher Choice
ELA			"Outsmart Your Smartphone"	Catherine Steiner-Adair	Required
ELA			"The Trouble With Television"	Robert MacNeil	Required
ELA			"On Woman's Right to Suffrage"	Susan B. Anthony	Teacher Choice
ELA			"Heads Up, Humans"	Claudia Alarcon	Teacher Choice
ELA			"The Automation Paradox"	James Bessen	Teacher Choice
ELA			"The Locavore Myth" and "It's Time to Become a Locavore"	James E. McWilliams & Neal Peirce	Required
ELA			"Is Binge-Watching a Harmless Pleasure or a Harmful Addiction"	NewsELA Staff	Teacher Choice
ELA			*Ground Zero*	Alan Gratz	Required
ELA			"Ambush"	Tim O'Brien	Required
ELA			"Patrol"	Walter Dean Myers	Teacher Choice
ELA			"9/11 Address to the Nation"	George W. Bush	Required
ELA			"September 11th: A Poem"	Kevin Powell	Teacher Choice
ELA			"The War in Vietnam"	Textbook	Teacher Choice
ELA			"September 11 Attacks"	History.com	Required
ELA			"How Technology Has Crowned Music's King"	Bill Dorfton	Required
ELA			"A Glow in the Dark"	Gary Paulson	Required
ELA			"Thank You, Ma'am"	Langston Hughes	Required
ELA			"The Tell-Tale Heart"	Edgar Allan Poe	Required
ELA			"All Summer in a Day"	Ray Bradbury	Required
ELA			*The Giver*	Lois Lowry	Teacher Choice
ELA	ELA	8	*The Adoration of Jenna Fox*	Mary E. Pearson	Student Choice
ELA			*The Limit*	Krisen Landon	Student Choice
ELA			*Matched*	Allie Condie	Student Choice
ELA			*Internment*	Samira Ahmed	Student Choice
ELA			*Unwind*	Neal Shusterman	Student Choice
ELA			*Brave New Girl*	Rachel Vincent	Student Choice
ELA			*Want*	Cindy Pon	Student Choice
ELA			*Illusive*	Emily Lloyd-Jones	Student Choice
ELA			"Harrison Bergeron"	Kurt Vonnegut	Required
ELA			"Pedestrian"	Ray Bradbury	Teacher Choice
ELA			"The Lottery"	Shirley Jackson	Teacher Choice
ELA			"The Machine Stops"	E.M. Forester	Teacher Choice
ELA			"The Fisherman and His Wife"	Brothers Grimm	Teacher Choice
ELA			"Perseus and Medusa"		Teacher Choice
ELA			"Theseus and the Minotaur"		Teacher Choice

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
ELA			"Arachne"	Olivia E. Coolidge	Teacher Choice
ELA			"Caged Bird"	Maya Angelou	Teacher Choice
ELA			Greek Myths	Olivia E. Coolidge	Teacher Choice
ELA			"Why are Bees Vanishing?"	Alison Pearce Stevens	Required
ELA			"Can DNA Editing Save Endangered Species?"	Kathiann Kowalski	Required
ELA			"Ithaka"	C.P. Cavafy	Teacher Choice
ELA			"The Odyssey of Homer"	Allen Mandelbaum	Teacher Choice
ELA			"The Rise of Greek City-States: Athens Versus Sparta"	commonlit.org	Required
ELA			"If You Go into the Woods You will Find You have Technology"	Heather Christle	Required
ELA	ELA Honors (additional)	8	*House of the Scorpion*	Nancy Farmer	Student Choice
ELA			*Fahrenheit 451*	Ray Bradbury	Teacher Choice
ELA			*Crossed*	Allie Condie	Student Choice
ELA			*Reached*	Allie Condie	Student Choice
ELA			*The Fox Inheritance*	Mary E. Pearson	Student Choice
ELA			*Fox Forever*	Mary E. Pearson	Student Choice
ELA			*UnWholly*	Neal Shusterman	Student Choice
ELA			*UnSouled*	Neal Shusterman	Student Choice
ELA			*UnDivided*	Neal Shusterman	Student Choice
ELA			*UnBound*	Neal Shusterman	Student Choice
ELA			*Strange New World*	Rachel Vincent	Student Choice
ELA	English 9 English 9 Honors	9	*Long Way Down*	Jason Reynolds	Required
ELA			"Through the Tunnel"	Doris Lessing	Teacher Choice
ELA			"The Scarlet Ibis"	James Hurst	Teacher Choice
ELA			"First Day Fly"	Jason Reynolds	Teacher Choice
ELA			"Eleven"	Sandra Cisneros	Teacher Choice
ELA			"Most Dangerous Game"	Richard Connell	Teacher Choice
ELA			*Of Mice and Men*	Steinbeck	Required
ELA			"To a Mouse"	Robert Burns	Required
ELA			"Abandoned Farmhouse"	Kooser	Teacher Choice
ELA			Blues Ain't No Mocking Bird	Toni Cade Bambara	Teacher Choice
ELA			"I Have a Dream"	Martin Luther King Jr.	Required
ELA			*Night*	Eli Weisel	Required
ELA			"Statement to the House Judiciary Committee on the 9/11 Victim Compensation Fund"	Jon Stewart	Teacher Choice
ELA			"Address to United Nations on Climate Change"	DiCaprio	Teacher Choice
ELA			"The UN Climate Action Summit Speech"	Greta Thunberg	Teacher Choice
ELA			"Senate Statement on PBS Funding"	Fred Rogers	Teacher Choice
ELA			*Romeo and Juliet*	William Shakespeare	Required
ELA			"The Interlopers"	Saki	Teacher Choice
ELA			English Sonnets	William Shakespeare et. al.	Teacher Choice
ELA			*Midsummer's Night Dream*	William Shakespeare	Student Choice
ELA			*Tueday's with Morrie*	Mitch Alboom	Student Choice
ELA	English 9 Honors (additional)		*The Hate U Give*	Angie Thomas	Teacher Choice
ELA			"Glory and Hope"	Nelson Mandela	Required
ELA			*Animal Farm*	George Orwell	Required
ELA	English 10		*A Raisin in the Sun*	Lorraine Hansberry	Required
ELA			"Women"	Alice Walker	Teacher Choice
ELA			"A Song in the Front Yard"	Langston Hughes	Teacher Choice
ELA			"The Kitchenette Building"	Gwendolyn Brooks	Teacher Choice
ELA			"Mother to Son"	Langston Hughes	Teacher Choice
ELA			"Harlem"	Langston Hughes	Required
ELA			*Lord of the Flies*	William Golding	Required
ELA			Ted Talk: A Story of Survival	Hussein A. Bulhan	Teacher Choice
ELA			"What Makes Good People Do Bad Things"	Phillip Zimbardo	Teacher Choice
ELA			"The Stanford Prison Experiments"	Saul McLeod	Teacher Choice
ELA			*To Kill a Mockingbird*	Harper Lee	Required
ELA			"Everyday Use"	Alice Walker	Teacher Choice
ELA			"Strange Fruit"	Billie Holiday	Teacher Choice
ELA			"Lamb to the Slaughter"	Roald Dahl	Required
ELA			"Where are You Going? Where Have You Been?"	Joyce Carol Oates	Required
ELA			"Harrison Bergeron"	Kurt Vonnegut	Teacher Choice

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ELA			"Occurrence at Owl Creek Bridge"	Ambrose Bierce	Teacher Choice
ELA	Engish 10		"On the Rainy River"	Tim O'Brien	Teacher Choice
ELA	English 10		"Where Have You Gone, Charming Billy?"	Tim O'Brien	Teacher Choice
ELA	Honors		"Flowers for Algernon"	Daniel Keyes	Teacher Choice
ELA		10	"Louisa, Please Come Home"	Shirley Jackson	Teacher Choice
ELA			"The Bass, The River, and Shiela Mant"	J.D. Wetherell	Teacher Choice
ELA			*The Joy Luck Club*	Amy Tan	Student Choice
ELA			When the Emperor Was Divine	Julia Otsuka	Student Choice
ELA			*Just Mercy*	Bryan Stevenson	Student Choice
ELA			*Unbroken*	Louis Zamperini	Student Choice
ELA			*Extraordinary Means*	Robyn Schneider	Student Choice
ELA			*Darius the Great is Not Okay*	Adib Khorram	Student Choice
ELA			*Internment*	Samira Ahmed	Student Choice
ELA			*I'm Not Your Perfect Mexican Daughter*	Erika Sanchez	Student Choice
ELA			*Reading Lolita in Tehran*	Azar Nafisi	Student Choice
ELA			"Nothing Gold Can Stay"	Robert Frost	Student Choice
ELA			"Birches"	Robert Frost	Student Choice
ELA			"Song of Myself # 6:	Walt Whitman	Student Choice
ELA	English 10		"We Real Cool"	Gwendolyn Brooks	Student Choice
ELA	Honors		"Mirror"	Sylvia Plath	Student Choice
ELA	(additional)		*The Crucible*	Arthur Miller	Required
ELA			"A Poison Tree"	William Blake	Teacher Choice
ELA			"I'm Nobody! Who are You?"	Dickinson	Teacher Choice
ELA			*A Separate Peace*	John Knowles	Required
ELA			"Aint I a Woman?"	Truth	Teacher Choice
ELA			"Ambush"	O'Brien	Required
ELA			"Black Boy"	Wright	Required
ELA			"A Pair of Silk Stockings"	Chopin	Required
ELA			"The Devil and Tom Walker"	Hawthorne	Required
ELA	English 11		"The Fish"	Elizabeth Bishop	Required
ELA			"The Life You Save May Be Your Own"	O'Connor	Required
ELA			"The Man I Killed"	O'Brien	Required
ELA			"The Secret Life of Walter Mitty"	Thurbefr	Teacher Choice
ELA			"To Build a Fire"	London	Required
ELA			"War is Kind"	Crane	Required
ELA			"Aphorisms"	Ben Franklin	Required
ELA			"Harlem"	Hughes	Required
ELA			"I Hear America Singing"	Whitman	Required
ELA			"I, Too"	Hughes	Required
ELA			"Learned Astroner"	Whitman	Required
ELA			"Miniver Cheevy"	Robinson	Required
ELA			"Mirror"	Plath	Required
ELA			"Richard Cory"	Robinson	Required
ELA			"Self-Reliance"	Emerson	Required
ELA			"Success is Counted Sweetest"	Dickinson	Required
ELA			"Tableau"	Cullen	Required
ELA			"The Masque of the Red Death"	Poe	Required
ELA			"Upon Burning of the House"	Broadstreet	Required
ELA			"Walden"	Thoreau	Required
ELA			*A Girl Called Fearless*	Catherine McKenzie	Student Choice
ELA			*A Tale of Two Cities*	Charles Dickens	Student Choice
ELA			*Brave New World*	Aldous Huxley	Student Choice
ELA			*Curious Incident of the Dog in the Nighttime*	Mark Haddon	Student Choice
ELA	English 11		*Dear Martin*	Nic Stone	Student Choice
ELA	English 11		*Fahrenheit 451*	Ray Bradbury	Student Choice
ELA	Honors		*Fences*	Wilson	Required
ELA			*Forget Tomorrow*		Student Choice
ELA			*Haunting of Hill House*	Shirley Jackson	Student Choice
ELA			*Heart of Darkness*	Joseph Conrad	Student Choice
ELA			*Marley and Me*	John Grogan	Student Choice
ELA			*Monster*	Walter Dean Myers	Student Choice

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
ELA			*One Flew Over the Cuckcoos Nest*	Ken Kesey	Student Choice
ELA			*Project Hail Mary*	Andy Weir	Student Choice
ELA			*Station Eleven*	Emily St. John Mandel	Student Choice
ELA			*Symptoms of Being Human*	Jeff Garvin	Student Choice
ELA			*Testaments*	Margaret Atwood	Student Choice
ELA			*The Bluest Eye*	Toni Morrison	Student Choice
ELA			*The Boys in the Boat*	Daniel James Brown	Student Choice
ELA			*The Forgetting*	Sharon Cameron	Student Choice
ELA			*The Great Gatsby*	Fitzgerald	Required
ELA			*The Hate U Give*	Angie Thomas	Student Choice
ELA			*The Nickel Boys*	Colson Whitehead	Student Choice
ELA		11	*Their Eyes Were Watching God*	Zora Neale Hurston	Student Choice
ELA			*Elements of Literature, Essentials of American Literature*	Various	Teacher Choice
ELA			The Catcher in the Rye	Salinger	Required
ELA			*Easy Writer: with Exercises*	Andrea A. Lunsford	Required
ELA			"Dr. Heidegger's Experiment"	Hawthorne	Required
ELA			"The Raven"	Poe	Required
ELA			Subject & Strategy: A Writer's Reader	Escholz & Rosa	Required
ELA			"Thanatopsis"	Bryant	Required
ELA			"This is just to say"	Dickinson	Required
ELA	English 11 Honors (additional)		"Pathedy"	Ellen Kay	Required
ELA			"Nothing Gold Can Stay"	Frost	Required
ELA			"Sonnet 18"	Shakespeare	Required
ELA			"I dwell in possiblility"	Dickinson	Required
ELA			"The President Flies Over"	Patricia Smith	Required
ELA			"Playground Elegy"	Clint Smith	Required
ELA			*A Worn Path*	Welty	Required
ELA			*The Lottery*	Jackson	Required
ELA			HIlls Like Elephant	Hemingway	Required
ELA			College Board Resources (Non-Fiction Texts)	Various	Teacher Choice
ELA			*The Language of Composition (textbook)*	Various	Teacher Choice
ELA			*Thank You for Arguing*	Jay Heinrichs	Required
ELA			*Foundations of Language and Literature*	Various	Teacher Choice
ELA			*Ideas in Argument*	Various	Teacher Choice
ELA			*American Literature and Rhetoric*	Various	Teacher Choice
ELA			*Back to the Lake*	Various	Teacher Choice
ELA			*Advanced Language and Literature*	Various	Teacher Choice
ELA			*Rhetorical Devices*	Various	Teacher Choice
ELA			*Advanced Composition Skills*	Various	Teacher Choice
ELA			*50 Essays*	Various	Teacher Choice
ELA			*Analysis, Argument, and Synthesis*	Various	Teacher Choice
ELA			*Everything's an Argument*	Various	Teacher Choice
ELA			*AP English Language and Composition Crash Course*	Various	Teacher Choice
ELA	AP Language and Compostion		*Ideas in Argument*	Various	Teacher Choice
ELA			*Current Issues and Enduring Questions*	Various	Teacher Choice
ELA			*The Norton Reader*	Various	Teacher Choice
ELA			*Conversations in American Literature*	Various	Teacher Choice
ELA			*Patterns for College Writing: A Rhetorical Reader and Guide*	Various	Teacher Choice
ELA			*Common Threads*	Various	Teacher Choice
ELA			*How to Read Nonfiction Like a Professor*	Various	Teacher Choice
ELA			"Freedom or Death"	Emmeline Pankhurst	Required
ELA			"What it Means to Be Colored in the Capital of the United States"	Mary Church Terrell	Required
ELA			Plato's *Apology*	Socrates	Teacher Choice
ELA			"Abolishment of Slavery"	Wilbur Wilberforce	Teacher Choice
ELA			"The Golden Speech"	Queen Elizabeth	Teacher Choice
ELA			The First of Fourth Orations	Cicero	Teacher Choice
ELA			"Pericles' Funeral Oration"	Thucydides	Teacher Choice
ELA			"Speech of Alexander the Great, from The Campaigns of Alexander"	Arrian	Required
ELA			Language and Composition: The Art of Voice	Various	Teacher Choice
ELA			English Language and Composition, Advanced Placement Edition	Various	Teacher Choice
ELA			"A Modest Proposal"	Jonathan Swift	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
ELA	English 12		"An Irish Airman Forsees His Death"	William Butler Yeats	Required
ELA			"Death Be Not Proud"	John Donne	Teacher Choice
ELA			"Dreamers"	Siegfried Sassoon	Required
ELA			"Dulce et Decorum Est"	Wilfred Owen	Required
ELA			"Meditation 17"	John Donne	Teacher Choice
ELA			"I Wandered Lonely as a Cloud"	William Wordsworth	Teacher Choice
ELA			"The Lamb"	William Blake	Teacher Choice
ELA			"The Nymph's Reply to the Shepherd"	Walter Raleigh	Teacher Choice
ELA			"The Passionate Shepherd to His Love"	Christopher Marlowe	Teacher Choice
ELA			"The Soldier"	Rupert Brooke	Required
ELA			"The Tyger"	William Blake	Teacher Choice
ELA			"The World is Too Much With Us"	William Wordsworth	Teacher Choice
ELA			"Tintern Abbey"	William Wordsworth	Teacher Choice
ELA			"To a Mouse"	Robert Burns	Teacher Choice
ELA			"To His Coy Mistress"	Andrew Marvell	Teacher Choice
ELA			"To the Virgins, To Make Much of Time"	Robert Herrick	Teacher Choice
ELA			*About A Boy*	Nick Hornby	Student Choice
ELA			*Born A Crime*	Trevor Noah	Required
ELA			*Danger of a Single Story*	Chimamanda Ngozi Adichie	Teacher Choice
ELA			*Dog Stars*	Peter Heller	Student Choice
ELA			*Extremely Loud, Incredibly Close*	Jonathan Safran Foer	Student Choice
ELA			*Giannis*	Mirin Fader	Student Choice
ELA			*Good Girl's Guide to Murder*	Holly Jackson	Student Choice
ELA			*Five Days at Memorial*	Sheri Fink	Student Choice
ELA			*Hamlet*	William Shakespeare	Teacher Choice
ELA			*Infinite In Between*	Carolyn Mackler	Student Choice
ELA			*Macbeth*	William Shakespeare	Required
ELA			*Metamorphosis*	Franz Kafka	Required
ELA			*Nickel and Dimed*	Barbara Ehrenreich	Student Choice
ELA			*Paper Towns*	John Green	Student Choice
ELA			*Sir Gawain & the Green Knight*		Teacher Choice
ELA			*Song of Achilles*	Madeline Miller	Student Choice
ELA			*Sonnets*	Edmund Spenser	Teacher Choice
ELA			*Sonnets*	William Shakespeare	Required
ELA			*The Help*	Kathryn Stockett	Student Choice
ELA			*The Housemaid*	Freida McFadden	Student Choice
ELA			*The Martian*	Andy Weir	Student Choice
ELA			*The Poet X*	Elizabeth Acevedo	Student Choice
ELA			The Language of Literature: World Literature	Various	Teacher Choice
ELA	English 12 Honors		*Beowulf*	Unknown	Required
ELA			*Our House is on Fire*	Greta Thunberg	Student Choice
ELA			*Persuasion*	Jane Austen	Student Choice
ELA			*Remarkable Creatures*	Chevalier	Student Choice
ELA			*Taming of the Shrew*	Shakespeare	Student Choice
ELA			*Glencoe Literature: The Readers Choice, British Literature*	Various	Teacher Choice
ELA			British Literature: 1780-1830	Various	Teacher Choice
ELA			*The Kite Runner*	Hosseini	Student Choice
ELA			*Turning of the Screw*	James	Student Choice
ELA			*Idylls of the King*	Tennyson	Teacher Choice
ELA			"Death Be Not Proud"	John Donne	Required
ELA			"Meditation 17"	John Donne	Required
ELA			*Macbeth*	Shakespeare	Required
ELA			"Ozymandias"	Percy Bysshe Shelley	Required
ELA			"The Lamb"	William Blake	Required
ELA			"The Nymph's Reply to the Shepherd"	Sir Walter Raleigh	Required
ELA			"The Passionate Shepherd to His Love"	Christopher Marlowe	Required
ELA			"The Tyger"	William Blake	Required
ELA			"The World is Too Much With Us"	William Wordsworth	Required
ELA			"To a Mouse"	Robert Burns	Required
ELA			"To Althea, from Prison"	Richard Lovelace	Required
ELA			"To the Virgins, to Make Much of Time"	Robert Herrick	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
ELA	English 12 Honors (additional)	12	"When I Have Fears that I May Cease to Be"	John Keats	Required
ELA			*Hamlet*	William Shakespeare	Teacher Choice
ELA			*Brave New World*	Aldous Huxley	Required
ELA			*Station Eleven*	Emily St. John Mandel	Required
ELA			*The Norton Anthology of English Literature (Volumes A and B)*	Various	Teacher Choice
ELA			*1984*	Orwell	Required
ELA			*The Handmaid's Tale*	Margaret Atwood	Teacher Choice
ELA			*Oryx and Crake*	Margaret Atwood	Teacher Choice
ELA			*Parable of the Sower*	Octavia Butler	Teacher Choice
ELA			*I am Legend*	Richard Matheson	Teacher Choice
ELA			*Klara and the Sun*	Kazuo Ishiguro	Teacher Choice
ELA			*The Testaments*	Margaret Atwood	Teacher Choice
ELA			*The Memory Police*	Yoko Ogawa	Teacher Choice
ELA			*A Clockwork Orange*	Anthony Burgess	Teacher Choice
ELA			*The Road*	Cormac McCarthy	Teacher Choice
ELA			*On the Beach*	Nevil Shute	Teacher Choice
ELA			*Children of Men*	P.D. James	Teacher Choice
ELA			"How Much Land Does a Man Need"	Leo Tolstoy	Teacher Choice
ELA			"Masque of the Red Death"	Edgar Allan Poe	Teacher Choice
ELA			"Ordeal by Cheque"	Wuther Crue	Teacher Choice
ELA			"The Lesson"	Toni Cade Bambara	Teacher Choice
ELA			"The Lottery"	Shirley Jackson	Teacher Choice
ELA			"The Ones that Walk Away from Omelas"	Ursula K. Le Guin	Teacher Choice
ELA			"The School"	Donald Barthelme	Teacher Choice
ELA			"The Yellow Wallpaper"	Charlotte Perkins	Teacher Choice
ELA			"Kitchenette Building"	Brooks	Required
ELA			"Suicide's Note"	Hughes	Required
ELA			"The Last Night that She Lived"	Dickinson	Required
ELA			"Stop all the Clocks"	Auden	Required
ELA			"Ballad of Birmingham"	Randall	Required
ELA			"Break of Day"	Donne	Required
ELA			"Ozymandias"	Shelly	Required
ELA			"I am!"	Clare	Required
ELA			"Golden Retrievals"	Doty	Required
ELA			"Animals are Passing from Our Lives"	Levin	Required
ELA			"Pathedy of Manners"	Key	Required
ELA			"Dessert Places"	Fronst	Required
ELA			"35/10"	Olds	Required
ELA			"Barbie Doll"	Piercy	Required
ELA			"Let No Charitable Hope"	Wylie	Required
ELA			"Ode to the West Wind"	Shelley	Required
ELA			"To Autumn"	Keats	Required
ELA			"Those Winter Sundays"	Hayden	Required
ELA			"Living in Sin"	Rich	Required
ELA			"The Writer"	Wilbur	Required
ELA			"Dream Song 14"	Berryman	Required
ELA			"I Wandered Lonely as a Cloud"	Wordsworth	Required
ELA			"The Lamb"	Blake	Required
ELA			"The Tyger"	Blake	Required
ELA			Sonnets 1-154	Shakespeare	Required
ELA			"Richard Cory"	Robinson	Required
ELA			"The Journey of the Magi"	Eliot	Required
ELA			Holy Sonnets 1-19	Donne	Required
ELA			"Nothing Gold Can Stay"	Frost	Required
ELA			"On the Death of my First and Dearest Child, Hector Philips, born the 23rd of April, and died the 2nd of May 1655."	Philips	Required
ELA			"On My First Son"	Jonson	Required
ELA			"On My First Daughter"	Jonson	Required
ELA			"Inconstancy in Love"	Burns	Required
ELA			"Porphyria's Lover"	Browning	Required
ELA			"My Heart Leaps Up"	Wordsworth	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
ELA	AP Literature and Composition		"Sonnet 19"	Milton	Required
ELA			"The World is Too Much With Us"	Wordsworth	Required
ELA			*Amoretti*	Spenser	Required
ELA			"Mad Girl's Love Song"	Plath	Required
ELA			"The Summer Day"	Oliver	Required
ELA			"Mirror"	Plath	Required
ELA			"The Applicant"	Plath	Required
ELA			"Follower"	Heaney	Required
ELA			"Some Boys are Born to Wander"	McDonald	Required
ELA			*The Norton Anthology of Poetry*	Various	Required
ELA			"Introduction to Poetry"	Collins	Required
ELA			Assorted Poetry	Assorted	Teacher Choice
ELA			*Beowulf*	Unknown	Teacher Choice
ELA			*Death of a Salesman*	Arthur Miller	Teacher Choice
ELA			*Fences*	August Wilson	Teacher Choice
ELA			*The Tempest*	Shakespeare	Teacher Choice
ELA			*King Lear*	Shakespeare	Teacher Choice
ELA			*Othello*	Shakespeare	Teacher Choice
ELA			*Hamlet*	William Shakespeare	Teacher Choice
ELA			*Interior Chinatown*	Charles Yu	Required
ELA			*Kindred*	Octavia Butler	Required
ELA			*Macbeth*	William Shakespeare	Required
ELA			*Maus*	Art Spiegelman	Required
ELA			*Persepolis*	Marjane Satrapi	Teacher Choice
ELA			*The Hitchiker's Guide to the Galaxy*	Douglas Adam	Required
ELA			*The Importance of Being Earnest*	Oscar Wilde	Teacher Choice
ELA			*There, There*	Tommy Orange	Required
ELA			*Sound and Sense*	Arp and Johnson	Required
ELA			*Lesson Before Dying*	Gaines	Teacher Choice
ELA			*The Road*	Cormac McCarthy	Teacher Choice
ELA			*The Canterbury Tales*	Chaucer	Required
ELA			*Foster*	Keegan	Teacher Choice
ELA			*All the Light We Cannot See*	Doerr	Teacher Choice
ELA			*The Theban Plays*	Sophocles	Teacher Choice
ELA			*The Norton Anthology of Contemporary Fiction*	Various	Teacher Choice
ELA			*The Norton Anthology of English*	Various	Teacher Choice
ELA			*The Norton Anthology of Modern and Contemporary Poetry*	Various	Teacher Choice
ELA			*The Norton Anthology of World Literature*	Various	Teacher Choice
ELA			*The Norton Anthology of Theory and Criticism*	Various	Teacher Choice
ELA			*The Norton Anthology of Western Literature*	Various	Teacher Choice
ELA			*The Northon Anthology of Literature by Women*	Various	Teacher Choice
ELA			*The Norton Anthology of Short Fiction*	Various	Teacher Choice
ELA			*The Norton Anthology of Drama*	Various	Teacher Choice
ELA			*Homegoing*	Gyasi	Teacher Choice
ELA			*Dubliners*	Joyce	Teacher Choice
ELA			*The Bell Jar*	Plath	Teacher Choice
ELA			*Slaughterhouse-Five*	Vonnegut	Teacher Choice
ELA			*The Handmaid's Tale*	Atwood	Teacher Choice
ELA			*The Stranger*	Camus	Teacher Choice
ELA			*When the Emeror was Divine*	Otsuka	Teacher Choice
ELA			Literature and Composition	Various	Teacher Choice
ELA			*English Literature and Composition*	Abdon and McFarlan	Teacher Choice
ELA			*How to Read Poetry like a Professor*	Foster	Teacher Choice
ELA			*How to Read Novels like a Professor*	Foster	Teacher Choice
ELA			*How to Read Literature like a Professor*	Foster	Teacher Choice
ELA			*The Norton Introdution to Literature*	Various	Teacher Choice
ELA			*England in Literature*	Various	Teacher Choice
ELA			*The Things They Carried*	O'Brien	Teacher Choice
ELA			*Norton Anthology of World Literature*	Martin Puchner	Required
ELA			*The Epic of Gilgamesh*	Sîn-lēqi-unninni	Required
ELA			*The Iliad*	Homer	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
ELA	Humanities Honors	12	*The Odyssey*	Homer	Required
ELA			*The Theban Cycle*	Sophocles	Required
ELA			*The Oresteia*	Aeschylus	Teacher Choice
ELA			*The Divne Comedy*	Dante Alighieri	Required
ELA			*The Aenied*	Virgil	Required
ELA			*Sir Gawain and the Green Knight*	Unknown	Teacher Choice
ELA			*The Canterbury Tales*	Geoffrey Chaucer	Teacher Choice
ELA			*The Tempest*	William Shakespeare	Teacher Choice
ELA			*A Handbook of Mythology*	E.M. Berens	Required
ELA			*The Power of Myth*	Joseph Campbell	Required
ELA			*Mythology*	Edith Hamilton	Required
ELA			*House of Names*	Colm Tóibín	Teacher Choice
ELA			*Silence of the Girls*	Pat Barker	Teacher Choice
ELA			*The Penelopiad*	Margaret Atwood	Teacher Choice
ELA			*A Thousand Ships*	Natalie Haynes	Teacher Choice
ELA			*Song of Achilles*	Madeline Miller	Teacher Choice
ELA			*Circe*	Madeline Miller	Teacher Choice
ELA			*Lavinia*	Ursula K. Leguin	Teacher Choice
ELA			*Cold Mountain*	Charles Frazier	Teacher Choice
ELA			*The Republic*	Plato	Teacher Choice
ELA			*Utopia*	Thomas Moore	Teacher Choice
ELA			*The Prince*	Machievelli	Teacher Choice

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
Social Studies	Grade 6 Social Studies	6th	World Studies: The Ancient World	Heidi Hayes Jacobs, Michal L. LeVasseur, Kate Kinsella, Kevin Feldman, Inc. Dorling Kindersley	Required
Social Studies	Grade 7 Social Studies	7th	History of our World	Heidi Hayes-Jacobs	Required
Social Studies	Grade 8 Social Studies (On Level/Honors)	8th	The American Nation (Beginnings through 1877)	James West Davidson	Required
Social Studies	Grade 8 Social Studies (On Level/Honors)	8th	Blood on the River	Elisa Carbone	Teacher Choice
Social Studies	Grade 8 Social Studies (On Level/Honors)	8th	Chains	Laurie Halse Anderson	Teacher Choice
Social Studies	Grade 8 Social Studies (On Level/Honors)	8th	Forge	Laurie Halse Anderson	Teacher Choice
Social Studies	Grade 8 Social Studies (On Level/Honors)	8th	Ashes	Laurie Halse Anderson	Teacher Choice
Social Studies	American Studies 1 (On Level)	9th	America: Pathways to the Present	Cayton, Perry, Reed, Winkler	Required
Social Studies	American Studies 1 (Honors)	9th	The American Pageant	Kennedy, Cohen, Bailey	Required
Social Studies	American Studies 1 (Honors)	9th	The King of Mulberry Street	Donna Jo Napoli	Required
Social Studies	AP United States History	9th-12th	America's History, For the AP* Course (Bedford Integrated Media Edition)	James A. Henretta, Eric Hinderaker, Rebecca Edwards	Required
Social Studies	AP United States History	9th-12th	Documenting United States History: Themes, Concepts, and Skills for the AP* Course	Stacy, James, Heller, Stephen	Required
Social Studies	American Studies 2 (On Level)	10th	America: Pathways to the Present	Cayton, Perry, Reed, Winkler	Required
Social Studies	American Studies 2 (Honors)	10th	The American Pageant	Kennedy, Cohen, Bailey	Required
Social Studies	AP Economics	10th-12th	Economics - Principles and Policy	Baumol, William J and Blinder, Alan S	Required
Social Studies	AP European History	10th-12th	A History of Western Society	John McKay, Clare Crowston,, Merry E. Wiesner-Hanks	Required
Social Studies	AP Government	10th-12th	American Government	Wilson, J.Q. & Dilulio, J.J.	Required
Social Studies	AP Psychology	10th-12th	Myers' Psychology	Myers, David G.; DeWall, C. Nathan; Hammer, Elizabeth Yost	Required
Social Studies	AP World History	10th-12th	Ways of the World	Nelson, E. & Strayer, R. W.	Required
Social Studies	World Studies (On Level)	11th	World History: The Human Journey, Modern World	Holt, Rinehart, Winston	Required
Social Studies	World Studies (Honors)	11th	World History: Connections to Today, Modern World	Ellis, Elisabeth Gaynor; Esler, Anthony; Beers, Burton	Required
Social Studies	AP African American Studies	11th-12th	Freedom on My Mind: A History of African Americans, With Documents	White, Deborah G., Mia Bay, and Waldo E. Martin Jr.	Required
Social Studies	Government (Dual Credit)	12th	Magruder's American Government	Prentice Hall	Required
Social Studies	Government (On Level)	12th	Civics Today: Citizenship, Economics, & You	Remy, Patrick, Shaffell, Clayton	Required
Social Studies	Psychology	12th	Psychology 2e	Rose M. Spielman, William J. Jenkins, Marilyn D. Lovett	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
Social Studies	Sociology	12th	Introduction to Sociology	Tonja R. Conerly, Kathleen Holmes, Asha Lal Tamang	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
Math	Mathematics	K-5	i-Ready Classroom Mathematics	Curriculum Associates	Required
Math	Course 1	6th	i-Ready Classroom Mathematics	Curriculum Associates	Required
Math	Course 1-2	6th	i-Ready Classroom Mathematics	Curriculum Associates	Required
Math	Course 2	6th-7th	i-Ready Classroom Mathematics	Curriculum Associates	Required
Math	Course 2-3	7th	i-Ready Classroom Mathematics	Curriculum Associates	Required
Math	Course 3	8th	i-Ready Classroom Mathematics	Curriculum Associates	Required
Math	Advanced Calc (Honors)	9-12	Calculus (10th Edition Full)	Wiley & Sons	Required
Math	Algebra I CP	9-12	Algebra 1 Common Core	Pearson	Required
Math	Algebra II CP	9-12	Glencoe Algebra 2 (Common Core Edition)	McGraw-Hill	Required
Math	Algebra II Honors	9-12	Glencoe Algebra 2 (Common Core Edition)	McGraw-Hill	Required
Math	Precalculus CP	9-12	Precalculus (4th Edition)	Prentice Hall	Required
Math	AP Calculus AB	9-12	Calculus with Early Transcendentals (10th Edition)	Wiley & Sons	Required
Math	AP Calculus BC	9-12	2024 Sullivan and Miranda Calculus for	Wiley & Sons	Required
Math	Calculus CP	9-12	Calculus with Applications (Brief 10th Edition)	Pearson Prentice Hall	Required
Math	Geometry CP	9-12	Glencoe Geometry (Common Core Edition)	McGraw-Hill	Required
Math	Geometry Honors	9-12	Geometry	Addison Wesley	Required
Math	Probability and Statistics CP	9-12	Elementary Statistics: Picturing the World	Pearson Prentice Hall	Required
Math	Statistics AP	9-12	The Practice of Statistics (6th Edition Up	BFW Publishing	Required
Math	AP Precalculus	9-12	College Board Resources	College Board	Required
Math	AP Calculus AB	9-12	College Board Resources	College Board	Required
Math	AP Calculus BC	9-12	College Board Resources	College Board	Required
Math	AP Statistics	9-12	College Board Resources	College Board	Required
Math	All high school courses	6-12	Delta Math	Delta Math	Required
Math	Foundations of Math	9-11	iXL	iXL	Required
Math	Fundamentals of Algebra	9-11	iXL	iXL	Required
Math	Algebra 1 Lab	9-11	iXL	iXL	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
Business/Computers	Grade 6-8 Computers	6-8	Ignition: Digital Wellness and Safety	Everfi	Required
Business/Computers	Grade 6-8 Computers	6-8	Sphero	Sphero	Required
Business/Computers	Grade 6-8 Computers	6-8	Code.org	Code.org	
Business/Computers	Accounting I	9-12	Century 21 Accounting, 11th edition	Cengage	Required
Business/Computers	Accounting II	9-12	Century 21 Accounting, 11th edition	Cengage	Required
Business/Computers	Accounting II	9-12	Microsoft Excel for Accounting	Prentice Hall	Required
Business/Computers	Adobe Photshop/Illustrator	9-12	Adobe® Photoshop Creative Cloud Revealed, 2nd Edition	Cengage	Required
Business/Computers	Advanced Photoshop	9-12	Adobe® Photoshop Creative Cloud Revealed, 2nd Edition	Cengage	Required
Business/Computers	AP Business with Personal Finance	9-12	Business with Personal Finance for the AP Course (High School)	BFW Publishers	Required
Business/Computers	Business Law	9-12	Business and Personal Law	Glencoe	Required
Business/Computers	Intro to Business	9-12	Intro to Business	Cengage	Required
Business/Computers	Marketing 1	9-12	Intro to Marketing	Cengage	Required
Business/Computers	Marketing 2	9-12	MKTG, Principles of Marketing (Lamb, Hair, McDaniel)	Cengage	Required
Business/Computers	Microsoft Excel	9-12	Microsoft Excel 2021 Comprehensive	Cengage	Required
Business/Computers	Microsoft Office	9-12	CompTia	CompTia	Required
Business/Computers	Microsoft PowerPoint	9-12	Microsoft PowerPoint 2013 Comprehensive	Cengage	Required
Business/Computers	Microsoft Word	9-12	Microsoft Word 2013 Comprehensive	Cengage	Required
Business/Computers	Retail Management 1	9-12	Retail Management (Berman, Evans, Chatterjee)	Pearson	Required
Business/Computers	Retail Management 2	9-12	MGMT, Prinicples of Management (Williams)	Cengage	Required
Business/Computers	Web Design	9-12	CodeHS	CodeHS	Required
FCS	6th Grade FCS	6	Discovering Food & Nutrition	Glencoe	Teacher Choice
FCS	6th Grade FCS	6	Take Charge of Your Life	Goodheart-Wilcox	Teacher Choice
HWF	Grade 6 Health	6	Glencoe Teen Health (2014)	McGraw-Hill	Required
HWF	Grade 7 Health	7	Glencoe Teen Health (2014)	McGraw-Hill	Required
HWF	Grade 8 Health	8	Glencoe Teen Health (2014)	McGraw-Hill	Required
HWF	Grade 10 Drivers Ed	10	Drive Right: You are the Driver (10th Edition)	Addison Wesley Ed. Publis	Required
HWF	Grade 10 Drivers Ed	10	Responsible Driving	Glencoe/McGraw Hill	Required
HWF	Grade 10 Drivers Ed	10	Pennsylvania Drivers Manual	PennDOT	Required
HWF	Grade 10 Health	10	Health and Wellness	McGraw-Hill	Required
HWF	Advanced Health	10-12	First Aid/CPR/AED Participant's Manual	American Red Cross	Required
Science	6th Grade Science	6	Open Sci Ed	OpenSciEd	Required
Science	7th Grade Science	7	Open Sci Ed	OpenSciEd	Required
Science	8th Grade Science	8	Open Sci Ed	OpenSciEd	Required
Science	8th Grade Science	8	Progress Learning	Progress Learning	Required
Science	Biology	9-10	Progress Learning	Progress Learning	Required
Science	Biology	9-10	Miller and Levine Biology: On-Level Edition	Pearson	Required
Science	Anatomy	9-12	Elaine Marieb Essentials of Human Anatomy & Physiology (7th Edition)	Benjamin Cummings	Required
Science	Anatomy	9-12	HOLES -Essentials of Human Anatomy and Physiology (6th Edition)	McGraw Hill	Required
Science	Anatomy	9-12	Principles of Anatomy & Physiology (7th Edition)	Tortora & Grabowski	Required
Science	AP Biology	9-12	Campbell Biology in Focus, 3rd Edition	Pearson	Required
Science	AP Biology	9-12	College Board Resources	College Board	Required
Science	AP Chemistry	9-12	Chemistry: The Central Science w/Online (13th Edition, AP Edition)	Pearson/Prentice Hall	Required
Science	AP Chemistry	9-12	College Board Resources	College Board	Required
Science	AP Environmental Science	9-12	Environment: The Science Behind the Story w/ Online (AP Edition, 6th edition)	Pearson	Required
Science	AP Environmental Science	9-12	College Board Resources	College Board	Required
Science	AP Physics 1	9-12	Physics w/ Online (Cutnell and Johnson, 9th Edition)	John Wiley and Sons	Required
Science	AP Physics 1	9-12	College Board Resources	College Board	Required
Science	AP Physics 2	9-12	Physics w/ Online (Cutnell and Johnson, 9th Edition)	John Wiley and Sons	Required
Science	AP Physics 2	9-12	College Board Resources	College Board	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
Science	AP Physics C	9-12	Physics for scientists and engineers by Serway and Jewett 10th edition	Cengage	Required
Science	AP Physics C	9-12	College Board Resources	College Board	Required
Science	CP Chemistry	9-12	Prentice Hall Chemistry	Prentice Hall	Student Choice
Science	CP Physics 1	9-12	Holt Physics w/ Online (2012 Edition)	Holt, Rinehart and Winstor	Student Choice
Science	CP Physics 2	9-12	Holt Physics w/ Online (2012 Edition)	Holt, Rinehart and Winstor	Student Choice
Science	Environmental Sustainability	9-12	Project Lead the Way	PLTW	Required
Science	Honors Chemistry	9-12	Modern Chemistry	Holt, Rinehart and Winstor	Student Choice
Technology Education	Capstone	9-12	Project Lead the Way	PLTW	Required
Technology Education	Civil Engineering & Architecture	9-12	Project Lead the Way	PLTW	Required
Technology Education	Digital Electronics	9-12	Project Lead the Way	PLTW	Required
Technology Education	Intro to Engineering Design	9-12	Project Lead the Way	PLTW	Required
Technology Education	Principles of Engineering	9-12	Project Lead the Way	PLTW	Required

Subject	Grade Level	Intervention Title	Author(s)/Publishers	Classroom Use
Reading	K-2	Bridge the Gap	VanHekken & Bottari	Teacher Choice
Reading	K-8	Equipped for Reading Success	Kilpatrick	Teacher Choice
Reading	K-3	Fundations	Wilson Language	Teacher Choice
Reading	K	Heggerty Pre K Program	VanHekken & Bottari	Teacher Choice
Reading	6-12	Lexia Power Up	Lexia Learning	Teacher Choice
Reading	6-12	Leveled Literacy Intervention (LLI)	Fountas & Pinnell	Teacher Choice
Reading	3-8	Orton Gillingham	Wilson Language	Teacher Choice
Reading	K-5	Peer Assisted Learning (PALS)	Vanderbilt	Teacher Choice
Reading	3-5	Read Naturally	Ihnot	Teacher Choice
Reading	6-10	Rewards	Voyager Sopris	Teacher Choice
Reading	K-1	Road to the Code	Brookes Publishing	Teacher Choice
Reading	K-5	Sonday System	Imagine Learning	Teacher Choice
Reading	K-3	Start Up, Build Up, Spiral Up	Benchmark Education	Teacher Choice
Reading	2-5	Voyager Passport	Voyager Sopris	Teacher Choice
Math	K-5	Bridges	Math Learning Center	Teacher Choice
Math	K-8	i-Ready Classroom Mathematics	Curriculum Associates	Teacher Choice
Math	2-8	Foundations	Moving With Math	Teacher Choice
Math	K-5	Kickstart Number Sense	Zaner Bloser	Teacher Choice
Math	9-12	IXL	iXL	Teacher Choice

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
Executive Functioning	Study Skills Emotional Support/ Executive Skills Development Learning Support	9-12+	Cerebrate	Candance Heiken	Teacher Choice
Executive Functioning		6-8	Cerebrate	Candance Heiken	Teacher Choice
Executive Functioning		4 & 5	Cerebrate	Candance Heiken	Teacher Choice
Written Language	English Lab	11 & 12	Step Up to Writing	Maureen Aumam	Teacher Choice
Replacment Math	Learning Support	9-12+	Math By Topic	Caryl Kelly Pierson	Teacher Choice
Replacment Math	Learning Support	6-8	Math By Topic	Caryl Kelly Pierson	Teacher Choice
Replacement ELA, Math, Science, Social Studies	Life Skills Support	9-12+	Unique	n2y	Teacher Choice
Replacment Math	Life Skills Support	6-8	Moving with Math Connections & Connecting Concepts	Siegfried Englemann	Teacher Choice
Replacement ELA	Autistic Support	9-12+	Readtopia	Don Johnston	Teacher Choice
Replacement ELA	Autistic Support & Life Skills Support	6-8	Readtopia	Don Johnston	Teacher Choice
Replacement Science & Social Studies	Life Skills Support	6-8	Explore World History/Explore Life Sciences/Unique	Attainment company/n2Y	Teacher Choice
Written Language	Learning Support	6-8	Step Up to Writing	Maureen Aumam	Teacher Choice
Replacement Math	Autistic Support	K-5	Moving with Math Connections & Connecting Concepts	Siegfried Englemann	Teacher Choice
Replacement Math	Life Skills Support	K-5	Moving with Math Connections	Math Teachers Press, Inc.	Teacher Choice
Replacment ELA	Life Skills Support, Autistic Support, Learning Support	K-5	Readtopia	Don Johnston	Teacher Choice
ES English	ES English D ZEND	9-12	The Hate U Give	Angie Thomas	Required
ES English	ES English D ZEND	9-12	Monster	Walter Dean Myers	Required
ES English	ES English D ZEND	9-12	Infinite In Between	Carol Mackler	Required
ES English	ES English D ZEND	9-12	Illusive	Emily Lloyd Jones	Required

Educational Conferences

Expensed through the general fund unless otherwise noted.

Conference Title & Sponsor:	2026 PASA-PSBA School Leadership Conference / PASA-PSBA
Location:	Kalahari Resorts & Conventions
Date(s):	October 18-20, 2026
Attending:	Dr. Kristen Campbell
Position/Building:	Superintendent
Cost:	$640.20

Conference Title & Sponsor:	2026 PASA-PSBA School Leadership Conference / PASA-PSBA
Location:	Kalahari Resorts & Conventions
Date(s):	October 18-20, 2026
Attending:	Shonta Ford
Position/Building:	School Board President
Cost:	$1,257.90

Conference Title & Sponsor:	Librarian Networking Day / CLIU 21
Location:	CLIU 21
Date(s):	October 19, 2026
Attending:	Molly Magro
Position/Building:	Librarian / EHS
Cost:	$0

Conference Title & Sponsor:	Teacher Education Assembly / PA Association of Colleges & Teacher Educators (PAC-TE)
Location:	Harrisburg, PA
Date(s):	October 21 - 23, 2026
Attending:	Tiffany Shimmel
Position/Building:	Instructional Coach / Eyer MS
Cost:	$0

Conference Title & Sponsor:	PAGE 2026: Connecting in the Commonwealth / PA Association for Gifted Students
Location:	Harrisburg, PA
Date(s):	October 26-27, 2026
Attending:	Jody Freed
Position/Building:	Director of Special Eduction
Cost:	$489.70

Conference Title & Sponsor:	PREPaRE WS2: Mental Health Crisis Intervention / PaTTAN
Location:	PaTTAN - Webinar
Date(s):	October 26-27, 2026
Attending:	Andrea Lerch
Position/Building:	School Psychologist / Wescosville ES
Cost:	$0

Conference Title & Sponsor:	Journalism Advisor Networking / CLIU 21
Location:	CLIU 21
Date(s):	October 29, 2026
Attending:	Shelby Ramirez
Position/Building:	Journalism teacher / EHS
Cost:	$0

Conference Title & Sponsor:	Journalism Advisor Networking / CLIU 21
Location:	CLIU 21
Date(s):	October 29, 2026
Attending:	Matt Shaw
Position/Building:	Journalism teacher / EHS
Cost:	$0

Conference Title & Sponsor:	Drug Impairment Training for Education Purposes / PA DUI and Berks County IU
Location:	Penn State Berks Campus
Date(s):	October 29-30, 2026
Attending:	Megan Freeman
Position/Building:	STEP Room Teacher / LMMS
Cost:	$86.16

Conference Title & Sponsor:	Drug Impairment Training for Education Purposes / PA DUI and Berks County IU
Location:	Penn State Berks Campus
Date(s):	October 29-30, 2026
Attending:	Kepleen Suida
Position/Building:	Student Supports Coordinator / LMMS
Cost:	$86.16

Conference Title & Sponsor:	Drug Impairment Training for Education Purposes / PA DUI and Berks County IU
Location:	Penn State Berks Campus
Date(s):	October 29-30, 2026
Attending:	Scott Shotwell
Position/Building:	Student Advisor / LMMS
Cost:	86.16

Conference Title & Sponsor:	Drug Impairment Training for Education Purposes / PA DUI and Berks County IU
Location:	Penn State Berks Campus
Date(s):	October 29-30, 2026
Attending:	Sallie Yencho
Position/Building:	Principal / LMMS
Cost:	86.16

Conference Title & Sponsor:	Instructional Coaching Networking / CLIU 20/21
Location:	CLIU 20 & CLIU 21
Date(s):	November 4, 2026 (IU 20) & March 3, 2027 (IU 21)
Attending:	Dennine Leschinsky
Position/Building:	Instructional Specialist Teacher
Cost:	$0

Conference Title & Sponsor:	College Board SSD Advisory Board / College Board
Location:	New York City
Date(s):	November 8-9, 2026
Attending:	Paul Wood
Position/Building:	School Counselor / EHS
Cost:	$0

Conference Title & Sponsor:	Elementary Math Teaching Strategies / CLIU 21
Location:	CLIU21
Date(s):	November 16, 2026 & April 8, 2027
Attending:	Krista Glick
Position/Building:	2nd Grade Teacher / Shoemaker ES
Cost:	$0

Conference Title & Sponsor:	Elementary Math Teaching Strategies / CLIU 21
Location:	CLIU21
Date(s):	November 16, 2026 & April 8, 2027
Attending:	Anjanette Hoffman
Position/Building:	4th Grade Teacher / Shoemaker ES
Cost:	$0

PERSONNEL AGENDA ITEMS EXHIBIT

RESOLVED, That the Board of School Directors of East Penn SD approve the following personnel items, as recommended by the Superintendent:

I. Resignation(s)

Name	Position	Building	Effective Date
Jaime DiPietro	Instructional Assistant	Shoemaker ES	10/16/2026
Mamta Malik	Instructional Assistant	LMMS	9/29/2026
Laura Orach	Food Service Leader	Eyer MS	10/14/2026
Jolicia Patricia Alexis Snyder	Food Service Support Staff	Eyer MS	10/12/2026

II. Retirement(s) - *Updated

Name	Position	Building	Effective Date
Wendy Crossley	Registration & Assessment Specialist	Administration	~~11/2/2026~~ 11/3/2026*

III. General Leave of Absence(s) Per Board Policy 339 – Uncompensated Leave - *Updated

Name	Position	Building	Effective Date
Michael Schwab	Staff Assistant	EHS	9/18/2026 PM – ~~9/30/2026~~ 10/14/2026*

IV. Full-Time Substitute Appointment(s)

Name: Emily Ervin
Education Level: B.S. Degree
Undergraduate School: Misericordia University
Assignment: Grade 6 Science Teacher – Eyer MS (Leave of M. Mauro)
Certification: Emergency Permit: Elementary K - 6
Experience: Substitute Teacher; Parkland SD; 5/2026– current
Salary: $66,500 Year 1; B
Effective: January 2027 – June 2027 *(pending the receipt & approval of all necessary documentation)*

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Name: Leah Richardson
Education Level: B.A. Degree
Undergraduate School: Geneva College
Assignment: Math Teacher – Lower Macungie MS (Leave of N. Plantier)
Certification: Emergency Permit: Math 7-9
Experience: Substitute Teacher; East Penn SD; 8/2026– current
Salary: $66,500 Year 1; B
Effective: December 2026 – June 2027

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Name:	Katie Tran
Education Level:	B.A. Degree; M. Ed. Degree
Undergraduate School:	Pennsylvania State University
Graduate School:	Kutztown University
Assignment:	Elementary Teacher – Shoemaker Elementary (Leave of J. Mueller)
Certification:	Grades PK - 4
Experience:	Substitute Teacher; East Penn SD; 10/2025– current Elementary Teacher; Moravian Academy 3/2018 – 1/2025
Salary:	$66,500 Year 1; B
Effective:	December 2026 – June 2027

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V. Student Supports Coordinator

Name	Building	Salary	Effective Date
Yolainy Valera	Eyer MS	$64,188 (New Position)	TBD *(pending the receipt & approval of all necessary documentation)*

VI. Support Staff Appointment(s) - *Updated

Name	Position	Salary/Hours	Effective Date
Kimberly Taskalos	Administrative Assistant EHS	$21.93/hr 35 hrs/wk (Resignation L. Lucchesi-Wood)	~~9/29/2026~~ 10/28/2026*

VII. Support Staff Appointment(s)

Name	Position	Salary/Hours	Effective Date
Gozde Kocak	Academic Support Assistant LMMS	$25.13/hr 29 hrs/wk (Resignation of M. Nemeth)	*TBD (pending the receipt & approval of all necessary documentation)*
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Wendell Greer	Staff Assistant EHS	$20.37/hr 29 hrs/wk (Resignation of J. McAfee)	*TBD (pending the receipt & approval of all necessary documentation)*
Kathleen Keenan	Staff Assistant Lincoln ES	$20.37/hr 22.5 hrs/wk (Transfer of J. Jacobs)	10/13/2026

VIII. Custodial Transfer of Assignment(s)

Name	From	To	Effective Date
Matthew Rumfield	Night Foreman – 2nd Shift LMMS $35.01/hr 40 hrs/wk	Maintenance B Eyer MS $36.26/hr 40 hrs/wk (Transfer of M. Brown)	10/12/2026

IX. Food Service Support Staff Transfer of Assignment(s)

Name	From	To	Effective Date
Diana Lujan	Food Service Support Staff LMMS 23.75 hrs/wk	Food Service Support Staff Macungie ES 18.75 hrs/wk (Rescind of A. Sousa)	10/13/2026

X. Support Staff Transfer of Assignment(s)

Name	From	To	Effective Date
Jenna Edwards	Staff Assistant EHS 27 hrs/wk	Staff Assistant EHS 29 hrs/wk (Transfer of 2 hrs/wk from vacant SA 8 hrs/wk position held by A. Mariner)	10/13/2026

XI. 2026-2027 Schedule B Co-Curricular Appointments (Exhibit "A")

XII. Additions to the STA of Pennsylvania, Inc. Transportation Personnel List – 2026-2027 School Year

Name	Role
Ronald Leibowitz	Driver

XIII. Additions to the 2026 - 2027 Per Diem Substitute

Stephanie Albanese	Instructional Assistant & Staff Assistant
Ireland Elia	Grades PK - 4
Andreo Ferraina	Social Studies 7-12 *(pending the receipt & approval of all necessary documentation)*
Trisha Jones	Instructional Assistant & Staff Assistant
Jennifer Kloss	Staff Assistant
Christine Kruk	Elementary K-6; Math 7-9
Mamta Malik	Administrative Assistant & Academic Support Assistant
Gwen Mitchell	Instructional Assistant & Staff Assistant
Jessica O'Connor	Instructional Assistant & Academic Support Assistant
Vasiliki Panagopoulos	Per Diem Teacher Substitute *(pending the receipt & approval of all necessary documentation)*
Paige Peterson	Guest Teacher - EPSD
Sybil Quinn	Food Service Support Staff *(pending the receipt & approval of all necessary documentation)*
Raydiris Rodriguez-Hernandez	Instructional Assistant & Staff Assistant
Jolicia Patricia Alexis Snyder	Food Service Support Staff

XIV. Additions to 2026-2027 New Teacher Induction Mentors

Sara Fritz	Carol Hausman
Mary Sollenberger	Alexis Williams

XV. Board Approved Personnel – Update to Pending Documentation Start Date

Name	Position	Building	Board Approved	Start Date
Jonathan Feher	Guest Teacher	n/a	9/28/2026	9/29/2026
Deanna Jackson	Building Substitute - Per Diem	Alburtis ES	9/28/2026	10/13/2026
Nicole Kline	Staff Assistant	EHS	8/24/2026	9/17/2026
Jennifer Morales	Spanish Teacher	EHS	9/14/2026	9/28/2026
Sarah Zinni	Instructional Assistant	Shoemaker ES	9/28/2026	10/7/2026

2026-2027 Schedule B
Co-Curricular Appointments

School	Name	Position	Contract/Volunteer	Amount	Notes
Shoemaker	Shreck, Jeffrey	Art Club Advisor	Club D	$2,041.00	
EHS	Giering, Richard	Athletic Event Worker	Contract	$59/game	Non-Employee
EHS	Gitski, Linda	Best Mates Club Co-Advisor	Volunteer	$0.00	
Eyer	Jones, Addison	Chaperone	Contract	$82/event	
EHS	Grice, Kara	Class Advisor (.75 base if two positions)	Contract	$764.25	Class of 2029 - Shared with R. Milliron; ($1019 x .75)
EHS	Milliron, Rachel	Class Advisor (.75 base if two positions)	Contract	$764.25	Class of 2029 - Shared with K. Grice; ($1019 x .75)
EHS	Kinzel, Sarah	Class Advisor (.75 base if two positions)	Contract	$764.25	Class of 2030 - Shared with M. Montero; ($1019 x .75)
EHS	Montero, Melissa	Class Advisor (.75 base if two positions)	Contract	$764.25	Class of 2030 - Shared with M. Montero; ($1019 x .75)
Shoemaker	Sicher, Kimberly	Dance Team	Club A	$425.00	
EHS	Espenshade, Jayne	Debate Team Club Advisor	Club C	$807.50	Shared with S. Raineri ($1615 x.5)
EHS	Raineri, Sam	Debate Team Club Advisor	Club C	$807.50	Shared with J. Espenshade ($1615 x.5)
LMMS	Williams, Denine	Dungeons & Dragons Club Advisor	Club B	$851.00	
Eyer	Krempasky, Matt	Event Technical Director	Contract	$340.00	Winter Band Concert
Eyer	Krempasky, Matt	Event Technical Director	Contract	$340.00	Spring Band Concert
Eyer	Krempasky, Matt	Event Technical Director	Contract	$340.00	Winter Choral concert
Eyer	Krempasky, Matt	Event Technical Director	Contract	$340.00	Spring Choral Concert
Eyer	Krempasky, Matt	Event Technical Director	Contract	$340.00	Spring Orchestra Concert
LMMS	Murray, Kathryn	Extended Learning Program	Contract	$48/session	Max 8 Sessions Per Month for 7 Months
LMMS	Scisly, Tanya	Extended Learning Program	Contract	$48/Session	Max 8 Sessions Per Month for 7 Months
EHS	Kinzel, Sarah	Future Business Leaders of America Club Advisor	Club D	$2,041.00	Replacing G. Laird
Shoemaker	Czubek, Natalia	Girls on the Run Club Advisor	Club A	$141.66	Shared with T. Smith/K. Petcavage ($425/3)
Shoemaker	Petcavage, Kate	Girls on the Run Club Advisor	Club A	$141.66	Shared with T. Smith/N.Czubek ($425/3)
Lincoln	Pethick, Holly	Girls on the Run Club Advisor	Club A	$425.00	
Shoemaker	Smith, Teri	Girls on the Run Club Advisor	Club A	$141.66	Shared with K. Petcavage/N.Czubek ($425/3)
EHS	Brito Aponte, Melissa	Key Club Advisor	Club A	$425.00	Reclassified to Club A (Club D for 2025-2026)
EHS	Newcomer, Melissa	Latin Club Advisor	Club B	$851.00	Reclassified to Club B (Club C for 2025-2026)
Lincoln	Ritter, Alma	Musical Club Advisor	Club C	$1,615.00	
Elementary	Lori Cooke	Musical Productions - Elementary	Contract	$621.00	SPRING - Instrumental Concert
Elementary	Sarro, Jennifer	Musical Productions - Elementary	Contract	$621.00	SPRING - Instrumental Concert
Elementary	Williams, Ryan	Musical Productions - Elementary	Contract	$621.00	SPRING - Instrumental Concert
EHS	Brown, David	Muslim Student Association Club Advisor	Volunteer	$0.00	
Eyer	Scherer, Jon	Outdoor Club	Club C	$1,615.00	New Club for 2026-2027
EHS	Augustin, Rebecca	Peers Assisting Learning Support (PALS) Club Advisor	Club D	$1,020.50	Shared with L. Schael - ($2041 X.5)
EHS	Schael, Lisa	Peers Assisting Learning Support (PALS) Club Advisor	Club D	$1,020.50	Shared with R. Augustin - ($2041 X.5)
EHS	Adams, Kimberly	Pennsylvania Math League Club Co-Advisor	Club C	$807.50	Shared with S. Kinzel ($1615 x .5)
EHS	Kinzel, Sarah	Pennsylvania Math League Club Co-Advisor	Club C	$807.50	Shared with K. Adams ($1615 x .5)
EHS	Carducci, Andrew	Pickleball Club Co-Advisor	Volunteer	$0.00	Non-Employee
EHS	Hogan, Alon	Pickleball Club Co-Advisor	Volunteer	$0.00	
EHS	McKinney, Dian	Pickleball Club Co-Advisor	Volunteer	$0.00	
Jefferson	Dooley, Paula	Reading Olympics Club Advisor	Club A	$212.50	Reclassified to Club A (Club B for 2025-2026); Shared with D. LeBourgeois ($425 x .5)
Jefferson	LeBourgeois, David	Reading Olympics Club Advisor	Club A	$212.50	Reclassified to Club A (Club B for 2025-2026); Shared with P. Dooley ($425 x .5)

2026-2027 Schedule B
Co-Curricular Appointments

Lincoln	LeBourgeois, David	Reading Olympics Club Advisor	Club A	$212.50	Reclassified to Club A (Club B for 2025-2026); Shared with J. Jacobs ($425 x .5)
Lincoln	Jacobs, Jessica	Reading Olympus Club Advisor	Club A	$212.50	Reclassified to Club A (Club B for 2025-2026); Shared with D. LeBourgeois ($425 x .5)
Eyer	Gillen, Nicole	Soccer Intramural	Contract	$42/session	New for 2026-2027
EHS	Giering, Richard	Softball Head Coach	Contract	$7,140.00	Non-Employee
Eyer	Agnoli, Victoria	Softball Head Coach	Contract	$4,283.00	Replacing E. Bednar
Eyer	Bednar, Eric	Softball Volunteer Assistant	Volunteer	$0.00	
EHS	Gitski, Linda	Unified Track Club	Volunteer	$0.00	
LMMS	Holveck, Amanda	What's So Cool About Manufacturing	Club C	$825.50	Shared with J. Solt ($1615 x.5)
LMMS	Solt, Justin	What's So Cool About Manufacturing	Club C	$825.50	Shared with A. Holveck ($1615 x.5)
EHS	Gallagher, Robert	Winter Track Club Volunteer Co-Advisor	Volunteer	$0.00	Non-Employee
EHS	Hochleitner, Wolfgang	Winter Track Club Volunteer Co-Advisor	Volunteer	$0.00	Non-Employee
EHS	Karwacki, Jeff	Winter Track Club Volunteer Co-Advisor	Volunteer	$0.00	Non-Employee
EHS	Lynch, Katherine	Winter Track Club Volunteer Co-Advisor	Volunteer	$0.00	Non-Employee
EHS	Manley, Marc	Winter Track Club Volunteer Co-Advisor	Volunteer	$0.00	Non-Employee
EHS	McNelllis, Ashleigh	Winter Track Club Volunteer Co-Advisor	Volunteer	$0.00	Non-Employee
EHS	Pezoldt, Kaitlyn	Winter Track Club Volunteer Co-Advisor	Volunteer	$0.00	Non-Employee
EHS	Reinhard, Kami	Winter Track Club Volunteer Co-Advisor	Volunteer	$0.00	Non-Employee
EHS	Roper, Breyanna	Winter Track Club Volunteer Co-Advisor	Volunteer	$0.00	Non-Employee
EHS	Susens, Kristin	Winter Track Club Volunteer Co-Advisor	Volunteer	$0.00	
EHS	Woodbury, Page	Winter Track Club Volunteer Co-Advisor	Volunteer	$0.00	Non-Employee

FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: PSGM - PSDLAF - GENERAL FUND MAX **Payment Dates:** 08/01/2026 - 08/31/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards
Sort: **Vendor Code**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* 0000AMAAUG	08/25/2026	AMAZON	SUPPLIES	SPECIAL SUPPLIES	215.56
* AMAAUG0260	08/25/2026	AMAZON	GENERAL SUPPLIES		171.02
* AMAAUG0354	08/25/2026	AMAZON	OP BLDG-SUPPLIES		(151.20)
* AMAAUG0417	08/25/2026	AMAZON	REG PROG-SUPPLIES		(9.99)
* AMAAUG0505	08/25/2026	AMAZON	REG PROG-SUPPLIES		8.39
* AMAAUG0712	08/25/2026	AMAZON	GENERAL SUPPLIES		335.50
* AMAAUG0720	08/25/2026	AMAZON	PCCD Grant Purchase - Eyer		(186.98)
* AMAAUG0758	08/25/2026	AMAZON	SUPPLIES		6.59
* AMAAUG0762	08/25/2026	AMAZON	SUPPLIES		6.59
* AMAAUG0765	08/25/2026	AMAZON	SUPPLIES		22.56
* AMAAUG0822	08/25/2026	AMAZON	SUPPLIES		194.75
* AMAAUG0829	08/25/2026	AMAZON	SUPPLIES		25.33
* AMAAUG0837	08/25/2026	AMAZON	SUPPLIES		1,327.93
* AMAAUG0860	08/25/2026	AMAZON	SUPPLIES (6TH GRADE/SUPREME)		19.36
* AMAAUG0868	08/25/2026	AMAZON	SUPPLIES (6TH GR/TEAM XTREME/MONFREDI)		45.16
* AMAAUG0870	08/25/2026	AMAZON	SUPPLIES (6TH GR/TEAM XTREME)		33.48
* AMAAUG0871	08/25/2026	AMAZON	SUPPLIES (6TH GR/TEAM XTREME)		19.36

* - Non-Negotiable Disbursement + - Procurement Card Non-Negotiable # - Payable within Payment P - Prenote D - Direct Deposit C - Credit Card ^ - Virtual Payment

FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: PSGM - PSDLAF - GENERAL FUND MAX **Payment Dates:** 08/01/2026 - 08/31/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards
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Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* AMAAUG0880	08/25/2026	AMAZON	Supplies		18.86
* AMAAUG0883	08/25/2026	AMAZON	Supplies		613.01
* AMAAUG0910	08/25/2026	AMAZON	SPECIAL SUPPLIES		84.01
* AMAAUG0948	08/25/2026	AMAZON	Supplies		30.99
* AMAAUG0955	08/25/2026	AMAZON	SUPPLIES (7TH GR/ELECTRIC ZEBRAS)		165.32
* AMAAUG0957	08/25/2026	AMAZON	BOOKS (7TH GRADE/ELECTRIC ZEBRAS)	SUPPLIES (7TH GR/ELECTRIC ZEBRAS)	567.68
* AMAAUG0958	08/25/2026	AMAZON	SUPPLIES (7TH GRADE/ELECTRIC ZEBRAS)		29.62
* AMAAUG0961	08/25/2026	AMAZON	SUPPLIES (7TH GR/VIKINGS)		658.61
* AMAAUG0962	08/25/2026	AMAZON	SUPPLIES (8TH GR/ALL STARS/CLARE HARVEY)	SUPPLIES (8TH GR/ALL STARS)	474.17
* AMAAUG0964	08/25/2026	AMAZON	SUPPLIES (8TH GRADE/ALL STARS)		99.99
* AMAAUG0980	08/25/2026	AMAZON	ADAPTERS		101.76
* AMAAUG0990	08/25/2026	AMAZON	GENERAL SUPPLIES		331.27
* AMAAUG0992	08/25/2026	AMAZON	CLASSROOM SUPPLIES		263.22
* AMAAUG0993	08/25/2026	AMAZON	CLASSROOM SUPPLIES		147.96
* AMAAUG0994	08/25/2026	AMAZON	CLASSROOM SUPPLIES		199.58
* AMAAUG0995	08/25/2026	AMAZON	CLASSROOM SUPPLIES		201.01
* AMAAUG0999	08/25/2026	AMAZON	SUPPLIES (7TH GR/EXCALIBUR/KIMBERLY BROWN)		768.25

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FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: PSGM - PSDLAF - GENERAL FUND MAX **Payment Dates:** 08/01/2026 - 08/31/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards
Sort: **Vendor Code**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* AMAAUG1000	08/25/2026	AMAZON	SUPPLIES (8TH GRADE/COASTAL CREW/SCIENCE)		667.56
* AMAAUG1001	08/25/2026	AMAZON	SUPPIES (8TH GRADE/COASTAL CREW)		85.71
* AMAAUG1002	08/25/2026	AMAZON	SUPPLIES (8TH GR/COASTAL CREW)		254.57
* AMAAUG1003	08/25/2026	AMAZON	SUPPIES (8TH GRADE/COASTAL CREW)		157.94
* AMAAUG1004	08/25/2026	AMAZON	SUPPIES (8TH GRADE/COASTAL CREW)		224.80
* AMAAUG1005	08/25/2026	AMAZON	SUPPIES (8TH GRADE/COASTAL CREW)		163.29
* AMAAUG1006	08/25/2026	AMAZON	SUPPLIES (8TH GRADE/DREAM/SCIENCE)		306.27
* AMAAUG1007	08/25/2026	AMAZON	SUPPLIES (8TH GRADE/DREAM)		499.48
* AMAAUG1008	08/25/2026	AMAZON	SUPPLIES (8TH GRADE/DREAM)		325.59
* AMAAUG1009	08/25/2026	AMAZON	SUPPLIES (8TH GRADE/DREAM)		296.12
* AMAAUG1010	08/25/2026	AMAZON	SUPPLIES (8TH GRADE/DREAM)		196.02
* AMAAUG1012	08/25/2026	AMAZON	SUPPLIES (INTERVENTIONISTS)		62.50
* AMAAUG1013	08/25/2026	AMAZON	SUPPLIES (INTERVENTIONISTS)		142.03
* AMAAUG1014	08/25/2026	AMAZON	SUPPLIES (INTERVENTIONISTS)		241.99
* AMAAUG1015	08/25/2026	AMAZON	SUPPLIES (INTERVENTIONISTS)		55.16
* AMAAUG1016	08/25/2026	AMAZON	SUPPLIES (INTERVENTIONISTS)		44.32
* AMAAUG1017	08/25/2026	AMAZON	SUPPLIES (INTERVENTIONISTS)		188.82

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FUND ACCOUNTING PAYMENT SUMMARY

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Sort: **Vendor Code**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* AMAAUG1018	08/25/2026	AMAZON	SUPPLIES (INTERVENTIONISTS)		114.97
* AMAAUG1019	08/25/2026	AMAZON	SUPPLIES (INTERVENTIONISTS)		112.81
* AMAAUG1020	08/25/2026	AMAZON	SUPPLIES (INTERVENTIONISTS)		260.79
* AMAAUG1021	08/25/2026	AMAZON	SUPPLIES (INTERVENTIONISTS)		322.52
* AMAAUG1022	08/25/2026	AMAZON	SUPPLIES (INTERVENTIONISTS)		260.90
* AMAAUG1024	08/25/2026	AMAZON	SUPPLIES (FCS)		411.53
* AMAAUG1025	08/25/2026	AMAZON	SUPPLIES (FCS)		721.33
* AMAAUG1027	08/25/2026	AMAZON	CLASSROOM SUPPLIES		21.95
* AMAAUG1030	08/25/2026	AMAZON	Special Education Supplies		1,889.86
* AMAAUG1031	08/25/2026	AMAZON	STUDENT SUPPLIES	VESPA ROOM FOOD/DRINKS	256.82
* AMAAUG1032	08/25/2026	AMAZON	AMBASSADOR SUPPLIES		52.97
* AMAAUG1035	08/25/2026	AMAZON	lacrosse girls		164.00
* AMAAUG1037	08/25/2026	AMAZON	OFFICE SUPPLLIES		70.56
* AMAAUG1039	08/25/2026	AMAZON	SUPPLIES		42.72
* AMAAUG1042	08/25/2026	AMAZON	PD SUPPLIES		149.07
* AMAAUG1043	08/25/2026	AMAZON	SUPPLIES		788.02
* AMAAUG1045	08/25/2026	AMAZON	INTERFUND ACCT RECEIVABLE		336.85

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FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: PSGM - PSDLAF - GENERAL FUND MAX **Payment Dates:** 08/01/2026 - 08/31/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards
Sort: **Vendor Code**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* AMAAUG1046	08/25/2026	AMAZON	GENERAL SUPPLIES		62.57
* AMAAUG1047	08/25/2026	AMAZON	GENERAL SUPPLIES		759.80
* AMAAUG1048	08/25/2026	AMAZON	GUIDANCE PAINT SUPPLIES		40.56
* AMAAUG1049	08/25/2026	AMAZON	GUIDANCE PAINT SUPPLIES		6.99
* AMAAUG1051	08/25/2026	AMAZON	SUPPLIES		115.97
* AMAAUG1054	08/25/2026	AMAZON	CLASSROOM SUPPLIES		197.00
* AMAAUG1055	08/25/2026	AMAZON	OFFICE SUPPLIES		16.06
* AMAAUG1065	08/25/2026	AMAZON	SUPPLIES		38.97
* AMAAUG1068	08/25/2026	AMAZON	SUPPLIES		796.64
* AMAAUG1069	08/25/2026	AMAZON	PLTW SUPPLIES		313.47
* AMAAUG1070	08/25/2026	AMAZON	SUPPLIES		113.40
* AMAAUG1078	08/25/2026	AMAZON	SUPPLIES		655.94
* AMAAUG1081	08/25/2026	AMAZON	Supplies - 2 Rolls Masking Tape		14.24
* AMAAUG1084	08/25/2026	AMAZON	BOOK STAMPS		19.84
* AMAAUG1085	08/25/2026	AMAZON	CLASSROOM SUPPLIES		188.01
* AMAAUG1087	08/25/2026	AMAZON	CLASSROOM SUPPLIES		172.73
* AMAAUG1088	08/25/2026	AMAZON	CLASSROOM SUPPLIES		68.32

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FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: PSGM - PSDLAF - GENERAL FUND MAX **Payment Dates:** 08/01/2026 - 08/31/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards
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Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* AMAAUG1089	08/25/2026	AMAZON	CLASSROOM SUPPLIES		30.99
* AMAAUG1092	08/25/2026	AMAZON	GENERAL SUPPLIES		36.36
* AMAAUG1096	08/25/2026	AMAZON	SUPPLIES (ELS-MACKEY)		505.52
* AMAAUG1103	08/25/2026	AMAZON	PLTW SUPPLIES		84.95
* AMAAUG1104	08/25/2026	AMAZON	SUPPLIES		1,355.33
* AMAAUG1106	08/25/2026	AMAZON	BUILDING SUPPLIES		62.76
* AMAAUG1107	08/25/2026	AMAZON	CLASSROOM SUPPLIES		60.96
* AMAAUG1109	08/25/2026	AMAZON	CABLE		17.99
* AMAAUG1110	08/25/2026	AMAZON	LAPTOP PART		49.68
* AMAAUG1111	08/25/2026	AMAZON	CABLES		144.06
* AMAAUG1117	08/25/2026	AMAZON	SUPPLIES		116.89
* AMAAUG1128	08/25/2026	AMAZON	Special Education Supplies		49.98
* AMAAUG1132	08/25/2026	AMAZON	OFFICE SUPPLIES		252.87
* AMAAUG1135	08/25/2026	AMAZON	BOOKS/PERIODICALS		244.27
* AMAAUG1138	08/25/2026	AMAZON	SUPPLIES		24.99
* AMAAUG1140	08/25/2026	AMAZON	Supplies		499.14
* AMAAUG1141	08/25/2026	AMAZON	SUPPLIES		182.56

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FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: PSGM - PSDLAF - GENERAL FUND MAX **Payment Dates:** 08/01/2026 - 08/31/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards
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Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* AMAAUG1143	08/25/2026	AMAZON	SUPPLIES		104.90
* AMAAUG1145	08/25/2026	AMAZON	SPECIAL SUPPLIES		131.49
* AMAAUG1146	08/25/2026	AMAZON	CLASSROOM SUPPLIES		19.98
* AMAAUG1148	08/25/2026	AMAZON	SUPPLIES		194.80
* AMAAUG1150	08/25/2026	AMAZON	SUPPLIES		413.77
* AMAAUG1153	08/25/2026	AMAZON	SUPPLIES (ELS/KAELEE MACKEY/610)		58.20
* AMAAUG1155	08/25/2026	AMAZON	SUPPLIES		1,010.24
* AMAAUG1156	08/25/2026	AMAZON	SUPPLIES		566.76
* AMAAUG1167	08/25/2026	AMAZON	OFFICE SUPPLIES		357.89
* AMAAUG1168	08/25/2026	AMAZON	SUPPLIES (FCS)		397.01
* AMAAUG1170	08/25/2026	AMAZON	Special Education Supplies		226.03
* AMAAUG1172	08/25/2026	AMAZON	Special Education Supplies		113.65
* AMAAUG1176	08/25/2026	AMAZON	Special Education Supplies		41.47
* AMAAUG1177	08/25/2026	AMAZON	Special Education Supplies		77.56
* AMAAUG1187	08/25/2026	AMAZON	SUPPLIES		159.84
* AMAAUG1189	08/25/2026	AMAZON	Supplies		38.96
* AMAAUG1193	08/25/2026	AMAZON	CLASSROOM SUPPLIES		25.94

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FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: PSGM - PSDLAF - GENERAL FUND MAX **Payment Dates:** 08/01/2026 - 08/31/2026

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Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* AMAAUG1195	08/25/2026	AMAZON	FAX LINE FOR COPIER		8.99
* AMAAUG1199	08/25/2026	AMAZON	SCHOOL SUPPLIES		75.00
* AMAAUG1200	08/25/2026	AMAZON	Supplies		45.57
* AMAAUG1210	08/25/2026	AMAZON	SUPPLIES		43.99
* AMAAUG1216	08/25/2026	AMAZON	SUPPLIES		28.34
* AMAAUG1219	08/25/2026	AMAZON	SUPPLIES		107.94
* AMAAUG1220	08/25/2026	AMAZON	SUPPLIES		35.98
* AMAAUG1221	08/25/2026	AMAZON	MATH MAKE AND TAKE SUPPLIES		47.73
* AMAAUG1224	08/25/2026	AMAZON	SUPPLIES		348.53
* AMAAUG1227	08/25/2026	AMAZON	SUPPLIES		465.06
* AMAAUG1229	08/25/2026	AMAZON	SUPPLIES		224.10
* AMAAUG1230	08/25/2026	AMAZON	SUPPLIES		395.02
* AMAAUG1231	08/25/2026	AMAZON	SUPPLIES		35.98
* AMAAUG1233	08/25/2026	AMAZON	OFFICE SUPPLIES		14.99
* AMAAUG1234	08/25/2026	AMAZON	SUPPLIES (6TH GRADE/XTREME)		35.99
* AMAAUG1235	08/25/2026	AMAZON	SUPPLIES		369.99
* AMAAUG1236	08/25/2026	AMAZON	SUPPLIES (6TH GRADE/INCREDIBLE/SCIENCE)		28.41

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FUND ACCOUNTING PAYMENT SUMMARY

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Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards
Sort: **Vendor Code**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* AMAAUG1237	08/25/2026	AMAZON	PD SUPPLIES - COURTNEY RIDLEY		283.46
* AMAAUG1238	08/25/2026	AMAZON	SUPPLIES (7TH GRADE/EXCALIBUR)		40.61
* AMAAUG1239	08/25/2026	AMAZON	SUPPLIES (INTERVENTIONIST)		14.24
* AMAAUG1240	08/25/2026	AMAZON	CLASSROOM SUPPLIES		57.62
* AMAAUG1250	08/25/2026	AMAZON	CLASSROOM SUPPLIES		89.79
* AMAAUG1251	08/25/2026	AMAZON	FURNITURE		707.97
* AMAAUG1252	08/25/2026	AMAZON	SUPPLIES		21.99
* AMAAUG1255	08/25/2026	AMAZON	CLASSROOM SUPPLIES		36.58
* AMAAUG1257	08/25/2026	AMAZON	CLASSROOM SUPPLIES		201.07
* AMAAUG1258	08/25/2026	AMAZON	CLASSROOM SUPPLIES		67.79
* AMAAUG1259	08/25/2026	AMAZON	GENERAL SUPPLIES		695.08
* AMAAUG1260	08/25/2026	AMAZON	CLASSROOM SUPPLIES		7.49
* AMAAUG1261	08/25/2026	AMAZON	GENERAL SUPPLIES		11.99
* AMAAUG1262	08/25/2026	AMAZON	CLASSROOM SUPPLIES		121.38
* AMAAUG1263	08/25/2026	AMAZON	GENERAL SUPPLIES		106.30
* AMAAUG1264	08/25/2026	AMAZON	CLASSROOM SUPPLIES		191.11
* AMAAUG1265	08/25/2026	AMAZON	GENERAL SUPPLIES		575.91

* - Non-Negotiable Disbursement + - Procurement Card Non-Negotiable # - Payable within Payment P - Prenote D - Direct Deposit C - Credit Card ^ - Virtual Payment

FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: PSGM - PSDLAF - GENERAL FUND MAX **Payment Dates:** 08/01/2026 - 08/31/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards
Sort: **Vendor Code**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* AMAAUG1266	08/25/2026	AMAZON	GENERAL SUPPLIES		199.75
* AMAAUG1267	08/25/2026	AMAZON	GENERAL SUPPLIES		159.99
* AMAAUG1268	08/25/2026	AMAZON	SUPPLIES		71.97
* AMAAUG1269	08/25/2026	AMAZON	SPECIAL SUPPLIES		103.56
* AMAAUG1271	08/25/2026	AMAZON	CLASSROOM SUPPLIES		11.12
* AMAAUG1272	08/25/2026	AMAZON	CLASSROOM SUPPLIES		17.94
* AMAAUG1273	08/25/2026	AMAZON	GENERAL SUPPLIES		123.98
* AMAAUG1274	08/25/2026	AMAZON	SUPPLIES (7TH GRADE/ELECTRIC ZEBRAS)		63.98
* AMAAUG1275	08/25/2026	AMAZON	SUPPLIES		498.89
* AMAAUG1276	08/25/2026	AMAZON	SUPPLIES		52.38
* AMAAUG1280	08/25/2026	AMAZON	SPECIAL SUPPLIES		43.38
* AMAAUG1281	08/25/2026	AMAZON	CLASSROOM SUPPLIES		155.87
* AMAAUG1282	08/25/2026	AMAZON	BUILDING SUPPLIES		91.58
* AMAAUG1284	08/25/2026	AMAZON	GENERAL SUPPLIES		94.74
* AMAAUG1285	08/25/2026	AMAZON	BUILDING SUPPLIES		18.99
* AMAAUG1286	08/25/2026	AMAZON	CLASSROOM SUPPLIES		28.73
* AMAAUG1289	08/25/2026	AMAZON	Special Education Supplies		54.98

* - Non-Negotiable Disbursement + - Procurement Card Non-Negotiable # - Payable within Payment P - Prenote D - Direct Deposit C - Credit Card ^ - Virtual Payment

FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: PSGM - PSDLAF - GENERAL FUND MAX **Payment Dates:** 08/01/2026 - 08/31/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards
Sort: **Vendor Code**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* AMAAUG1294	08/25/2026	AMAZON	UNIFORMS		44.00
* AMAAUG1300	08/25/2026	AMAZON	OTL FID ENVELOPES		103.79
* AMAAUG1307	08/25/2026	AMAZON	FID SUPPLIES		94.74
* AMAAUG1309	08/25/2026	AMAZON	CUSTODIAN CART		159.67
* AMAAUG1311	08/25/2026	AMAZON	DAMAGED PCCD TED KANGAROO SENSORY CHAIR REPLACEMENT		114.39
* AMAAUG1314	08/25/2026	AMAZON	REPLACEMENT PROJECTOR REMOTE		15.19
* AMAAUG1315	08/25/2026	AMAZON	SUPPLIES		297.36
* AMAAUG1317	08/25/2026	AMAZON	STEP SUPPLIES		114.15
* AMAAUG1318	08/25/2026	AMAZON	CLASSROOM SUPPLIES		172.08
* AMAAUG1319	08/25/2026	AMAZON	SUPPLIES		121.07
* AMAAUG1320	08/25/2026	AMAZON	INSTRUCTIONAL MATERIALS		561.32
* AMAAUG1324	08/25/2026	AMAZON	OFFICE SUPPLIES		642.31
* AMAAUG1327	08/25/2026	AMAZON	SUPPLIES		67.96
* AMAAUG1329	08/25/2026	AMAZON	CLASSROOM SUPPLIES		59.28
* AMAAUG1331	08/25/2026	AMAZON	SUPPLIES		195.48
* AMAAUG1332	08/25/2026	AMAZON	SUPPLIES		42.70
* AMAAUG1334	08/25/2026	AMAZON	SUPPLIES		162.25

* - Non-Negotiable Disbursement + - Procurement Card Non-Negotiable # - Payable within Payment P - Prenote D - Direct Deposit C - Credit Card ^ - Virtual Payment

FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: PSGM - PSDLAF - GENERAL FUND MAX **Payment Dates:** 08/01/2026 - 08/31/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards
Sort: **Vendor Code**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* AMAAUG1335	08/25/2026	AMAZON	SUPPLIES (AMERICAN LUNG ASSOC. INCENTIVE)		111.51
* AMAAUG1336	08/25/2026	AMAZON	SUPPLIES		196.20
* AMAAUG1337	08/25/2026	AMAZON	SUPPLIES		8.85
* AMAAUG1340	08/25/2026	AMAZON	SUPPLIES		8.85
* AMAAUG1341	08/25/2026	AMAZON	GENERAL SUPPLIES		134.77
* AMAAUG1342	08/25/2026	AMAZON	SUPPLIES		17.99
* AMAAUG1343	08/25/2026	AMAZON	Special Education Supplies		165.83
* AMAAUG1345	08/25/2026	AMAZON	INSTRUCTIONAL SUPPLIES		276.91
* AMAAUG1346	08/25/2026	AMAZON	INSTRUCTIONAL SUPPLIES		244.16
* AMAAUG1347	08/25/2026	AMAZON	INSTRUCTIONAL SUPPLIES		1,344.54
* AMAAUG1348	08/25/2026	AMAZON	INSTRUCTIONAL SUPPLIES		714.68
* AMAAUG1349	08/25/2026	AMAZON	OFFICE SUPPLIES		80.73
* AMAAUG1351	08/25/2026	AMAZON	CLASSROOM SUPPLIES		27.98
* AMAAUG1352	08/25/2026	AMAZON	Supplies		413.23
* AMAAUG1357	08/25/2026	AMAZON	OFFICE SUPPLLIES		17.94
* AMAAUG1358	08/25/2026	AMAZON	CLASSROOM SUPPLIES		29.99
* AMAAUG1359	08/25/2026	AMAZON	PRINCIPAL SUPPLIES		37.32

* - Non-Negotiable Disbursement + - Procurement Card Non-Negotiable # - Payable within Payment P - Prenote D - Direct Deposit C - Credit Card ^ - Virtual Payment

FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: PSGM - PSDLAF - GENERAL FUND MAX **Payment Dates:** 08/01/2026 - 08/31/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards
Sort: **Vendor Code**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* AMAAUG1361	08/25/2026	AMAZON	SUPPLIES (6TH GR/TEAM SUPREME/POMERHN)		149.04
* AMAAUG1362	08/25/2026	AMAZON	OTC Medication Order - Terri Hildebrand		716.07
* AMAAUG1364	08/25/2026	AMAZON	CLASSROOM SUPPLIES		60.30
* AMAAUG1366	08/25/2026	AMAZON	GENERAL SUPPLIES		168.82
* AMAAUG1369	08/25/2026	AMAZON	SUPPLIES		511.25
* AMAAUG1370	08/25/2026	AMAZON	SUPPLIES		283.74
* AMAAUG1371	08/25/2026	AMAZON	SUPPLIES		404.10
* AMAAUG1382	08/25/2026	AMAZON	CLASSROOM SUPPLIES		191.33
* AMAAUG1388	08/25/2026	AMAZON	PRINCIPAL SUPPLIES		178.66
* AMAAUG1392	08/25/2026	AMAZON	OTL OFFICE SUPPLIES		93.36
* AMAAUG1393	08/25/2026	AMAZON	SUPPLIES		23.11
* AMAAUG1398	08/25/2026	AMAZON	SUPPLIES		113.66
* AMAAUG1401	08/25/2026	AMAZON	SUPPLIES		569.07
* AMAAUG1402	08/25/2026	AMAZON	SUPPLIES		136.90
* AMAAUG1405	08/25/2026	AMAZON	SUPPLIES (6TH GR/XTREME/MONFREDI)		8.99
* AMAAUG1406	08/25/2026	AMAZON	SUPPLIES		14.99
* AMAAUG1407	08/25/2026	AMAZON	SUPPLIES		315.57

* - Non-Negotiable Disbursement + - Procurement Card Non-Negotiable # - Payable within Payment P - Prenote D - Direct Deposit C - Credit Card ^ - Virtual Payment

FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: PSGM - PSDLAF - GENERAL FUND MAX **Payment Dates:** 08/01/2026 - 08/31/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards
Sort: **Vendor Code**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* AMAAUG1408	08/25/2026	AMAZON	SUPPLIES (7TH GR/VIKINGS)		22.24
* AMAAUG1409	08/25/2026	AMAZON	SUPPLIES (INTERVENTIONISTS)		111.04
* AMAAUG1412	08/25/2026	AMAZON	SUPPLIES		37.97
* AMAAUG1414	08/25/2026	AMAZON	SUPPLIES		239.32
* AMAAUG1418	08/25/2026	AMAZON	WRINGER BUCKET		72.49
* AMAAUG1419	08/25/2026	AMAZON	SUPPLIES (INTERVENTIONISTS)		119.02
* AMAAUG1420	08/25/2026	AMAZON	SUPPLIES (7TH GRADE IPC)		206.99
* AMAAUG1421	08/25/2026	AMAZON	CLASSROOM SUPPLIES		7.98
* AMAAUG1422	08/25/2026	AMAZON	SUPPLIES		240.04
* AMAAUG1424	08/25/2026	AMAZON	CLASSROOM SUPPLIES		38.61
* AMAAUG1425	08/25/2026	AMAZON	CLASSROOM SUPPLIES		14.89
* AMAAUG1426	08/25/2026	AMAZON	CLASSROOM SUPPLIES		135.31
* AMAAUG1428	08/25/2026	AMAZON	SUPPLIES		45.57
* AMAAUG1429	08/25/2026	AMAZON	SUPPLIES		249.06
* AMAAUG1430	08/25/2026	AMAZON	SPECIAL SUPPLIES		92.01
* AMAAUG1432	08/25/2026	AMAZON	SUPPLIES		36.70
* AMAAUG1434	08/25/2026	AMAZON	OFFICE SUPPLIES		87.61

* - Non-Negotiable Disbursement + - Procurement Card Non-Negotiable # - Payable within Payment P - Prenote D - Direct Deposit C - Credit Card ^ - Virtual Payment

FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: PSGM - PSDLAF - GENERAL FUND MAX **Payment Dates:** 08/01/2026 - 08/31/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards
Sort: **Vendor Code**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* AMAAUG1440	08/25/2026	AMAZON	SUPPLIES		78.98
* AMAAUG1444	08/25/2026	AMAZON	SUPPLIES (FCS)		219.97
* AMAAUG1446	08/25/2026	AMAZON	SUPPLIES		37.89
* AMAAUG1449	08/25/2026	AMAZON	SUPPLIES		162.49
* AMAAUG1450	08/25/2026	AMAZON	RINGER BUCKET		72.49
* AMAAUG1451	08/25/2026	AMAZON	SUPPLIES		7.53
* AMAAUG1452	08/25/2026	AMAZON	LOCK BOX FOR VANS		28.49
* AMAAUG1455	08/25/2026	AMAZON	SUPPLIES		43.99
* AMAAUG1456	08/25/2026	AMAZON	SUPPLIES		42.72
* AMAAUG1457	08/25/2026	AMAZON	SUPPLIES		136.90
* AMAAUG1458	08/25/2026	AMAZON	SUPPLIES		118.99
* AMAAUG1460	08/25/2026	AMAZON	HOOKS		79.92
* AMAAUG1464	08/25/2026	AMAZON	SUPPLIES		396.67
* AMAAUG1469	08/25/2026	AMAZON	INTERFUND ACCT RECEIVABLE		245.53
* AMAAUG1471	08/25/2026	AMAZON	PROJECTOR LAMPS		656.56
* AMAAUG1473	08/25/2026	AMAZON	CLASSROOM SUPPLIES		157.28
* AMAAUG1474	08/25/2026	AMAZON	GENERAL SUPPLIES		83.24

* - Non-Negotiable Disbursement + - Procurement Card Non-Negotiable # - Payable within Payment P - Prenote D - Direct Deposit C - Credit Card ^ - Virtual Payment

FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: PSGM - PSDLAF - GENERAL FUND MAX **Payment Dates:** 08/01/2026 - 08/31/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards
Sort: **Vendor Code**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* AMAAUG1481	08/25/2026	AMAZON	SUPPLIES (FCS)		139.80
* AMAAUG1482	08/25/2026	AMAZON	GENERAL SUPPLIES		141.05
* AMAAUG1483	08/25/2026	AMAZON	GENERAL SUPPLIES		299.45
* AMAAUG1485	08/25/2026	AMAZON	PAPER TOWEL DISPENSER		159.96
* AMAAUG1489	08/25/2026	AMAZON	INSTRUCTIONAL MATERIALS		50.45
* AMAAUG1490	08/25/2026	AMAZON	INSTRUCTIONAL MATERIALS		41.56
* AMAAUG1492	08/25/2026	AMAZON	CLASSROOM SUPPLIES		37.98
* AMAAUG1494	08/25/2026	AMAZON	GENERAL SUPPLIES		75.99
* AMAAUG1495	08/25/2026	AMAZON	Supplies		585.21
* AMAAUG1497	08/25/2026	AMAZON	CLASSROOM SUPPLIES		9.49
* AMAAUG1520	08/25/2026	AMAZON	Special Education Supplies		139.50
* AMAAUG1523	08/25/2026	AMAZON	GENERAL SUPPLIES		114.37
* AMAAUG1533	08/25/2026	AMAZON	CLASSROOM SUPPLIES		21.49
* AMAAUG1534	08/25/2026	AMAZON	SUPPLIES		380.09
* AMAAUG1537	08/25/2026	AMAZON	SUPPLIES		29.46
* ANTAUG0699	08/25/2026	ANTHROPTIC PBC	SOFTWARE SUBSCRIPTION		125.00
* APLAUG1060	08/25/2026	A-PLUS BODYWORKS CO INC	PLAYGROUND PARTS		1,540.00

* - Non-Negotiable Disbursement + - Procurement Card Non-Negotiable # - Payable within Payment P - Prenote D - Direct Deposit C - Credit Card ^ - Virtual Payment

FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: PSGM - PSDLAF - GENERAL FUND MAX **Payment Dates:** 08/01/2026 - 08/31/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards
Sort: **Vendor Code**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* BHAAUG1919	08/25/2026	BEHAVIORAL HEALTH ASSOCIATES	Conference		500.00
* CHIAUG1670	08/25/2026	DBA CHICK-FIL-A TREXLERTOWN	CO & DILT LUNCH		508.38
* EDUAUG0453	08/25/2026	EDUCATIONPLUS RESOURCES INC	PAREAP 2026 - 2027		1,099.00
* TANAUG1578	08/25/2026	INTAND CORPORATION	General		936.93
* KUTAUG1206	08/25/2026	KUTZTOWN UNIVERSITY OF PA	JOB FAIR - FALL 2026		150.00
* LEHAUG0104	08/25/2026	LEHIGH COUNTY AUTHORITY	WATER/SEWER		1,844.21
* MAIAUG0809	08/25/2026	MAILCHIMP	DUES/FEES		148.00
* MARAUG1521	08/25/2026	MICHAEL J BOYLE	Special Education Supplies		185.00
* MORAUG0172	08/25/2026	MORNING CALL	SUBSCRIPTION-UNLIMITED DIGITAL ACCESS		67.96
* PANAUG1671	08/25/2026	PANERA BREAD CO.	CO & DILT BREAKFAST		39.54
* EZPAUG2065	08/25/2026	PA TURNPIKE TOLL BY PLATE	TURNPIKE TOLLS		114.00
* COMAUG1664	08/25/2026	PA DEPARTMENT OF EDUCATION	EMERGENCY PERMITS		100.00
* COMAUG1839	08/25/2026	PA DEPARTMENT OF EDUCATION	EMERGENCY PERMIT		105.00
* RYDAUG1303	08/25/2026	RYDER SERVICES CORPORATION	TRUCK RENTAL		2,085.00
* RYDAUG1801	08/25/2026	RYDER SERVICES CORPORATION	TRUCK RENTAL		1,408.75
* SMAAUG1480	08/25/2026	SMASH BALLOON LLC	SUBSCRIPTION & LICENSE		598.00
* STAAUG1632	08/25/2026	STARBUCKS CORPORATION	CABINET MEMBER GIFTS		125.00
* UGIAUG0058	08/25/2026	UGI ENERGY SERVICES LLC	BLANKET PURCHASE ORDER		547.82
* UGIAUG0059	08/25/2026	UGI UTILITIES INC	BLANKET PURCHASE ORDER		1,522.26

* - Non-Negotiable Disbursement + - Procurement Card Non-Negotiable # - Payable within Payment P - Prenote D - Direct Deposit C - Credit Card ^ - Virtual Payment

FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: PSGM - PSDLAF - GENERAL FUND MAX **Payment Dates:** 08/01/2026 - 08/31/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards
Sort: **Vendor Code**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
* UGIAUG0060	08/25/2026	UGI UTILITIES INC	BLANKET PURCHASE ORDER		1,523.79
* UGIAUG0063	08/25/2026	UGI UTILITIES INC	NATURAL GAS		18.64
* UGIAUG0064	08/25/2026	UGI UTILITIES INC	BLANKET PURCHASE ORDER		47.11
* UGIAUG0117	08/25/2026	UGI UTILITIES INC	BLANKET PURCHASE ORDER		1,209.14
* UGIAUG0209	08/25/2026	UGI UTILITIES INC	BLANKET PURCHASE ORDER		86.26
* VECAUG1202	08/25/2026	SCENARIO LEARNING	SPECIAL EDUCATION COURSE LIBRARY		2,877.09
* WAWAUG1442	08/25/2026	WAWA, INC.	PD DAY LUNCH		357.24
* WAWAUG1131	08/25/2026	CLEANER'S SUPPLY, INC	SUPPLIES (FCS)		423.20
* WEBAUG1207	08/25/2026	THE WEBSTAURANT STORE INC	FINANCIAL SVCS-SUPPLIES		3,700.56
* WEGAUG1634	08/25/2026	WEGMANS FOOD MARKETS INC	WELCOME BACK DINNER		459.39

10 - GENERAL FUND	**77,043.47**
Grand Total All Funds	**77,043.47**
Grand Total Credit Cards	**0.00**
Grand Total Direct Deposits	**0.00**
Grand Total Manual Checks	**0.00**
Grand Total Other Disbursement Non-negotiables	**77,043.47**
Grand Total Procurement Card Other Disbursement Non-negotiables	**0.00**
Grand Total Regular Checks	**0.00**
Grand Total Virtual Payments	**0.00**
Grand Total All Payments	**77,043.47**

* - Non-Negotiable Disbursement + - Procurement Card Non-Negotiable # - Payable within Payment P - Prenote D - Direct Deposit C - Credit Card ^ - Virtual Payment

FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: KBGF - KEY BANK - GENERAL FUND **Payment Dates:** 09/01/2026 - 09/30/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards, Virtual Payments
Sort: **Payment Number**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
0000059707	09/03/2026	AMANDA ROBBINS	SETTLEMENT AGREEMENT FEES		2,939.19
0000059708	09/10/2026	ADAM'S GLASS & ALUMINUM INC	REPAIR		580.00
0000059709	09/10/2026	AGIREPAIR INC	MAC AIR REPAIR		948.00
0000059710	09/10/2026	ALAN KUNSMAN ROOFING & SIDING, INC.	ALBURTIS ROOF REPAIR	ROOF REPAIR	14,644.30
0000059711	09/10/2026	ALBURTIS AREA COMMUNITY CENTER	RENTAL FEE		500.00
0000059712	09/10/2026	ALICCA ZEINER	CONTRACTED STUDENT SUPPORT SVCS		65.00
0000059713	09/10/2026	ALLIANCE MECHANICAL INSULATION, LLC	INSULATE CHILLED LINES		563.43
0000059714	09/10/2026	APPLE INC	APPLE PENCILS	REPLACEMENT CHARGER	612.00
0000059715	09/10/2026	ARBITERSPORTS LLC	General		4,270.00
0000059716	09/10/2026	ARTHUR J GALLAGHER RISK MANAGEMENT SERV INC	BROKERAGE FEE		12,000.00
0000059717	09/10/2026	BAILEY WOOD PRODUCTS, INC	MATERIALS		1,090.00
0000059718	09/10/2026	BALSATRON, INC	SUPPLIES		317.25
0000059719	09/10/2026	BARNES & NOBLE	BOOKS		728.27
0000059720	09/10/2026	BOROUGH OF EMMAUS	SCHOOL RESOURCE OFFICER		39,372.20
0000059721	09/10/2026	BSN SPORTS LLC	Eyer Field Hockey	Basketball Girls EHS	6,063.84
0000059722	09/10/2026	CENTRAL SUSQUEHANNA IU	SOFTWARE SUBSCRIPTION		51,619.91
0000059723	09/10/2026	CHASE & ASSOCIATES, INC	COIL ASSEMBLY		18,950.00
0000059724	09/10/2026	COMMERCIAL FLOOR COVERING SOLUTION LLC	NEW FLOOR	TEACHER LOUNGE REPAIRS	4,580.00
0000059725	09/10/2026	CORRO THERM	OP BLDG-REPAIR/BLDG MAINT		400.00
0000059726	09/10/2026	CRAIG D DEPPE	AED - BLS FOR PROVIDERS		550.00

* - Non-Negotiable Disbursement + - Procurement Card Non-Negotiable # - Payable within Payment P - Prenote D - Direct Deposit C - Credit Card ^ - Virtual Payment

FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: KBGF - KEY BANK - GENERAL FUND **Payment Dates:** 09/01/2026 - 09/30/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards, Virtual Payments
Sort: **Payment Number**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
0000059727	09/10/2026	CREATIVE NOTEBOOK SOLUTIONS LLC	SUPPLIES		432.00
0000059728	09/10/2026	DEIRDRE HOFFMAN	SETTLEMENT PAYMENTS		280.00
0000059729	09/10/2026	DENNEY ELECTRIC SUPPLY OF NESHAMINY	BLANKET PURCHASE ORDER		5,151.38
0000059730	09/10/2026	DIANA'S CAFE INC	CATERING		1,515.00
0000059731	09/10/2026	EDCLUB, INC	SUPPLIES (BUSINESS & COMPUTERS)	SUPPLIES	745.89
0000059732	09/10/2026	FITNESS CENTRAL CORP	EQUIPMENT (H/W/F)		1,254.00
0000059733	09/10/2026	FLINN SCIENTIFIC, INC.	SUPPLIES		2,002.94
0000059734	09/10/2026	FOLLETT CONTENT SOLUTIONS LLC	BOOKS (LIBRARY)	BOOKS	1,042.28
0000059735	09/10/2026	FRANK ZULLO	PROPERTY TAX REBATES - MACUNGIE		770.00
0000059736	09/10/2026	GOVCONNECTION, INC.	PROJECTORS STOCK		3,365.88
0000059737	09/10/2026	GRANICK SPORT INC	swimming girls	swimming boys	6,474.15
0000059738	09/10/2026	GRIZZLY INDUSTRIAL INC.	SUPPLIES		1,040.93
0000059739	09/10/2026	HOME DEPOT CREDIT SERVICES	SUPPLIES		763.93
0000059740	09/10/2026	HOUGHTON MIFFLIN HARCOURT PUBLISHING CO.	REG PROG-BOOKS/PERIODICALS		9,902.68
0000059741	09/10/2026	HSA MECHANICAL SERVICES LLC	ANNUAL CONTRACT	VAV REPLACEMENT	37,335.00
0000059742	09/10/2026	IMAGINE LEARNING LLC	BOOKS (INTERVENTIONISTS)	RESOURCES	440.00
0000059743	09/10/2026	IMPERIAL BRADY	OP BLDG-SUPPLIES		1,762.48
0000059744	09/10/2026	JANET KERETZ	PROPERTY TAX REBATES - EMMAUS		460.00
0000059745	09/10/2026	JEAN HAUSER	PROPERTY TAX REBATES - LOWER MACUNGIE		770.00
0000059746	09/10/2026	JESSA BOEHM	SPEECH SERVICES		460.00

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FUND ACCOUNTING PAYMENT SUMMARY

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Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards, Virtual Payments
Sort: **Payment Number**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount	
0000059747	09/10/2026	KAELEE B MACKEY	TECHNOLOGY (ANNUAL SUBSCRIPTION)		36.00	
0000059748	09/10/2026	KEZIAH KOHATH	PROPERTY TAX REBATES - MACUNGIE		770.00	
0000059749	09/10/2026	LARRY D HEIL	PROPERTY TAX REBATES - UPPER MILFORD		380.00	
0000059750	09/10/2026	LEON DRIES	PROPERTY TAX REBATES - EMMAUS		380.00	
0000059751	09/10/2026	LIVING FELT, INC.	SUPPLIES		635.49	
0000059752	09/10/2026	MARGARET O'BRIEN	PROPERTY TAX REBATE		380.00	
0000059753	09/10/2026	MARTHA GERHART	PROPERTY TAX REBATES - EMMAUS		770.00	
0000059754	09/10/2026	MARY ANN TRETTER	PROPERTY TAX REBATES - LOWER MACUNGIE		380.00	
0000059755	09/10/2026	MATHCOUNTS REGISTRATION	REGISTRATION		378.00	
0000059756	09/10/2026	MBCIP INC	BACK TO SCHOOL BAGELS	PD DAY BREAKFAST - COUNSELORS	1,025.40	
0000059757	09/10/2026	MCKINLEY & RYAN LLC	SETTLEMENT ATTORNEY FEES		8,450.00	
0000059758	09/10/2026	MILLER MUNICIPAL SUPPLY LLC	OP BLDG-SUPPLIES		730.20	
0000059759	09/10/2026	MONTGOMERY COUNTY COMMUNITY COLLEGE	REGISTRATION FEES (SCIENCE)		390.00	
0000059760	09/10/2026	NASCO	SUPPLIES		586.16	*P*
0000059761	09/10/2026	ONEIDA AIR SYSTEMS INC	REG PROG-SUPPLIES		33.90	
0000059762	09/10/2026	PA DISTANCE LEARNING CHARTER SCHOOL	CHARTER TUITION REG ED - CYBER		3,800.55	
0000059763	09/10/2026	PA PRINCIPALS ASSOCIATION	MEMBERSHIP RENEWAL		605.00	
0000059764	09/10/2026	PASCO SCIENTIFIC	SUPPLIES		571.45	*P*
0000059765	09/10/2026	PENNSYLVANIA MUSIC EDUCATORS ASSOCIATION	REG PROG-DUES/FEES		1,200.00	
0000059766	09/10/2026	PENNWOOD CYBER CHARTER SCHOOL	CHARTER TUITION SPEC ED - CYBER	CHARTER TUITION REG ED - CYBER	8,120.35	

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Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
0000059767	09/10/2026	POWERSCHOOL GROUP LLC	SUBSCRIPTIONS		18,417.50
0000059768	09/10/2026	PPL ELECTRIC UTILITIES	ELECTRICITY		73,543.03
0000059769	09/10/2026	SCHOLASTIC, INC.	Supplies		1,251.86
0000059770	09/10/2026	SCHOOL SPECIALITY LLC	GENERAL SUPPLIES	CLASSROOOM FURNITURE	6,275.84 *P*
0000059771	09/10/2026	SDI INNOVATIONS INC	STUDENT RESOURCES		444.79
0000059772	09/10/2026	SITEONE LANDSCAPE SUPPLY LLC	BLANKET PURCHASE ORDER		1,053.33
0000059773	09/10/2026	SMITHSONIAN INSTITUTION	SUBSCRIPTION		29.99
0000059774	09/10/2026	STEPHANIE PROULX	Reimbursement for settlement		2,647.79
0000059775	09/10/2026	TANYA UNGAR	SETTLEMENT ATTORNEY FEES		10,000.00
0000059776	09/10/2026	THE BRADLEY CENTER INC	REG PROG - TUIT TO PRRI		3,850.00
0000059777	09/10/2026	THREE MEN & A BAGEL	BACK TO SCHOOL BAGELS		685.13
0000059778	09/10/2026	TOTAL DISINFECTION SYSTEMS	HALO MIST		2,488.24
0000059779	09/10/2026	UGI ENERGY SERVICES LLC	BLANKET PURCHASE ORDER		5,157.46
0000059780	09/10/2026	UNIVERSITY OF OREGON	swis license	TECH FEES	1,000.00
0000059781	09/10/2026	VARSITY SPIRIT FASHIONS INC.	Cheer EHS		8,998.50
0000059782	09/10/2026	VERIZON COMMUNICATIONS INC	TRANSPORT/TELECOMM SVCS		379.00
0000059783	09/10/2026	VERIZON WIRELESS	TRANSPORT/TELECOMM SVCS		3,875.90
0000059784	09/10/2026	VIOLET R MUSOROFITI	PROPERTY TAX REBATES - LOWER MACUNGIE		380.00
0000059785	09/10/2026	VOYAGER SOPRIS LEARNING	BOOKS (INTERVENTIONISTS)		523.60
0000059786	09/10/2026	WARD'S SCIENCE	SUPPLIES		414.23
0000059787	09/10/2026	WHITEHALL TURF EQUIPMENT INC	PARTS	VEHICLE OP - GEN SUPPLIES	403.46

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FUND ACCOUNTING PAYMENT SUMMARY

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Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount	
0000059788	09/10/2026	YVONNE WONG	PROPERTY TAX REBATES - LOWER MACUNGIE		380.00	
0000059789	09/24/2026	72POINT5	Wrestling EHS		650.00	
0000059790	09/24/2026	ADAM'S GLASS & ALUMINUM INC	REPLACE EXISTING BARRIER		1,109.00	
0000059791	09/24/2026	AGIREPAIR INC	MAC AIR REPAIR		199.00	
0000059792	09/24/2026	ALAN KUNSMAN ROOFING & SIDING, INC.	ROOF REPAIR		953.55	
0000059793	09/24/2026	ALLIANCE SALES & DISTRIBUTION LLLC	OP BLDG-SUPPLIES		3,874.20	*P*
0000059794	09/24/2026	ALON HOGAN	REIMBURSEMENT		225.29	
0000059795	09/24/2026	ANATOMICAL WORLDWIDE LLC	SUPPLIES		95.49	
0000059796	09/24/2026	APPLE FINANCIAL SERVICES	IPAD LEASE	MAC LEASE	486,007.50	
0000059797	09/24/2026	APPLE INC	REG PROG-TECH SUPPLY		2,291.99	
0000059798	09/24/2026	ARTHUR J GALLAGHER RISK MANAGEMENT SERVICES , LLC	INSURANCE		334.00	
0000059799	09/24/2026	ASHA	SPEECH PD SUBSCRIPTIONS		1,380.00	
0000059800	09/24/2026	ASSOCIATED FASTENERS INC	SUPPLIES		259.62	
0000059801	09/24/2026	AUTOZONE	VEHICLE OP - GEN SUPPLIES		54.10	
0000059802	09/24/2026	BABLINGUA	SUBSCRIPTIONS		50.00	
0000059803	09/24/2026	BALANCE PAYMENTS, INC	CONSUMABLES		50.14	*P*
0000059804	09/24/2026	BOROUGH OF EMMAUS	SECURITY		187.50	
0000059805	09/24/2026	BOYCE RECREATION	SHOEMAKER PLAYGROUND		10,596.00	
0000059806	09/24/2026	BREAKOUT INC	SPE Subscription / License		1,156.00	
0000059807	09/24/2026	BRIAN AND JOELENE DOUGLAS	SETTLEMENT AGREEMENT		3,391.99	
0000059808	09/24/2026	BSN SPORTS LLC	LMMS Field Hockey		2,772.00	

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Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount
0000059809	09/24/2026	CARBON LEHIGH INTERMEDIATE UNIT 21	OTIS FOR EDUCATORS ST ANNS		1,080.00
0000059810	09/24/2026	CARON TREATMENT CENTERS	FEES		1,800.00
0000059811	09/24/2026	CATASAUQUA AREA SCHOOL DISTRICT	SP ED TUITION		7,516.10
0000059812	09/24/2026	CENTER FOR EXCELLENCE IN EDUCATION	REGISTRATION FEES		125.00
0000059813	09/24/2026	CM REGENT LLC	PROFESSIONAL SERVICES		774.00
0000059814	09/24/2026	COMPTIA INC	TECH FEES		1,550.00
0000059815	09/24/2026	CORA MACARTHUR	PHEAA PA STUDENT TEACHER SUPPORT PROGRAM		10,000.00
0000059816	09/24/2026	CTBOOK HOLDINGS LLC	BOOKS	EHS BOOKS	5,066.72
0000059817	09/24/2026	DAVID M JAINDL	PROPERTY TAX REFUNDS - LOWER MACUNGIE		495.91
0000059818	09/24/2026	DEDUCTIBLE RECOVERY GROUP	LEGAL FEES		1,752.50
0000059819	09/24/2026	DENISE YUPPA	PROPERTY TAX REFUNDS - LOWER MACUNGIE		1,310.75
0000059820	09/24/2026	DOROTHY K LAKE	PROPERTY TAX REBATE		380.00
0000059821	09/24/2026	DR. ROBERT BRIAN BARNES	PAYMENT FOR MEDICAL ACCESS REVIEW		720.00
0000059822	09/24/2026	EASTON GIRLS VOLLEYBALL BOOSTER CLUB	Volleyball Girls EHS		250.00
0000059823	09/24/2026	ENVIRAHEALTH CORPORATION	TESTING		3,675.00
0000059824	09/24/2026	EPSD - STUDENT SERVICES OFFICE	PETTY CASH - SPECIAL EDUCATION		300.00
0000059825	09/24/2026	EVERWAY, LLC	ONLINE SP ED BOOKS		5,332.92
0000059826	09/24/2026	FOLLETT CONTENT SOLUTIONS LLC	BOOKS		168.08
0000059827	09/24/2026	FROMM ELECTRIC SUPPLY CORPORATION	OP BLDG-SUPPLIES		404.37

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Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount	
0000059828	09/24/2026	GENERAL HEALTHCARE RESOURCES LLC	HEALTH ROOM COVERAGE		2,730.00	
0000059829	09/24/2026	GLORIA L FRIEDMAN	PROPERTY TAX REBATE		380.00	
0000059830	09/24/2026	GLORIA R SOKALSKY	PROPERTY TAX REBATE		770.00	
0000059831	09/24/2026	GOLD STANDARD CONSULTING, LLC	TESTING/CLEANING OF TURF FIELDS		3,318.00	
0000059832	09/24/2026	GOTTA GO POTTIES, INC	PORTABLE POTTIES		965.00	
0000059833	09/24/2026	GOVCONNECTION, INC.	TV		672.79	
0000059834	09/24/2026	HOBBY LOBBY STORES INC	SUPPLIES		494.40	
0000059835	09/24/2026	IMPERIAL BRADY	OP BLDG-SUPPLIES		432.01	
0000059836	09/24/2026	JAMES R AND CATHERINE R VAN LANGEN	SETTLEMENT AGREEMENT FEES		16,601.40	
0000059837	09/24/2026	JESSA BOEHM	SPEECH SERVICES		125.00	
0000059838	09/24/2026	JOHN ZEINER III	REPAIRS	REPAIR	430.00	*P*
0000059839	09/24/2026	JONATHAN D & MICHELLE H KARMAZYN	PROPERTY TAX REFUNDS - UPPER MILFORD		63.20	
0000059840	09/24/2026	JULIA YEAGER	PHEAA PA STUDENT TEACHER SUPPORT PROGRAM		10,000.00	
0000059841	09/24/2026	JULIA ZIMMER	REIMBURSEMENT		157.86	
0000059842	09/24/2026	KEVIN M WACHTER	PROPERTY TAX REFUNDS - UPPER MILFORD		332.28	
0000059843	09/24/2026	LINDE GAS & EQUIPMENT INC	BLANKET PURCHASE ORDER		113.70	
0000059844	09/24/2026	LUCILLE FRITZINGER	PROPERTY TAX REBATE		460.00	
0000059845	09/24/2026	MARY E SNYDER	PROPERTY TAX REBATE		380.00	
0000059846	09/24/2026	MICHAEL J BOYLE	CONSUMABLES		495.00	
0000059847	09/24/2026	NEW DIRECTION SOLUTIONS, LLC	REG PROG - OTHER PROF SVC		7,693.74	
0000059848	09/24/2026	NORCAST CONSULTING LLC	Weather/Ice Forecast		1,000.00	

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0000059849	09/24/2026	NORMAN K WILLIAMSON	VINYL GRAPHIC SIGNS		834.79
0000059850	09/24/2026	OVERBROOK SCHOOL FOR THE BLIND	ESY TUITION		6,720.00
0000059851	09/24/2026	PA ASSOC OF STUDENT ASSIST PROFESS.	renewal - PASAP		700.00
0000059852	09/24/2026	PENTELEDATA	BLANKET		603.98
0000059853	09/24/2026	PHILIP E FISHER	INST STAFF CERT - TUIT REIMB		660.00
0000059854	09/24/2026	PMG SM PA LLC	PUMP REPAIR - PAINT STRIPER		316.86
0000059855	09/24/2026	PPL ELECTRIC UTILITIES	ELECTRICITY		23,997.24
0000059856	09/24/2026	PROGRESS LEARNING LLC	ONLINE LEARNING		903.00
0000059857	09/24/2026	REBECCA GEORGE	General		42.31
0000059858	09/24/2026	SANDRA KLEPPINGER	PROPERTY TAX REBATES - EMMAUS		380.00
0000059859	09/24/2026	SERVICE ELECTRIC CABLE TV INC	YEARLY MAINTENANCE & SUPPORT		1,272.05
0000059860	09/24/2026	SITEONE LANDSCAPE SUPPLY LLC	BLANKET PURCHASE ORDER		158.62
0000059861	09/24/2026	SPIRALEDGE, INC.	SUPPLIES		407.30
0000059862	09/24/2026	SUCCESS BY DESIGN, INC	MATERIALS		3,224.35
0000059863	09/24/2026	SWEETWATER SOUND INC.	PODCAST EQUIPMENT	GENERAL SUPPLIES	3,066.43
0000059864	09/24/2026	THE STEPPING STONES GROUP LLC	Special Education Supports		4,656.30
0000059865	09/24/2026	TYLER TECHNOLOGIES, INC	PAETEP		16,309.00
0000059866	09/24/2026	TYLER WERTMAN & LAUREL ROMIG	PROPERTY TAX REFUNDS - UPPER MILFORD		28.55
0000059867	09/24/2026	UGI ENERGY SERVICES LLC	BLANKET PURCHASE ORDER		5,064.19
0000059868	09/24/2026	UNITED CONCORDIA	DENTAL PREMIUMS		535.13
0000059869	09/24/2026	UNITED RENTALS PR, INC	CONTAINER RENTAL		770.00

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0000059870	09/24/2026	UNIVERSITY OF OREGON	SWIS LICENSE	RESOURCES	1,500.00	
0000059871	09/24/2026	VARVARA GOSTEVSKHY	SEWING PROJECTS		1,111.43	
0000059872	09/24/2026	WAWA, INC.	REFRESHEMENTS		314.77	
0000059873	09/24/2026	WAYSIDE PUBLISHING	BOOKS		253.00	
0000059874	09/24/2026	WESTERN LEHIGH SERVICES, INC.	TOP SOIL		90.00	
0000059875	09/24/2026	WM CORPORATE SERVICES INC	DISPOSAL SERVICES	30 YD ROLLOFF	16,896.65	
D000013724	09/10/2026	ABA SUPPORT SERVICES LLC	SETTLEMENT PAYMENT		1,503.75	*D*
D000013725	09/10/2026	ACHIEVEMENT HOUSE CYBER CHARTER SCHOOL	PA CHARTER SCHOOL TUITION		3,826.92	*D*
D000013726	09/10/2026	AMANDA L DEUTSCH	MISC REIMBURSEMENT		242.06	*D*
D000013727	09/10/2026	ANGELA KUNTZ	MILEAGE REIMBURSEMENT		9.04	*D*
D000013728	09/10/2026	ANNE KUKITZ	EYE CARE INSURANCE		150.00	*D*
D000013729	09/10/2026	ANTHONY TOTO	EYE CARE INSURANCE		150.00	*D*
D000013730	09/10/2026	ARAMSCO INC	OP BLDG-SUPPLIES	SUPPLIES	2,524.37	*D*
D000013731	09/10/2026	ARBOR SCIENTIFIC	SUPPLIES		776.99	*D*
D000013732	09/10/2026	BETH GUARRIELLO	REIMBURSEMENT		480.13	*D*
D000013733	09/10/2026	BLICK ART MATERIALS	SUPPLIES (ART - WEST)	SUPPLIES	4,178.48	*D*
D000013734	09/10/2026	BROOKE ESHBACH	EYE CARE INSURANCE		150.00	*D*
D000013735	09/10/2026	BUSS PAINTS	OP BLDG-SUPPLIES		36.66	*D*
D000013736	09/10/2026	CARLI HARRELL	INSTR & CURR - TRAVEL		17.25	*D*
D000013737	09/10/2026	CAROLINA BIOLOGICAL SUPPLY COM	SUPPLIES	SUPPLIES (7TH GRADE/VIKINGS/SCIENCE)	3,286.97	*D*
D000013738	09/10/2026	CASCADE SCHOOL SUPPLIES INC	REG PROG-SUPPLIES		876.25	*D*

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D000013739	09/10/2026	CHRISTINA BEAN	INSTR & CURR - TRAVEL		18.85	D
D000013740	09/10/2026	DANIELLE WALSH	EYE CARE INSURANCE		150.00	D
D000013741	09/10/2026	DAVID N WILLETT	EYE CARE INSURANCE		150.00	D
D000013742	09/10/2026	DEER COUNTRY FARM & LAWN INC	VEHICLE OP - GEN SUPPLIES		476.55	D
D000013743	09/10/2026	DENINE M WILLIAMS	SUPPLIES (FCS)		122.11	D
D000013744	09/10/2026	DM SUPPLY SOURCE LLC	OP BLDG-SUPPLIES		4,963.13	D
D000013745	09/10/2026	DOUGLAS POVILAITIS	EYE CARE INSURANCE		575.80	D
D000013746	09/10/2026	DOUGLAS S BARNDT	CLASSROOM SUPPLIES		191.96	D
D000013747	09/10/2026	EAS WATER COFFEE PAPER INC	WATER		67.84	D
D000013748	09/10/2026	ECA SCIENCE KIT SERVICES	SCIENCE KITS		31,676.10	D
D000013749	09/10/2026	ENCORE HOLDINGS, LLC	EXTINGUISHER MAINTENANCE		7,384.85	D
D000013750	09/10/2026	EPSD CAFETERIA FUND	STATE SHARE OF EMPLOYER RETIREMENT CONTRIBUTION		3,137.99	D
D000013751	09/10/2026	ERIN GEIGER	SUPPLIES		94.60	D
D000013752	09/10/2026	FERGUSON ENTERPRISES INC #501	SUPPLIES		5,238.31	D
D000013753	09/10/2026	FP FINANCE LLC	POSTAGE METER LEASE		375.00	D
D000013754	09/10/2026	FP MAILING SOLUTIONS	POSTAGE		1,906.12	D
D000013755	09/10/2026	GORMAN & ASSOCIATES P.C.	PROFESSIONAL SERVICES		23,740.69	D
D000013756	09/10/2026	GRAINGER	OP BLDG-SUPPLIES		142.78	D
D000013757	09/10/2026	GREG'S AUTO & TIRE SERVICE INC	VEHICLE OP - GEN SUPPLIES		336.00	D
D000013758	09/10/2026	GROSS MCGINLEY, LLP	LEGAL PROFESSIONAL SERVICES		3,754.40	D
D000013759	09/10/2026	GUYETTE COMMUNICATION INDUSTRIES CORPORATION	PHONE REPAIRS	DISPLAY CLOCK/SPEAKERS	7,108.94	D

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FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: KBGF - KEY BANK - GENERAL FUND **Payment Dates:** 09/01/2026 - 09/30/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards, Virtual Payments
Sort: **Payment Number**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount	
D000013760	09/10/2026	INTEGRA ONE	SUBSCRIPTION & LICENSE	SUBSCRIPTION	8,789.40	D
D000013761	09/10/2026	INTERAXON INC	TECH SUPPLIES		1,024.96	D
D000013762	09/10/2026	INTERSTATE BATTERY OF ALLENTOWN	BATTERIES		73.90	D
D000013763	09/10/2026	IQ PEST SOLUTIONS LLC	EXTERMINATION SERVICES		11,400.00	D
D000013764	09/10/2026	ITSAVVY LLC	FEES		237.26	D
D000013765	09/10/2026	JACOB KISTLER	REIMBURSEMENT		44.95	D
D000013766	09/10/2026	JESSICA SANTANIELLO	EYE CARE INSURANCE		130.00	D
D000013767	09/10/2026	JESSICA THACHER	REG PROG - TRAVEL		92.64	D
D000013768	09/10/2026	JOHNSON CONTROLS FIRE PROTECTION LP	SERVICE CALL		3,244.80	D
D000013769	09/10/2026	JOHNSTONE SUPPLY	SUPPLIES		201.24	D
D000013770	09/10/2026	JONATHAN CHASE	CLASSROOM SUPPLIES		110.98	D
D000013771	09/10/2026	JOSHUA RADCLIFFE	BUS DRIVER MEETING		91.95	D
D000013772	09/10/2026	JULIE HUMMELL	EYE CARE INSURANCE		147.48	D
D000013773	09/10/2026	JW PEPPER & SON INC	SUPPLIES (MUSIC)		55.00	D
D000013774	09/10/2026	KATIE BICKEL	INST STAFF DEV CERT-TRAIN/DEVEL		27.55	D
D000013775	09/10/2026	KEVIN RUPPERT	REIMBURSEMENT		3,836.95	D
D000013776	09/10/2026	KEYS TO LITERACY LLC	KEYS TO CONTENT	BOOK	1,157.50	D
D000013777	09/10/2026	KRISTEN CAMPBELL	WAWA GIFT CARDS	CO & DILT REFRESHMENTS	149.53	D
D000013778	09/10/2026	KURTZ BROS INC.	ART SUPPLIES		48.81	D
D000013779	09/10/2026	L.J.C. JANITORIAL DISTRIBUTORS	OP BLDG-SUPPLIES		13.25	D
D000013780	09/10/2026	LAURA L WITMAN	EYE CARE INSURANCE		445.00	D
D000013781	09/10/2026	LCTI-DISTRIBUTION CENTER	SUPPLIES		7,165.14	D

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FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: KBGF - KEY BANK - GENERAL FUND **Payment Dates:** 09/01/2026 - 09/30/2026

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Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount	
D000013782	09/10/2026	LEHIGH CAREER & TECHNICAL INSTITUTE	LCTI TUITION		532,709.10	D
D000013783	09/10/2026	LEHIGH VALLEY ACADEMY REGIONAL CHARTER SCHOOL	CHARTER TUITION REG ED - BRICK AND MORTAR	CHARTER TUITION SPEC ED - BRICK AND MORTAR	43,457.05	D
D000013784	09/10/2026	LEHIGHCAR	LCCC TUITION		54,482.42	D
D000013785	09/10/2026	MASTER SUPPLY LINE	ICE MELT REMOVER	OP BLDG-SUPPLIES	1,577.25	D
D000013786	09/10/2026	MCNEES WALLACE & NURICK LLC	LEGAL SERVICES - LABOR & NEGOTATIONS		5,356.00	D
D000013787	09/10/2026	MEAGHAN BUCK	SUPPLIES (7TH GR/VIKINGS)		77.59	D
D000013788	09/10/2026	MELISSA MINEWEASER	EYE CARE INSURANCE		919.00	D
D000013789	09/10/2026	MENCHEY MUSIC SERVICE, INC.	BLANKET PO MUSIC SUPPLIES		248.00	D
D000013790	09/10/2026	MICHAEL MIHALIK	TEE SHIRTS	NTI SUPPLES/FOOD/COFFEE	1,090.06	D
D000013791	09/10/2026	MUHLENBERG MEDICAL REPAIR	General		559.00	D
D000013792	09/10/2026	NACCI PRINTING	ACTIVITIES CALENDAR		7,450.00	D
D000013793	09/10/2026	NAPA AUTO PARTS	VEHICLE OP - GEN SUPPLIES		282.18	D
D000013794	09/10/2026	NICOLE M BOSSE	SUPPLIES (8TH GRADE-COASTAL CREW)		81.12	D
D000013795	09/10/2026	NORTHEAST CHEMICAL AND SUPPLY INC.	BLANKET PURCHASE ORDER		1,771.75	D
D000013796	09/10/2026	ODP BUSINESS SOLUTIONS	REG PROG-SUPPLIES	OFFICE SUPPLIES	974.19	D
D000013797	09/10/2026	PA LEADERSHIP CHARTER SCHOOL	CHARTER TUITION REG ED - CYBER	CHARTER TUITION SPEC ED - CYBER	66,378.09	D
D000013798	09/10/2026	PENNSYLVANIA VIRTUAL CHARTER SCHOOL	CHARTER TUITION SPEC ED - CYBER	CHARTER TUITION REG ED - CYBER	6,712.24	D
D000013799	09/10/2026	POWERPRO EQUIPMENT	PARTS		232.80	D
D000013800	09/10/2026	PROASYS INC	OP BLDG-REPAIR/MAINT		1,227.25	D
D000013801	09/10/2026	QUILL CORPORATION	Supplies	ART BID	567.47	D

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D000013802	09/10/2026	RACHEL HARING	MEALS		18.93	D
D000013803	09/10/2026	REBECCA AUGUSTIN	EYE CARE INSURANCE		150.00	D
D000013804	09/10/2026	REBECCA CHAMPION	FACULTY/STAFF MEALS	BUILDING SUPPLIES	389.99	D
D000013805	09/10/2026	REBECCA GEORGE	SCHL SPONS ATHLET -TRAVEL		186.32	D
D000013806	09/10/2026	RODD LUCKENBILL	PRINCIPAL-TRAVEL		27.92	D
D000013807	09/10/2026	SALLIE YENCHO	SUPPLIES		522.68	D
D000013808	09/10/2026	SCHAEDLER YESCO	BLANKET PURCHASE ORDER		1,251.93	D
D000013809	09/10/2026	SCHOLASTIC BOOKS FAIRS-14	SUBSCRIPTIONS		582.34	D
D000013810	09/10/2026	SCHOOL HEALTH CORP	NURSING-SUPPLIES		11.19	D
D000013811	09/10/2026	SCHOOL HEALTH CORP	NURSING-SUPPLIES	NURSING SUPPLIES - Alburtis	14.08	D
D000013812	09/10/2026	SERVICE CASTER CORPORATION	CASTERS		41.84	D
D000013813	09/10/2026	SHARAWN VALENTINE	PSYCH-TRAVEL		52.90	D
D000013814	09/10/2026	SHARP ENERGY INC	FUEL FOR BUSES		2,591.44	D
D000013815	09/10/2026	STA CENTRAL REGION	PUPIL TRANSPORTATION		6,068.06	D
D000013816	09/10/2026	STEVE WEISS MUSIC	SUPPLIES		729.95	D
D000013817	09/10/2026	SUSAN RACEK	CLASSROOM SUPPLIES		169.76	D
D000013818	09/10/2026	SWEET, STEVENS, KATZ & WILLIAMS LLP	LEGAL SERVICES - SPECIAL EDUCATION		5,288.00	D
D000013819	09/10/2026	TERRI HILDEBRAND	INST STAFF DEV CERT-TRAIN/DEVEL		92.26	D
D000013820	09/10/2026	ULINE	SUPPLIES		67.50	D
D000013821	09/10/2026	WAREHOUSE BATTERY OUTLET INC	BATTERIES		682.18	D
D000013822	09/10/2026	WEAVERS HARDWARE	BATTERIES		590.40	D
D000013823	09/10/2026	WEHRUNGS MACUNGIE LLC	BLANKET PURCHASE ORDER		2,199.54	D

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Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount	
D000013824	09/10/2026	WEIS MARKETS INC	SUPPLIES (FCS)		132.57	D
D000013825	09/10/2026	WORTHINGTON DIRECT	OFFICE FURNITURE		1,939.66	D
D000013826	09/24/2026	21ST CENTURY CHARTER SCHOOL	CHARTER TUITION REG ED - CYBER		3,800.55	D
D000013827	09/24/2026	ABA SUPPORT SERVICES LLC	REG PROG - OTHER PROF SVC		35,296.86	D
D000013828	09/24/2026	ABE LABORATORIES LLC	WATER TESTING		390.00	D
D000013829	09/24/2026	ADRIANE ULICNY	INST STAFF CERT - TUIT REIMB		3,072.50	D
D000013830	09/24/2026	ADVANCED COMMUNICATION SOLUTIONS LLC	REPLACEMENT EQUIPMENT FROM WATER DAMAGE	BLANKET PURCHASE ORDER	41,400.00	D
D000013831	09/24/2026	AGORA CYBER CHARTER SCHOOL	PA CHARTER SCHOOL TUITION		12,533.17	D
D000013832	09/24/2026	AIRGAS EAST INC	OP BLDG-SUPPLIES	RENTAL OF ARGON, OXYGEN, ACETYLENE	609.12	D
D000013833	09/24/2026	ALAN BERGEY	STAFF DEV NONCERT - TUIT REIMB		1,410.00	D
D000013834	09/24/2026	ALEXA SZEWCZUK	INST STAFF CERT - TUIT REIMB		1,683.00	D
D000013835	09/24/2026	ALLENTOWN SEWING MACHINE OUTLET	MAINTENANCE	REPAIRS (FCS)	1,756.25	D
D000013836	09/24/2026	ALLISON FISHER	INST STAFF CERT - TUIT REIMB		660.00	D
D000013837	09/24/2026	ALYSSA HESS	REIMBURSEMENT		36.00	D
D000013838	09/24/2026	ANDREA LERCH	MEMBERSHIP DUES		240.00	D
D000013839	09/24/2026	ANGELA KUNTZ	EYE CARE INSURANCE		150.00	D
D000013840	09/24/2026	ARAMSCO INC	BURNISHER - CREDIT CORRECTION	OP BLDG-SUPPLIES	2,133.42	D
D000013841	09/24/2026	ARTS ACADEMY CHARTER SCHOOL	CHARTER TUITION REG ED - BRICK AND MORTAR	CHARTER TUITION SPEC ED - BRICK AND MORTAR	60,335.82	D
D000013842	09/24/2026	ARTS ACADEMY ELEMENTARY CHARTER SCHOOL	CHARTER TUITION REG ED - BRICK AND MORTAR	CHARTER TUITION SPEC ED - BRICK AND MORTAR	25,496.54	D
D000013843	09/24/2026	ASHLEY COSME	INST STAFF CERT - TUIT REIMB		1,602.00	D

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FUND ACCOUNTING PAYMENT SUMMARY

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Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount	
D000013844	09/24/2026	ASHLEY SCHEUER	TUITION REIMB		2,320.00	D
D000013845	09/24/2026	BARTELL & BARTELL LTD	Central Office & DILT Training		15,448.47	D
D000013846	09/24/2026	BEHAVIORAL HEALTH ASSOCIATES	TUITION		32,484.00	D
D000013847	09/24/2026	BELMONT BEHAVIORAL HOSPITAL	STUDENT TUITION		700.00	D
D000013848	09/24/2026	BLICK ART MATERIALS	SUPPLIES		7,787.92	D
D000013849	09/24/2026	BRIAN SIGAFOOS	TECH - TRAVEL		58.67	D
D000013850	09/24/2026	BRIDGET M DOKLAN	EYE CARE INSURANCE		145.00	D
D000013851	09/24/2026	BRYAN D SVENCER	CLASSROOM SUPPLIES		204.67	D
D000013852	09/24/2026	CAITLIN SHUTTE	EYE CARE INSURANCE		150.00	D
D000013853	09/24/2026	CAROLINA BIOLOGICAL SUPPLY COM	SUPPLIES (7TH GRADE/VIKINGS/SCIENCE)		35.37	D
D000013854	09/24/2026	CARRIE ENGLAND	SUPPLIES		44.98	D
D000013855	09/24/2026	CENGAGE LEARNING, INC.	TECH FEES		1,336.50	D
D000013856	09/24/2026	CHESTER COUNTY INTERMEDIATE UNIT	PROFESSIONAL DEVELOPMENT		2,590.00	D
D000013857	09/24/2026	CINDY L SNOW	EYE CARE INSURANCE		150.00	D
D000013858	09/24/2026	CIRCLE OF SEASONS CHARTER SCHOOL	CHARTER TUITION REG ED - BRICK AND MORTAR	CHARTER TUITION SPEC ED - BRICK AND MORTAR	152,457.46	D
D000013859	09/24/2026	COLLEEN KLEPEIS	TUITION REIMB		1,602.00	D
D000013860	09/24/2026	COLONIAL INTERMEDIATE UNIT 20	CPE TRACKER BILLING		7,936.59	D
D000013861	09/24/2026	COMMONWEALTH CHARTER ACADEMY CHARTER SCHOOL	PA CHARTER SCHOOL TUITION		475,220.79	D
D000013862	09/24/2026	COMMUNITIES IN SCHOOLS OF EASTERN PA INC	COMMUNITIES IN SCHOOLS - HIGH SCHOOL		43,213.76	D
D000013863	09/24/2026	CYNTHIA M BRASHEAR	REIMBURSEMENT		325.00	D

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FUND ACCOUNTING PAYMENT SUMMARY

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Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount	
D000013864	09/24/2026	DANIEL KUKITZ	TUITION REIMB		420.00	D
D000013865	09/24/2026	DAVID BUDINAS	EYE CARE INSURANCE		150.00	D
D000013866	09/24/2026	DECKER EQUIPMENT INC	STOOL CAP		217.03	D
D000013867	09/24/2026	DEER COUNTRY FARM & LAWN INC	VEHICLE OP - GEN SUPPLIES		713.07	D
D000013868	09/24/2026	DEMCO INC	SUPPLIES (LIBRARY)		1,143.47	D
D000013869	09/24/2026	DEREK SANTIAGO	TECH - TRAVEL		117.12	D
D000013870	09/24/2026	DIAN M MCKINNEY	INST STAFF CERT - TUIT REIMB		1,683.00	D
D000013871	09/24/2026	DM SUPPLY SOURCE LLC	OP BLDG-SUPPLIES		4,030.15	D
D000013872	09/24/2026	EAS WATER COFFEE PAPER INC	EAS Water - Blanket PO	Special Education Supplies	37.42	D
D000013873	09/24/2026	EMILY A SCHWARTZ	INST STAFF CERT - TUIT REIMB		2,320.00	D
D000013874	09/24/2026	EMILY C REED	INST STAFF CERT - TUIT REIMB		580.00	D
D000013875	09/24/2026	EPSD CAFETERIA FUND	NTI - LUNCH DAY 2	NTI - BREAKFAST DAY 1	888.80	D
D000013876	09/24/2026	ERIN GEIGER	SUPPLIES		417.18	D
D000013877	09/24/2026	EXECUTIVE EDUCATION ACADEMY CHARTER SCHOOL	PA CHARTER SCHOOL TUITION		75,139.74	D
D000013878	09/24/2026	FAST SIGNS OF EASTON	SIGNAGE	swimming boys	5,053.76	D
D000013879	09/24/2026	GRAINGER	OP BLDG-SUPPLIES		1,006.46	D
D000013880	09/24/2026	GREAT SPRING WATER	REFRESHEMENTS	REFRESHMENTS (FCS/WATER)	85.50	D
D000013881	09/24/2026	GROSS MCGINLEY, LLP	SP. ED. LEGAL PROFESSIONAL SERVICES		240.50	D
D000013882	09/24/2026	GUYETTE COMMUNICATION INDUSTRIES CORPORATION	COURTYARD SPEAKERS		2,409.00	D
D000013883	09/24/2026	HARNED DURHAM OIL COMPANY	BLANKET PURCHASE ORDER		3,667.23	D
D000013884	09/24/2026	HEATHER MOLNARKO	REIMBURSEMENT		89.88	D

FUND ACCOUNTING PAYMENT SUMMARY

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D000013885	09/24/2026	INSIGHT PA CYBER CHARTER SCHOOL	PA CHARTER SCHOOL TUITION		16,732.92	D
D000013886	09/24/2026	INSTITUTE FOR MULTI-SENSORY EDUCATION LLC	SUBSCRIPTION		250.00	D
D000013887	09/24/2026	IXL LEARNING, INC.	SPE Subscription / License		1,225.00	D
D000013888	09/24/2026	JACOB KISTLER	TUITION REIMB		1,602.00	D
D000013889	09/24/2026	JASON D BAKER	TUITION REIMB		1,680.00	D
D000013890	09/24/2026	JEFFREY ROBERT MCDERMOTT	STRIPE PARKING LOT AND CROSSWALKS		1,200.00	D
D000013891	09/24/2026	JENNA VENANZI CHROMIAK	EYE CARE INSURANCE	LICENSE RENEWAL	272.00	D
D000013892	09/24/2026	JENNIFER CAROLLA	SNACKS FOR PD LUNCH		105.17	D
D000013893	09/24/2026	JENNIFER CSORDAS	EYE CARE INSURANCE		150.00	D
D000013894	09/24/2026	JENNIFER M THOMAS	REIMBURSEMENT		99.99	D
D000013895	09/24/2026	JESSICA MORALES	TUITION REIMB		1,683.00	D
D000013896	09/24/2026	JOHNSON CONTROLS FIRE PROTECTION LP	REPAIR DOOR ACCESS AT LMMS	SERVICE CALL	7,667.30	D
D000013897	09/24/2026	JOHNSTONE SUPPLY	SUPPLIES		17.39	D
D000013898	09/24/2026	JONATHAN M BORDEN	INST STAFF CERT - TUIT REIMB		1,680.00	D
D000013899	09/24/2026	JONATHAN SHIRVINSKI	SUPPLIES (7TH GR/ELECTRIC ZEBRAS/SCIENCE)		9.77	D
D000013900	09/24/2026	JONATHAN ZOLOMIJ	REIMBURSEMENT		9,271.58	D
D000013901	09/24/2026	JORDAN FAINOR	INST STAFF CERT - TUIT REIMB		3,204.00	D
D000013902	09/24/2026	JULIANNE KAHL	INST STAFF CERT - TUIT REIMB	SUPPLIES (TECH ED)	904.92	D
D000013903	09/24/2026	JULIE CHALMERS	EYE CARE INSURANCE		105.00	D
D000013904	09/24/2026	JUSTINE FRANTZEN	REIMBURSEMENT		76.89	D
D000013905	09/24/2026	JW PEPPER & SON INC	GENERAL SUPPLIES	SUPPLIES	207.93	D

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D000013906	09/24/2026	JW PEPPER & SON INC	SUPPLIES		1,892.39	D
D000013907	09/24/2026	K&H CUSTOM WINDOW TREATMENTS	VERTICAL VANES		430.00	D
D000013908	09/24/2026	KAM COM TECHNOLOGIES INC	HP CHROMEBOOK PARTS STOCK	CHROMEBOOK CHARGERS	20,856.86	D
D000013909	09/24/2026	KAREN CHRIST	DUES REIMBURSEMENT		240.00	D
D000013910	09/24/2026	KATELYN TERPLAN	TUITION REIMB		1,674.38	D
D000013911	09/24/2026	KATHRYN MURRAY	SUPPLIES (6TH GRADE/SCIENCE)		23.76	D
D000013912	09/24/2026	KELLY SERVICES, INC.	CONTRACTED STUDENT SUPPORT SVCS		35,207.94	D
D000013913	09/24/2026	KEPLEEN SUIDA	SNACKS FOR SUMMER BRIDGE		8.97	D
D000013914	09/24/2026	KIMBERLY BEST	INST STAFF CERT - TUIT REIMB		1,602.00	D
D000013915	09/24/2026	KRE SECURITY LLC	LMMS Security	Eyer Security	2,850.87	D
D000013916	09/24/2026	KRISTEN BRUCKNER	EYE CARE INSURANCE		56.00	D
D000013917	09/24/2026	KRISTIN ERVIN	TUITION REIMB		5,033.26	D
D000013918	09/24/2026	KRISTY LYNN GRUBER	CONTRACTED STUDENT SVCS		5,250.00	D
D000013919	09/24/2026	KURTZ BROS INC.	CLASSROOM SUPPLIES	GENERAL SUPPLIES	223.90	D
D000013920	09/24/2026	LARS D CEDERBERG	INST STAFF CERT - TUIT REIMB		3,204.00	D
D000013921	09/24/2026	LAURA L WITMAN	Leaders Lunch 9/3/2026		160.45	D
D000013922	09/24/2026	LCTI-DISTRIBUTION CENTER	SUPPLIES		7,165.14	D
D000013923	09/24/2026	LEHIGH VALLEY CHARTER HIGH SCHOOL FOR THE ARTS INC	PA CHARTER SCHOOL TUITION		110,093.34	D
D000013924	09/24/2026	LEHIGHCAR	SETTLEMENT AGREEMENT - FEES		720.00	D
D000013925	09/24/2026	LINCOLN LEADERSHIP ACADEMY CHARTER SCHOOL	CHARTER TUITION REG ED - BRICK AND MORTAR	CHARTER TUITION SPEC ED - BRICK AND MORTAR	61,134.86	D
D000013926	09/24/2026	LINCOLN LIBRARY PRESS INC	SUBSCRIPTION		798.00	D

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Sort: **Payment Number**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount	
D000013927	09/24/2026	LINDA GITSKI	MILEAGE REIMBURSEMENT		16.72	D
D000013928	09/24/2026	LISA LECHMANIK	EYE CARE INSURANCE		125.00	D
D000013929	09/24/2026	LORI A SCHAEFFER	SUPPLIES (6TH GR/SCIENCE)		20.84	D
D000013930	09/24/2026	LUANN MATIKA	EYE CARE INSURANCE		203.00	D
D000013931	09/24/2026	MACMILLAN HOLDINGS LLC	EHS AP BUSINESS/FINANCE BOOKS		11,354.29	D
D000013932	09/24/2026	MADISYN KOWALICK	TUITION REIMB		460.00	D
D000013933	09/24/2026	MARCO TECHNOLOGIES LLC	PRINTER SUPPLIES	GENERAL SUPPLIES	2,625.46	D
D000013934	09/24/2026	MARK CACCAVO	EYE CARE INSURANCE		150.00	D
D000013935	09/24/2026	MATTHEW MORY	EYE CARE INSURANCE		150.00	D
D000013936	09/24/2026	MEGAN BEHR	INST STAFF CERT - TUIT REIMB		1,680.00	D
D000013937	09/24/2026	MEGAN FOSTER	MISCELLANEOUS REIMBURSEMENT		278.00	D
D000013938	09/24/2026	MELANIE OLIVIERI	INST STAFF CERT - TUIT REIMB	EYE CARE INSURANCE	1,833.00	D
D000013939	09/24/2026	NAZARETH MUSIC CENTER LTD	REPAIRS	REPAIRS-MAINTENANCE (MUSIC)	142.50	D
D000013940	09/24/2026	NICOLE FENSTERMAKER	MISCELLANEOUS REIMBURSEMENT		278.00	D
D000013941	09/24/2026	NICOLE M BOSSE	SUPPLIES (PBIS)		15.06	D
D000013942	09/24/2026	NORTHEAST CHEMICAL AND SUPPLY INC.	BLANKET PURCHASE ORDER		1,209.40	D
D000013943	09/24/2026	NORTHEAST JANITORIAL SUPPLY LLC	SUPPLIES		1,421.60	D
D000013944	09/24/2026	ODP BUSINESS SOLUTIONS	OFFICE SUPPLIES		122.38	D
D000013945	09/24/2026	OTTER GRAPHICS INC	PRINTER CARTRIDGES		1,101.00	D
D000013946	09/24/2026	PROASYS INC	OP BLDG-REPAIR/MAINT		1,227.25	D
D000013947	09/24/2026	QUILL CORPORATION	GENERAL SUPPLIES/ART	OFFICE SUPPLIES	90.80	D
D000013948	09/24/2026	REACH CYBER CHARTER SCHOOL	CHARTER TUITION REG ED - CYBER	CHARTER TUITION SPEC ED - CYBER	54,975.31	D

* - Non-Negotiable Disbursement + - Procurement Card Non-Negotiable # - Payable within Payment P - Prenote D - Direct Deposit C - Credit Card ^ - Virtual Payment

FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: KBGF - KEY BANK - GENERAL FUND **Payment Dates:** 09/01/2026 - 09/30/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards, Virtual Payments
Sort: **Payment Number**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount	
D000013949	09/24/2026	ROBERT SAUL	PETTY CASH - BUSINESS OFFICE		300.00	D
D000013950	09/24/2026	ROBERTO CLEMENTE CHARTER SCHOOL	CHARTER TUITION REG ED - BRICK AND MORTAR		4,300.73	D
D000013951	09/24/2026	ROBERTS OXYGEN COMPANY INC	OP BLDG-SUPPLIES		139.11	D
D000013952	09/24/2026	ROBYN GURNARI	STAFF DEV NONCERT - TUIT REIMB		3,204.00	D
D000013953	09/24/2026	RYAN K WILLIAMS	EYE CARE INSURANCE		150.00	D
D000013954	09/24/2026	SAMUEL HAFNER	REIMBURSEMENT		167.77	D
D000013955	09/24/2026	SAMUEL RAINERI	INST STAFF CERT - TUIT REIMB		5,049.00	D
D000013956	09/24/2026	SARA FRITZ	TUITION REIMB		840.00	D
D000013957	09/24/2026	SARAH BODNAR	INST STAFF CERT - TUIT REIMB		4,593.00	D
D000013958	09/24/2026	SARAH RABER	REG PROG - TRAVEL		54.64	D
D000013959	09/24/2026	SCHOLASTIC INC	SUBSCRIPTIONS		109.89	D
D000013960	09/24/2026	SCHOOL HEALTH CORP	NURSING-SUPPLIES		5.56	D
D000013961	09/24/2026	SCHOOL HEALTH CORP	NURSING-SUPPLIES		14.96	D
D000013962	09/24/2026	SCHOOL SPECIALITY LLC	GENERAL SUPPLIES	SUPPLIES	284.85	D
D000013963	09/24/2026	SHANNON FRASER	REIMBURSEMENT		119.76	D
D000013964	09/24/2026	SHARP ENERGY INC	TRANSPORTATION - DISTRICT FUEL		21,415.43	D
D000013965	09/24/2026	SKRIP PAVING & EXCAVATING LLC	EHS MANHOLE REPAIR		3,400.00	D
D000013966	09/24/2026	SPILLMAN FARMER ARCHITECTS	WALL RESTORATION	ASPHALT PAVING	10,575.00	D
D000013967	09/24/2026	STA CENTRAL REGION	PUPIL TRANSPORTATION		370,908.03	D
D000013968	09/24/2026	STEVE WEISS MUSIC	SUPPLIES		608.00	D
D000013969	09/24/2026	TARA DESIDERIO	GENERAL SUPPLIES		233.91	D
D000013970	09/24/2026	TAYLOR GETCHIUS	INST STAFF CERT - TUIT REIMB		3,204.00	D

* - Non-Negotiable Disbursement + - Procurement Card Non-Negotiable # - Payable within Payment P - Prenote D - Direct Deposit C - Credit Card ^ - Virtual Payment

FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: KBGF - KEY BANK - GENERAL FUND **Payment Dates:** 09/01/2026 - 09/30/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards, Virtual Payments
Sort: **Payment Number**

Payment #	Paymnt Dt	Vendor Name	Description Of Purchase	Description Of Purchase	Amount	
D000013971	09/24/2026	THE CERAMIC SHOP LLC	SUPPLIES		1,772.49	*D*
D000013972	09/24/2026	THERAPY BRIDGES LLC	SETTLEMENT PAYMENT	CONTRACTED OT SERVICES	285.00	*D*
D000013973	09/24/2026	THOMAS P MIRABELLA	EYE CARE INSURANCE	SUP OF STU - TRAVEL	540.43	*D*
D000013974	09/24/2026	TIMOTHY MURPHY	TUITION REIMB		2,001.00	*D*
D000013975	09/24/2026	ULINE	SUPPLIES		74.43	*D*
D000013976	09/24/2026	VERNIER SCIENCE EDUCATION	SUPPLIES		3,504.57	*D*
D000013977	09/24/2026	VIRGINIA HANNA	INST STAFF CERT - TUIT REIMB		2,278.50	*D*
D000013978	09/24/2026	WEIS MARKETS INC	SUPPLIES		21.55	*D*
D000013979	09/24/2026	WESLEY KLINE	INST STAFF CERT - TUIT REIMB		840.00	*D*
D000013980	09/24/2026	ZACHARY SABOL	INST STAFF CERT - TUIT REIMB		3,366.00	*D*
* PNCAUG2026	09/04/2026	PNC BENEFITS PLUS	PROFESSIONAL SERVICES		442.90	
* PSER091826	09/18/2026	PUBLIC SCHOOL EMPLOYEES' RETIREMENT SYSTEM	PAYROLL PAYABLES - RETIREMENT CONTRIBUTIONS	REG PROG-RETIRE	8,025,256.76	
* PYRL091426	09/14/2026	EPSD PAYROLL FUND	GF TO PAYROLL CASH TRANSFER ACCOUNT		3,580,934.83	
* PYRL092826	09/28/2026	EPSD PAYROLL FUND	PAYROLL ACCOUNT TRANSFER TOTAL	FSA ACCOUNT TRANSFER TOTAL	5,716,720.12	
* TRUISTBANK	09/01/2026	TRUIST BANK	TAX INCREMENT FINANCING RETURN - LOWER MACUNGIE		775,247.59	

* - Non-Negotiable Disbursement + - Procurement Card Non-Negotiable # - Payable within Payment P - Prenote D - Direct Deposit C - Credit Card ^ - Virtual Payment

FUND ACCOUNTING PAYMENT SUMMARY

Bank Account: KBGF - KEY BANK - GENERAL FUND **Payment Dates:** 09/01/2026 - 09/30/2026

Payment Categories: Regular Checks, Non-negotiable Disbursements, Direct Deposits, Manual Checks, Procurement Cards, Credit Cards, Virtual Payments
Sort: **Payment Number**

10 - GENERAL FUND	**21,970,056.43**
Grand Total All Funds	**21,970,056.43**
Grand Total Credit Cards	**0.00**
Grand Total Direct Deposits	**2,766,101.10**
Grand Total Manual Checks	**0.00**
Grand Total Other Disbursement Non-negotiables	**18,098,602.20**
Grand Total Procurement Card Other Disbursement Non-negotiables	**0.00**
Grand Total Regular Checks	**1,105,353.13**
Grand Total Virtual Payments	**0.00**
Grand Total All Payments	**21,970,056.43**

EAST PENN SCHOOL DISTRICT
TREASURER'S REPORT
AUGUST 31, 2026

GENERAL FUND

	BEGINNING BALANCE
CHECKING - KEY BANK	$3,189,047.50
CHECKING - KEY BANK FSA	$83,140.11
CHECKING - KEY BANK PAYROLL	$2,684,129.30
EHS COMMENCEMENT AWARDS	$7.20
POSTAGE TRUST ACCOUNT	$10,000.00
CHECKING - ARBITER SPORTS	$30,000.00
PETTY CASH - ATHLETIC GATE STARTUP	$3,000.00
PETTY CASH - SPECIAL EDUCATION	$0.00
PETTY CASH - BUSINESS OFFICE	$0.00
MONEY MARKET - PSDLAF	$3,936,890.35
MONEY MARKET - PSDLAF MEM AND SCH AWARDS	$21,562.69
INVESTMENTS - PSDLAF	$23,266,070.81
INVESTMENTS - PSDLAF MEM AND SCH AWARDS	$100,000.00
TOTAL BEGINNING BALANCES	$33,323,847.96

RECEIPTS	$23,705,940.80
DISBURSEMENTS	$9,392,964.09

	ENDING BALANCE
CHECKING - KEY BANK	$14,447,991.13
CHECKING - KEY BANK FSA	$89,959.25
CHECKING - KEY BANK PAYROLL	$5,748,648.60
EHS COMMENCEMENT AWARDS	$8.92
POSTAGE TRUST ACCOUNT	$10,000.00
CHECKING - ARBITER SPORTS	$30,000.00
PETTY CASH - ATHLETIC GATE STARTUP	$3,000.00
PETTY CASH - SPECIAL EDUCATION	$0.00
PETTY CASH - BUSINESS OFFICE	$0.00
MONEY MARKET - PSDLAF	$3,863,369.63
MONEY MARKET - PSDLAF MEM AND SCH AWARDS	$21,626.03
INVESTMENTS - PSDLAF	$23,322,221.11
INVESTMENTS - PSDLAF MEM AND SCH AWARDS	$100,000.00
TOTAL ENDING BALANCES	$47,636,824.67

CAFETERIA FUND

BEGINNING BALANCE	$2,791,373.32
RECEIPTS	$43,334.53
DISBURSEMENTS	$88,596.65
ENDING BALANCE	$2,746,111.20

OTHER FUNDS	BEGINNING BALANCE	ENDING BALANCE
CAPITAL RESERVE FUND	$11,724,240.29	$11,508,049.92
CAPITAL RESERVE FUND - RESTRICTED	$1,768,402.73	$1,770,281.11
MEMORIAL FUND	$70,401.43	$70,431.95
TECHNOLOGY STABILIZATION FUND	$880,306.15	$794,069.51

EAST PENN SCHOOL DISTRICT
TREASURER'S REPORT - INVESTMENTS
AUGUST 31, 2026

GENERAL FUND INVESTMENTS **Bank or Institution**	**Type**	**Purchase Date**	**Maturity Date**	**Investment Term**	**Interest Rate**	**Principal Amount**
PSDLAF	Full Flex CD Pool (NexB-1)	N/A	N/A	N/A	3.593%	$8,012,102.50
PSDLAF	Full Flex CD Pool (Bank 7)	N/A	N/A	N/A	3.590%	$5,326,407.42
PSDLAF	Full Flex CD Pool (Bank Plus)	N/A	N/A	N/A	3.590%	$5,127,811.19
PSDLAF - CFBank, National Association	General Fund CD	3/12/2026	3/12/2027	365	3.621%	$240,400.00
PSDLAF - GBank	General Fund CD	3/12/2026	3/12/2027	365	3.671%	$240,200.00
PSDLAF - Bank Hapoalim	General Fund CD	3/12/2026	3/12/2027	365	3.590%	$240,400.00
PSDLAF - T Bank, National Association	General Fund CD	3/12/2026	3/12/2027	365	3.621%	$240,400.00
PSDLAF - Providence Bank	General Fund CD	3/12/2026	3/12/2027	365	3.599%	$240,400.00
PSDLAF - CFG Bank	General Fund CD	3/12/2026	3/12/2027	365	3.593%	$240,400.00
PSDLAF - Solera National Bank	General Fund CD	3/12/2026	3/12/2027	365	3.650%	$240,300.00
PSDLAF - BOM Bank	General Fund CD	3/12/2026	3/12/2027	365	3.665%	$240,200.00
PSDLAF - Consumers Credit Union	General Fund CD	3/17/2026	3/17/2027	365	3.675%	$240,500.00
PSDLAF - Financial Federal Bank	General Fund CD	3/17/2026	3/17/2027	365	3.660%	$240,500.00
PSDLAF - Transportation Alliance Bank, Inc. d/b/a TAB Bank	General Fund CD	3/17/2026	3/17/2027	365	3.588%	$240,400.00
PSDLAF - First Bank of DeQueen	General Fund CD	3/19/2026	3/19/2027	365	3.633%	$240,400.00
PSDLAF - Oxford Bank	General Fund CD	3/19/2026	3/19/2027	365	3.630%	$240,500.00
PSDLAF - Cumberland Federal Bank	General Fund CD	3/19/2026	3/19/2027	365	3.630%	$240,500.00
PSDLAF - KS StateBank	General Fund CD	3/19/2026	3/19/2027	365	3.697%	$240,400.00
PSDLAF	Collateralized CD Pool	4/2/2026	4/7/2027	370	3.750%	$1,250,000.00
Subtotal General Fund						**$23,322,221.11**
PSDLAF - Cornerstone Bank	General Fund - Memorial and Scholarship Awards	3/6/2026	3/6/2028	731	3.632%	$100,000.00
General Fund Investment Total						**$23,422,221.11**

CAPITAL RESERVE INVESTMENTS **Bank or Institution**	**Type**	**Purchase Date**	**Maturity Date**	**Investment Term**	**Interest Rate**	**Principal Amount**
PSDLAF	Full Flex CD Pool (NexB-1)	N/A	N/A	N/A	3.593%	$10,215,484.10
Capital Reserve Investment Total						**$10,215,484.10**

MEMORIAL FUND INVESTMENTS **Bank or Institution**	**Type**	**Purchase Date**	**Maturity Date**	**Investment Term**	**Interest Rate**	**Principal Amount**
PSDLAF	Collateralized Pool Investment	4/2/2026	10/7/2027	553	3.805%	$60,000.00
Memorial Fund Investment Total						**$60,000.00**

INVESTMENT TOTAL	**$33,697,705.21**

Condensed Board Summary Report

Fund: 10
From 08/01/2026 To 08/31/2026
Summarization Level: FULL FUND/MAJOR FUNCTION/FULL FUNCTION

Account	Description	Current Budget	PTD Exp/Rev	YTD Exp/Rev	YTD Outstanding Enc	Balance	YTD% Used
6000	**GENERAL FUND - REVENUE FROM LOCAL SOURCES**						
6111	CURRENT REAL ESTATE TAXES	(128,138,691.00)	(16,070,225.86)	(21,060,519.44)	0.00	(107,078,171.56)	16.44
6112	INTERIM REAL ESTATE TAXES	(993,091.00)	0.00	0.00	0.00	(993,091.00)	0.00
6113	PUBLIC UTILITY REALTY TAXES	(120,605.00)	0.00	0.00	0.00	(120,605.00)	0.00
6114	PAYMENTS IN LIEU OF TAXES	(11,256.00)	0.00	0.00	0.00	(11,256.00)	0.00
6151	CURRENT ACT 511 EARNED INCOME TAXES	(13,179,841.00)	(2,130,900.34)	(2,354,753.07)	0.00	(10,825,087.93)	17.87
6153	CURRENT ACT 511 REAL ESTATE TRANSFER TAXES	(2,245,920.00)	(214,309.45)	(214,309.45)	0.00	(2,031,610.55)	9.54
6411	DELINQUENT REAL ESTATE TAXES	(1,698,569.00)	0.00	0.00	0.00	(1,698,569.00)	0.00
6451	DELINQUENT ACT 511 EARNED INCOME TAXES	0.00	0.00	0.00	0.00	0.00	0.00
6510	INTEREST ON INVESTMENTS	(2,216,832.00)	(81,458.95)	(164,096.79)	0.00	(2,052,735.21)	7.40
6710	ADMISSIONS	(68,546.00)	(660.00)	(660.00)	0.00	(67,886.00)	0.96
6720	BOOKSTORE SALES	0.00	0.00	0.00	0.00	0.00	0.00
6740	FEES	(170,116.00)	(316.00)	(316.00)	0.00	(169,800.00)	0.19
6750	SCHOOL SPONSORED ACTIVITIES AND SPECIAL EVENTS	(5,000.00)	0.00	0.00	0.00	(5,000.00)	0.00
6790	OTHER DISTRICT ACTIVITIES	(8,050.00)	0.00	(35.00)	0.00	(8,015.00)	0.43
6810	REVENUE FROM LOCAL GOVERNMENTS	(14,500.00)	0.00	0.00	0.00	(14,500.00)	0.00
6831	FEDERAL REVENUE RECEIVED FROM OTHER LEAS	(22,400.00)	0.00	0.00	0.00	(22,400.00)	0.00
6832	FEDERAL IDEA REVENUE RECEIVED FROM OTHER LEAS	(1,599,286.00)	0.00	0.00	0.00	(1,599,286.00)	0.00
6910	RENTALS	(54,678.00)	0.00	0.00	0.00	(54,678.00)	0.00
6920	CONTRIBUTIONS & DONATIONS FROM PRIVATE SOURCES	(100,000.00)	(910.00)	(910.00)	0.00	(99,090.00)	0.91
6942	SUMMER SCHOOL TUITION	(30,000.00)	0.00	(500.00)	0.00	(29,500.00)	1.67
6943	ADULT EDUCATION TUITION	0.00	0.00	0.00	0.00	0.00	0.00
6944	TUITION RECEIPTS FROM OTHER PA LEAS	(90,000.00)	0.00	0.00	0.00	(90,000.00)	0.00
6949	OTHER TUITION FROM PATRONS	(22,300.00)	(2,250.00)	(8,250.00)	0.00	(14,050.00)	37.00
6991	REFUND OF PRIOR YEAR EXPENDITURES	(50,000.00)	(723.11)	(723.11)	0.00	(49,276.89)	1.45

Condensed Board Summary Report

Fund: 10
From 08/01/2026 To 08/31/2026
Summarization Level: FULL FUND/MAJOR FUNCTION/FULL FUNCTION

Account	Description	Current Budget	PTD Exp/Rev	YTD Exp/Rev	YTD Outstanding Enc	Balance	YTD% Used
6992	ENERGY EFFICIENCY REVENUES & INCENTIVES	(39,340.00)	(19,898.15)	(68,633.08)	0.00	29,293.08	174.46
6999	OTHER REVENUE	(36,275.00)	(3,510.60)	(4,010.60)	0.00	(32,264.40)	11.06
	MAJOR FUNCTION TOTAL	**(150,915,296.00)**	**(18,525,162.46)**	**(23,877,716.54)**	**0.00**	**(127,037,579.46)**	**15.82**
7000	**GENERAL FUND - REVENUE FROM STATE SOURCE**						
7111	BASIC EDUCATION FUNDING	(18,293,216.00)	(2,512,743.35)	(2,512,743.35)	0.00	(15,780,472.65)	13.74
7144	CYBER CHARTER TRANSITION	0.00	0.00	0.00	0.00	0.00	0.00
7160	TUITION FOR ORPHANS & PRIVATE HOME PLACEMENTS	(115,953.00)	0.00	0.00	0.00	(115,953.00)	0.00
7250	MIGRATORY CHILDREN	0.00	0.00	(80.00)	0.00	80.00	0.00
7271	SPECIAL EDUCATION FUNDING FOR SCHOOL AGED PUPILS	(5,125,381.00)	0.00	(764,925.00)	0.00	(4,360,456.00)	14.92
7311	PUPIL TRANSPORTATION SUBSIDY	(2,024,329.00)	(182,944.00)	(182,944.00)	0.00	(1,841,385.00)	9.04
7312	NONPUBLIC & CHARTER PUPIL TRANSPORTATION SUBSIDY	(356,895.00)	0.00	0.00	0.00	(356,895.00)	0.00
7320	RENTAL & SINKING FUND PAYMENTS	(194,769.00)	0.00	0.00	0.00	(194,769.00)	0.00
7331	STATE REIMBURSEMENT FOR HEALTH SERVICES	(151,609.00)	0.00	0.00	0.00	(151,609.00)	0.00
7332	FEMININE HYGIENE PRODUCT FUNDING	0.00	0.00	0.00	0.00	0.00	0.00
7340	STATE PROPERTY TAX REDUCTION ALLOCATION	(3,165,477.00)	(1,582,738.00)	(1,582,738.00)	0.00	(1,582,739.00)	50.00
7369	OTHER SAFE SCHOOL GRANTS	(136,820.00)	0.00	0.00	0.00	(136,820.00)	0.00
7531	READY TO LEARN BLOCK GRANT FOUNDATION	(2,895,143.00)	0.00	0.00	0.00	(2,895,143.00)	0.00
7532	ADEQUACY SUPPLEMENT	(1,094,579.00)	0.00	0.00	0.00	(1,094,579.00)	0.00
7599	OTHER STATE REVENUE	0.00	0.00	0.00	0.00	0.00	0.00
7810	STATE SHARE SS & MED	(3,229,503.00)	(904,626.45)	(904,626.45)	0.00	(2,324,876.55)	28.01
7820	STATE SHARE OF RETIREMENT CONTRIBUTIONS	(14,049,752.00)	2,273.46	2,273.46	0.00	(14,052,025.46)	(0.02)
	MAJOR FUNCTION TOTAL	**(50,833,426.00)**	**(5,180,778.34)**	**(5,945,783.34)**	**0.00**	**(44,887,642.66)**	**11.70**
8000	**GENERAL FUND - REVENUE FROM FEDERAL SOURCES**						
8514	ESEA - TITLE I	(962,115.00)	0.00	0.00	0.00	(962,115.00)	0.00
8515	ESEA - TITLE II	(170,548.00)	0.00	0.00	0.00	(170,548.00)	0.00

Condensed Board Summary Report

Fund: 10
From 08/01/2026 To 08/31/2026
Summarization Level: FULL FUND/MAJOR FUNCTION/FULL FUNCTION

Account	Description	Current Budget	PTD Exp/Rev	YTD Exp/Rev	YTD Outstanding Enc	Balance	YTD% Used
8516	ESEA - TITLE III	(30,004.00)	0.00	0.00	0.00	(30,004.00)	0.00
8517	ESEA - TITLE IV	(72,583.00)	0.00	0.00	0.00	(72,583.00)	0.00
8810	SCHOOL BASED ACCESS MEDICAID REIMBURSEMENT PROGRAM	(252,095.00)	0.00	0.00	0.00	(252,095.00)	0.00
8820	MEDICAL ASSISTANCE REIMBURSEMENT FOR CLAIM FILING	(42,583.00)	0.00	0.00	0.00	(42,583.00)	0.00
	MAJOR FUNCTION TOTAL	**(1,529,928.00)**	**0.00**	**0.00**	**0.00**	**(1,529,928.00)**	**0.00**
9000	**GENERAL FUND - OTHER FINANCING SOURCES**						
9220	LEASES AND OTHER RIGHT TO USE ARRANGEMENTS	0.00	0.00	0.00	0.00	0.00	0.00
9290	OTHER EXTENDED TERM FINANCING PROCEEDS	0.00	0.00	0.00	0.00	0.00	0.00
9370	TRUST & CUSTODIAL FUND TRANSFERS	0.00	0.00	0.00	0.00	0.00	0.00
9400	SALE OF FIXED ASSETS	0.00	0.00	0.00	0.00	0.00	0.00
9990	INSURANCE RECOVERIES	0.00	0.00	0.00	0.00	0.00	0.00
	MAJOR FUNCTION TOTAL	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Fund 10 Totals							
	Total Expenditure	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	Total Other Expenditure	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	Total Revenue	**(203,278,650.00)**	**(23,705,940.80)**	**(29,823,499.88)**	**0.00**	**(173,455,150.12)**	**14.67**
	Total Other Revenue	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
		(203,278,650.00)	**(23,705,940.80)**	**(29,823,499.88)**	**0.00**	**(173,455,150.12)**	

Condensed Board Summary Report

Grand Totals	Current Budget	PTD Exp/Rev	YTD Exp/Rev	YTD Outstanding Enc	Balance	YTD% Used
Total Expenditure	0.00	0.00	0.00	0.00	0.00	0.00
Total Other Expenditure	0.00	0.00	0.00	0.00	0.00	0.00
Total Revenue	(203,278,650.00)	(23,705,940.80)	(29,823,499.88)	0.00	(173,455,150.12)	14.67
Total Other Revenue	0.00	0.00	0.00	0.00	0.00	0.00
	(203,278,650.00)	(23,705,940.80)	(29,823,499.88)	0.00	(173,455,150.12)	

Condensed Board Summary Report

Fund: 10
From 08/01/2026 To 08/31/2026
Summarization Level: FULL FUND/SUB FUNCTION/MAJOR OBJECT

Account	Description	Current Budget	PTD Exp/Rev	YTD Exp/Rev	YTD Outstanding Enc	Balance	YTD% Used
1100	**GENERAL FUND - REGULAR PROGRAMS - ELEMENTARY / SECONDARY**						
100	PERSONNEL SERVICES - SALARIES	46,715,229.00	3,983.27	4,195.72	0.00	46,711,033.28	0.01
200	PERSONNEL SERVICES - EMPLOYEE BENEFITS	33,078,456.00	1,091,420.99	2,176,254.87	21,212.00	30,880,989.13	6.64
300	PURCHASED PROFESSIONAL & TECHNICAL SERVICES	528,000.00	0.00	32,533.00	0.00	495,467.00	6.16
400	PURCHASED PROPERTY SERVICES	690,125.00	17,781.29	32,368.44	10,932.90	646,823.66	6.27
500	OTHER PURCHASED SERVICES	6,792,950.00	327,389.72	406,768.54	3,550.00	6,382,631.46	6.04
600	SUPPLIES	2,570,122.00	513,377.33	1,051,533.57	191,706.66	1,326,881.77	48.37
700	PROPERTY	26,627.00	1,254.00	1,254.00	6,842.00	18,531.00	30.41
800	OTHER OBJECTS	21,000.00	1,885.00	2,365.00	2,620.76	16,014.24	23.74
	SUB FUNCTION TOTAL	**90,422,509.00**	**1,957,091.60**	**3,707,273.14**	**236,864.32**	**86,478,371.54**	**4.36**
1200	**GENERAL FUND - SPECIAL PROGRAMS - ELEMENTARY / SECONDARY**						
100	PERSONNEL SERVICES - SALARIES	14,478,806.00	66,770.52	95,501.31	0.00	14,383,304.69	0.66
200	PERSONNEL SERVICES - EMPLOYEE BENEFITS	9,129,564.00	278,117.54	553,407.89	0.00	8,576,156.11	6.06
300	PURCHASED PROFESSIONAL & TECHNICAL SERVICES	5,261,614.00	26,122.01	28,820.31	471,244.69	4,761,549.00	9.50
400	PURCHASED PROPERTY SERVICES	0.00	0.00	0.00	0.00	0.00	0.00
500	OTHER PURCHASED SERVICES	5,965,585.00	260,482.73	437,411.19	827,290.50	4,700,883.31	21.20
600	SUPPLIES	160,250.00	26,114.07	29,389.66	16,286.10	114,574.24	28.50
800	OTHER OBJECTS	4,308.00	0.00	0.00	0.00	4,308.00	0.00
	SUB FUNCTION TOTAL	**35,000,127.00**	**657,606.87**	**1,144,530.36**	**1,314,821.29**	**32,540,775.35**	**7.03**
1300	**GENERAL FUND - VOCATIONAL EDUCATION**						
500	OTHER PURCHASED SERVICES	4,105,842.00	773,877.07	1,002,180.97	3,102,356.03	1,305.00	99.97
	SUB FUNCTION TOTAL	**4,105,842.00**	**773,877.07**	**1,002,180.97**	**3,102,356.03**	**1,305.00**	**99.97**
1400	**GENERAL FUND - OTHER INSTRUCTIONAL PROG - ELEMENTARY / SECONDARY**						
100	PERSONNEL SERVICES - SALARIES	108,550.00	6,809.00	11,105.00	0.00	97,445.00	10.23
200	PERSONNEL SERVICES - EMPLOYEE BENEFITS	45,416.00	2,848.87	4,565.66	0.00	40,850.34	10.05

Condensed Board Summary Report

Fund: 10
From 08/01/2026 To 08/31/2026
Summarization Level: FULL FUND/SUB FUNCTION/MAJOR OBJECT

Account	Description	Current Budget	PTD Exp/Rev	YTD Exp/Rev	YTD Outstanding Enc	Balance	YTD% Used
300	PURCHASED PROFESSIONAL & TECHNICAL SERVICES	0.00	0.00	0.00	0.00	0.00	0.00
400	PURCHASED PROPERTY SERVICES	1,000.00	0.00	0.00	568.36	431.64	56.84
500	OTHER PURCHASED SERVICES	7,000.00	0.00	1,818.00	0.00	5,182.00	25.97
600	SUPPLIES	4,000.00	113.74	113.74	1,986.21	1,900.05	52.50
800	OTHER OBJECTS	0.00	0.00	0.00	0.00	0.00	0.00
	SUB FUNCTION TOTAL	**165,966.00**	**9,771.61**	**17,602.40**	**2,554.57**	**145,809.03**	**12.15**
1500	**GENERAL FUND - NONPUBLIC SCHOOL PROGRAMS**						
300	PURCHASED PROFESSIONAL & TECHNICAL SERVICES	40,247.00	0.00	0.00	0.00	40,247.00	0.00
600	SUPPLIES	218.00	238.76	238.76	0.00	(20.76)	109.52
	SUB FUNCTION TOTAL	**40,465.00**	**238.76**	**238.76**	**0.00**	**40,226.24**	**0.59**
1600	**GENERAL FUND - ADULT EDUCATION PROGRAMS**						
100	PERSONNEL SERVICES - SALARIES	4,000.00	0.00	0.00	0.00	4,000.00	0.00
200	PERSONNEL SERVICES - EMPLOYEE BENEFITS	1,674.00	0.00	0.00	0.00	1,674.00	0.00
500	OTHER PURCHASED SERVICES	909,487.00	181,581.42	181,581.42	726,405.58	1,500.00	99.84
600	SUPPLIES	1,500.00	101.00	101.00	0.00	1,399.00	6.73
	SUB FUNCTION TOTAL	**916,661.00**	**181,682.42**	**181,682.42**	**726,405.58**	**8,573.00**	**99.06**
2100	**GENERAL FUND - SUPPORT SERVICES - STUDENTS**						
100	PERSONNEL SERVICES - SALARIES	4,469,486.00	135,773.21	226,158.10	0.00	4,243,327.90	5.06
200	PERSONNEL SERVICES - EMPLOYEE BENEFITS	3,378,722.00	182,878.00	352,930.87	0.00	3,025,791.13	10.45
300	PURCHASED PROFESSIONAL & TECHNICAL SERVICES	1,153,690.00	16,910.71	16,910.71	784,049.29	352,730.00	69.43
400	PURCHASED PROPERTY SERVICES	0.00	0.00	0.00	0.00	0.00	0.00
500	OTHER PURCHASED SERVICES	18,300.00	668.31	668.31	5,104.69	12,527.00	31.55
600	SUPPLIES	178,692.00	29,078.87	30,213.06	6,246.56	142,232.38	20.40
800	OTHER OBJECTS	8,165.00	1,310.00	1,310.00	0.00	6,855.00	16.04

Condensed Board Summary Report

Fund: 10
From 08/01/2026 To 08/31/2026
Summarization Level: FULL FUND/SUB FUNCTION/MAJOR OBJECT

Account	Description	Current Budget	PTD Exp/Rev	YTD Exp/Rev	YTD Outstanding Enc	Balance	YTD% Used
	SUB FUNCTION TOTAL	**9,207,055.00**	**366,619.10**	**628,191.05**	**795,400.54**	**7,783,463.41**	**15.46**
2200	**GENERAL FUND - SUPPORT SERVICES - INSTRUCTIONAL STAFF**						
100	PERSONNEL SERVICES - SALARIES	2,590,519.00	125,024.60	244,121.84	0.00	2,346,397.16	9.42
200	PERSONNEL SERVICES - EMPLOYEE BENEFITS	2,353,048.00	145,387.92	266,199.12	0.00	2,086,848.88	11.31
300	PURCHASED PROFESSIONAL & TECHNICAL SERVICES	121,241.00	67,268.74	70,032.74	0.00	51,208.26	57.76
400	PURCHASED PROPERTY SERVICES	6,000.00	0.00	0.00	0.00	6,000.00	0.00
500	OTHER PURCHASED SERVICES	26,450.00	348.11	348.11	4,535.92	21,565.97	18.47
600	SUPPLIES	309,625.00	21,030.24	183,504.27	10,819.31	115,301.42	62.76
700	PROPERTY	3,700.00	0.00	0.00	0.00	3,700.00	0.00
800	OTHER OBJECTS	207,500.00	151,937.83	161,921.87	12,553.07	33,025.06	84.08
	SUB FUNCTION TOTAL	**5,618,083.00**	**510,997.44**	**926,127.95**	**27,908.30**	**4,664,046.75**	**16.98**
2300	**GENERAL FUND - SUPPORT SERVICES - ADMINISTRATION**						
100	PERSONNEL SERVICES - SALARIES	4,869,146.00	390,593.25	776,868.01	0.00	4,092,277.99	15.95
200	PERSONNEL SERVICES - EMPLOYEE BENEFITS	3,790,239.00	370,926.23	679,034.16	0.00	3,111,204.84	17.92
300	PURCHASED PROFESSIONAL & TECHNICAL SERVICES	326,867.00	18,325.23	30,925.23	288,563.50	7,378.27	97.74
400	PURCHASED PROPERTY SERVICES	17,200.00	0.00	0.00	3,754.40	13,445.60	21.83
500	OTHER PURCHASED SERVICES	107,140.00	4,488.58	6,175.58	20,743.42	80,221.00	25.13
600	SUPPLIES	191,720.00	4,643.19	40,119.43	19,426.93	132,173.64	31.06
700	PROPERTY	0.00	0.00	0.00	0.00	0.00	0.00
800	OTHER OBJECTS	54,300.00	2,642.74	29,213.20	4,833.00	20,253.80	62.70
	SUB FUNCTION TOTAL	**9,356,612.00**	**791,619.22**	**1,562,335.61**	**337,321.25**	**7,456,955.14**	**20.30**
2400	**GENERAL FUND - SUPPORT SERVICES - PUPIL HEALTH**						
100	PERSONNEL SERVICES - SALARIES	1,583,737.00	5,504.23	7,432.31	0.00	1,576,304.69	0.47
200	PERSONNEL SERVICES - EMPLOYEE BENEFITS	1,012,045.00	34,271.18	66,947.29	0.00	945,097.71	6.62

Condensed Board Summary Report

Fund: 10
From 08/01/2026 To 08/31/2026
Summarization Level: FULL FUND/SUB FUNCTION/MAJOR OBJECT

Account	Description	Current Budget	PTD Exp/Rev	YTD Exp/Rev	YTD Outstanding Enc	Balance	YTD% Used
300	PURCHASED PROFESSIONAL & TECHNICAL SERVICES	83,000.00	1,410.50	7,910.50	0.00	75,089.50	9.53
400	PURCHASED PROPERTY SERVICES	5,000.00	280.00	280.00	0.00	4,720.00	5.60
500	OTHER PURCHASED SERVICES	500.00	0.00	0.00	0.00	500.00	0.00
600	SUPPLIES	84,100.00	4,172.35	38,547.64	2,771.32	42,781.04	49.13
	SUB FUNCTION TOTAL	**2,768,382.00**	**45,638.26**	**121,117.74**	**2,771.32**	**2,644,492.94**	**4.48**
2500	**GENERAL FUND - SUPPORT SERVICES - BUSINESS**						
100	PERSONNEL SERVICES - SALARIES	744,972.00	57,082.18	114,164.36	0.00	630,807.64	15.32
200	PERSONNEL SERVICES - EMPLOYEE BENEFITS	561,536.00	50,141.55	94,634.92	0.00	466,901.08	16.85
300	PURCHASED PROFESSIONAL & TECHNICAL SERVICES	47,300.00	3,724.39	14,172.74	23,324.70	9,802.56	79.28
400	PURCHASED PROPERTY SERVICES	4,500.00	375.00	750.00	3,750.00	0.00	100.00
500	OTHER PURCHASED SERVICES	12,800.00	399.37	399.37	13,100.63	(700.00)	105.47
600	SUPPLIES	82,400.00	4,078.43	29,255.79	47,970.38	5,173.83	93.72
800	OTHER OBJECTS	8,050.00	909.80	6,057.80	0.00	1,992.20	75.25
	SUB FUNCTION TOTAL	**1,461,558.00**	**116,710.72**	**259,434.98**	**88,145.71**	**1,113,977.31**	**23.78**
2600	**GENERAL FUND - OPERATION & MAINTENANCE OF PLANT SERVICES**						
100	PERSONNEL SERVICES - SALARIES	6,657,224.00	490,829.92	954,353.62	0.00	5,702,870.38	14.34
200	PERSONNEL SERVICES - EMPLOYEE BENEFITS	5,121,722.00	382,397.87	735,503.10	8,233.53	4,377,985.37	14.52
300	PURCHASED PROFESSIONAL & TECHNICAL SERVICES	347,834.00	1,750.38	13,535.18	251,603.02	82,695.80	76.23
400	PURCHASED PROPERTY SERVICES	1,245,165.00	287,345.39	380,828.62	669,054.80	195,281.58	84.32
500	OTHER PURCHASED SERVICES	655,159.00	8,221.28	512,932.55	99,681.45	42,545.00	93.51
600	SUPPLIES	3,170,109.00	313,284.90	412,040.14	2,319,601.93	438,466.93	86.17
700	PROPERTY	59,000.00	38,533.20	38,533.20	0.00	20,466.80	65.31
800	OTHER OBJECTS	10,000.00	300.00	521.00	0.00	9,479.00	5.21
	SUB FUNCTION TOTAL	**17,266,213.00**	**1,522,662.94**	**3,048,247.41**	**3,348,174.73**	**10,869,790.86**	**37.05**

Condensed Board Summary Report

Fund: 10
From 08/01/2026 To 08/31/2026
Summarization Level: FULL FUND/SUB FUNCTION/MAJOR OBJECT

Account	Description	Current Budget	PTD Exp/Rev	YTD Exp/Rev	YTD Outstanding Enc	Balance	YTD% Used
2700	**GENERAL FUND - STUDENT TRANSPORTATION SERVICES**						
200	PERSONNEL SERVICES - EMPLOYEE BENEFITS	0.00	0.00	0.00	0.00	0.00	0.00
500	OTHER PURCHASED SERVICES	13,522,718.00	203,010.47	204,746.84	12,044,971.16	1,273,000.00	90.59
	SUB FUNCTION TOTAL	**13,522,718.00**	**203,010.47**	**204,746.84**	**12,044,971.16**	**1,273,000.00**	**90.59**
2800	**GENERAL FUND - SUPPORT SERVICES - CENTRAL**						
100	PERSONNEL SERVICES - SALARIES	1,027,758.00	72,302.52	145,605.04	0.00	882,152.96	14.17
200	PERSONNEL SERVICES - EMPLOYEE BENEFITS	895,462.00	54,405.06	108,798.05	0.00	786,663.95	12.15
300	PURCHASED PROFESSIONAL & TECHNICAL SERVICES	319,640.00	14,499.39	162,282.95	10,169.40	147,187.65	53.95
400	PURCHASED PROPERTY SERVICES	75,048.00	3,492.72	3,492.72	38,153.22	33,402.06	55.49
500	OTHER PURCHASED SERVICES	64,097.00	603.98	1,205.87	16,834.13	46,057.00	28.14
600	SUPPLIES	214,307.00	36,682.47	37,690.40	598.92	176,017.68	17.87
700	PROPERTY	1,020.00	0.00	0.00	0.00	1,020.00	0.00
800	OTHER OBJECTS	559.00	0.00	0.00	0.00	559.00	0.00
	SUB FUNCTION TOTAL	**2,597,891.00**	**181,986.14**	**459,075.03**	**65,755.67**	**2,073,060.30**	**20.20**
2900	**GENERAL FUND - OTHER SUPPORT SERVICES**						
500	OTHER PURCHASED SERVICES	153,501.00	55.42	7,055.42	3,712.88	142,732.70	7.02
	SUB FUNCTION TOTAL	**153,501.00**	**55.42**	**7,055.42**	**3,712.88**	**142,732.70**	**7.02**
3200	**GENERAL FUND - STUDENT ACTIVITIES**						
100	PERSONNEL SERVICES - SALARIES	1,146,134.00	20,959.13	41,574.09	0.00	1,104,559.91	3.63
200	PERSONNEL SERVICES - EMPLOYEE BENEFITS	557,902.00	15,119.52	30,098.05	0.00	527,803.95	5.39
300	PURCHASED PROFESSIONAL & TECHNICAL SERVICES	88,466.00	0.00	0.00	0.00	88,466.00	0.00
400	PURCHASED PROPERTY SERVICES	37,790.00	559.00	559.00	0.00	37,231.00	1.48
500	OTHER PURCHASED SERVICES	386,226.00	11.10	46,811.10	46,938.90	292,476.00	24.27
600	SUPPLIES	218,378.00	46,336.71	47,036.04	83,277.28	88,064.68	59.67
700	PROPERTY	0.00	0.00	0.00	0.00	0.00	0.00

Condensed Board Summary Report

Fund: 10
From 08/01/2026 To 08/31/2026
Summarization Level: FULL FUND/SUB FUNCTION/MAJOR OBJECT

Account	Description	Current Budget	PTD Exp/Rev	YTD Exp/Rev	YTD Outstanding Enc	Balance	YTD% Used
800	OTHER OBJECTS	60,118.00	2,075.00	10,805.00	838.00	48,475.00	19.37
	SUB FUNCTION TOTAL	**2,495,014.00**	**85,060.46**	**176,883.28**	**131,054.18**	**2,187,076.54**	**12.34**
3300	**GENERAL FUND - COMMUNITY SERVICES**						
100	PERSONNEL SERVICES - SALARIES	69,943.00	0.00	0.00	0.00	69,943.00	0.00
200	PERSONNEL SERVICES - EMPLOYEE BENEFITS	5,781.00	0.00	0.00	0.00	5,781.00	0.00
300	PURCHASED PROFESSIONAL & TECHNICAL SERVICES	0.00	0.00	0.00	0.00	0.00	0.00
400	PURCHASED PROPERTY SERVICES	500.00	0.00	0.00	500.00	0.00	100.00
600	SUPPLIES	14,100.00	459.39	459.39	0.00	13,640.61	3.26
800	OTHER OBJECTS	0.00	0.00	0.00	0.00	0.00	0.00
	SUB FUNCTION TOTAL	**90,324.00**	**459.39**	**459.39**	**500.00**	**89,364.61**	**1.06**
3400	**GENERAL FUND - SCHOLARSHIPS AND AWARDS**						
800	OTHER OBJECTS	0.00	0.00	0.00	0.00	0.00	0.00
	SUB FUNCTION TOTAL	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
4600	**GENERAL FUND - EXISTING BUILDING IMPROVEMENT SERVICES**						
700	PROPERTY	22,063.00	0.00	0.00	0.00	22,063.00	0.00
	SUB FUNCTION TOTAL	**22,063.00**	**0.00**	**0.00**	**0.00**	**22,063.00**	**0.00**
5100	**GENERAL FUND - DEBT SERVICE AND OTHER FINANCING USES**						
800	OTHER OBJECTS	147,700.00	0.00	0.00	147,700.00	0.00	100.00
900	OTHER USES OF FUNDS	1,395,000.00	0.00	0.00	1,395,000.00	0.00	100.00
	SUB FUNCTION TOTAL	**1,542,700.00**	**0.00**	**0.00**	**1,542,700.00**	**0.00**	**100.00**
5200	**GENERAL FUND - INTERFUND TRANSFERS - OUT**						
900	OTHER USES OF FUNDS	6,524,966.00	2,000,000.00	2,000,000.00	4,524,966.00	0.00	100.00
	SUB FUNCTION TOTAL	**6,524,966.00**	**2,000,000.00**	**2,000,000.00**	**4,524,966.00**	**0.00**	**100.00**
5900	**GENERAL FUND - BUDGETARY RESERVE**						

Condensed Board Summary Report

Fund: 10
From 08/01/2026 To 08/31/2026
Summarization Level: FULL FUND/SUB FUNCTION/MAJOR OBJECT

Account	Description	Current Budget	PTD Exp/Rev	YTD Exp/Rev	YTD Outstanding Enc	Balance	YTD% Used
800	OTHER OBJECTS	10,163,900.00	0.00	0.00	0.00	10,163,900.00	0.00
	SUB FUNCTION TOTAL	**10,163,900.00**	**0.00**	**0.00**	**0.00**	**10,163,900.00**	**0.00**
Fund 10 Totals							
	Total Expenditure	**195,210,984.00**	**7,405,087.89**	**13,447,182.75**	**22,228,717.53**	**159,535,083.72**	**18.28**
	Total Other Expenditure	**18,231,566.00**	**2,000,000.00**	**2,000,000.00**	**6,067,666.00**	**10,163,900.00**	**44.25**
	Total Revenue	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	Total Other Revenue	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
		213,442,550.00	**9,405,087.89**	**15,447,182.75**	**28,296,383.53**	**169,698,983.72**	

Condensed Board Summary Report

Grand Totals	Current Budget	PTD Exp/Rev	YTD Exp/Rev	YTD Outstanding Enc	Balance	YTD% Used
Total Expenditure	**195,210,984.00**	**7,405,087.89**	**13,447,182.75**	**22,228,717.53**	**159,535,083.72**	**18.28**
Total Other Expenditure	**18,231,566.00**	**2,000,000.00**	**2,000,000.00**	**6,067,666.00**	**10,163,900.00**	**44.25**
Total Revenue	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total Other Revenue	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	213,442,550.00	**9,405,087.89**	**15,447,182.75**	**28,296,383.53**	**169,698,983.72**	

STUDENT ACTIVITY ACCOUNT SUMMARY

Fund: 80 - STUDENT ACTIVITY FUND From 08/01/2026 to 08/31/2026

Activity Account	Beginning Balance	Receipts	Expended	Adjustments	Transfer Amends	Ending Balance
710 - LMMS BAND	1,673.91	0.00	0.00	0.00	0.00	1,673.91
711 - LMMS BUILDERS CLUB	84.08	0.00	0.00	0.00	0.00	84.08
713 - LMMS CHORUS	3,069.84	0.00	0.00	0.00	0.00	3,069.84
715 - LMMS INTEREST ACCUMULATION ACCOUNT	2,795.53	97.69	0.00	0.00	0.00	2,893.22
716 - LMMS ORCHESTRA	1,551.78	0.00	0.00	0.00	0.00	1,551.78
717 - LMMS PLAYS	13,710.90	0.00	0.00	0.00	0.00	13,710.90
718 - LMMS HIVE A	684.23	0.00	0.00	0.00	0.00	684.23
719 - LMMS SKI CLUB	4,421.93	0.00	0.00	0.00	0.00	4,421.93
720 - LMMS STUDENT BODY	17,375.10	0.00	0.00	0.00	0.00	17,375.10
721 - LMMS STUDENT COUNCIL	9,908.73	0.00	0.00	0.00	0.00	9,908.73
722 - LMMS SUCCESS TEAM	6,215.31	0.00	0.00	0.00	0.00	6,215.31
723 - LMMS YEARBOOK	2,833.65	0.00	0.00	0.00	0.00	2,833.65
724 - LMMS 6TH GRADE CLASS	13,375.87	0.00	0.00	0.00	0.00	13,375.87
725 - LMMS 7TH GRADE CLASS	5,467.20	0.00	0.00	0.00	0.00	5,467.20
726 - LMMS 8TH GRADE CLASS	8,529.07	0.00	0.00	0.00	0.00	8,529.07
727 - LMMS HIVE B	1.00	0.00	0.00	0.00	0.00	1.00
760 - EYER BAND	2,717.66	0.00	(389.00)	0.00	0.00	2,328.66
761 - EYER BUILDERS CLUB	2,366.88	0.00	0.00	0.00	0.00	2,366.88
762 - EYER INTEREST ACCUMULATION ACCOUNT	1,067.68	59.76	0.00	0.00	0.00	1,127.44
764 - EYER MUSICAL	7,342.67	0.00	0.00	0.00	0.00	7,342.67
765 - EYER ORCHESTRA	158.11	0.00	0.00	0.00	0.00	158.11
766 - EYER PAWS	4,165.76	0.00	0.00	0.00	0.00	4,165.76
767 - EYER SCHOOL STORE	5,194.11	0.00	0.00	0.00	0.00	5,194.11

STUDENT ACTIVITY ACCOUNT SUMMARY

Fund: 80 - STUDENT ACTIVITY FUND From 08/01/2026 to 08/31/2026

Activity Account	Beginning Balance	Receipts	Expended	Adjustments	Transfer Amends	Ending Balance
768 - EYER SKI & SNOWBOARD CLUB	5,278.99	0.00	0.00	0.00	0.00	5,278.99
769 - EYER STEM CLUB	2,050.31	0.00	0.00	0.00	0.00	2,050.31
770 - EYER STUDENT BODY	19,448.88	0.00	0.00	0.00	0.00	19,448.88
771 - EYER STUDENT COUNCIL	2,984.72	0.00	0.00	0.00	0.00	2,984.72
773 - EYER CHORUS	1,421.00	0.00	0.00	0.00	0.00	1,421.00
810 - EHS AMERICAN COMPUTER SCIENCE LEAGUE	2,230.42	0.00	0.00	0.00	0.00	2,230.42
811 - EHS ACADEMIC TEAM	778.44	0.00	0.00	0.00	0.00	778.44
812 - EHS NATIONAL ART HONOR SOCIETY	1,214.19	0.00	0.00	0.00	0.00	1,214.19
813 - EHS ASTRONOMY CLUB	1,417.43	0.00	0.00	0.00	0.00	1,417.43
814 - EHS BAND CLUB	4,203.46	4,975.00	0.00	0.00	0.00	9,178.46
815 - EHS FASHION CLUB	794.52	0.00	0.00	0.00	0.00	794.52
816 - EHS CHESS CLUB	1,612.97	0.00	0.00	0.00	0.00	1,612.97
817 - EHS SHAVE THE BRAVE	620.00	0.00	0.00	0.00	0.00	620.00
818 - EHS UNIFIED BEST MATES	2,429.34	0.00	0.00	0.00	0.00	2,429.34
819 - EHS MUSLIM STUDENT ASSOC.	1,455.90	0.00	0.00	0.00	0.00	1,455.90
827 - EHS CLASS OF 2027	8,244.97	0.00	0.00	0.00	0.00	8,244.97
828 - EHS CLASS OF 2028	3,208.63	0.00	0.00	0.00	0.00	3,208.63
829 - EHS CLASS OF 2029	1,190.72	0.00	0.00	0.00	0.00	1,190.72
841 - EHS COLLAGE	392.94	0.00	0.00	0.00	0.00	392.94
842 - EHS DANCE TEAM	390.79	0.00	0.00	0.00	0.00	390.79
843 - EHS DEBATE TEAM	446.18	0.00	0.00	0.00	0.00	446.18
844 - EHS THEATER CLUB	6,723.14	0.00	0.00	0.00	0.00	6,723.14
845 - EHS EARTHWATCH CLUB	1,079.99	0.00	0.00	0.00	0.00	1,079.99
846 - EHS ENVIROTHON	2,126.38	0.00	0.00	0.00	0.00	2,126.38

STUDENT ACTIVITY ACCOUNT SUMMARY

Fund: 80 - STUDENT ACTIVITY FUND From 08/01/2026 to 08/31/2026

Activity Account	Beginning Balance	Receipts	Expended	Adjustments	Transfer Amends	Ending Balance
847 - EHS FBLA	2,025.50	0.00	0.00	0.00	0.00	2,025.50
850 - EHS FRENCH CLUB	498.65	0.00	0.00	0.00	0.00	498.65
851 - EHS GAY STRAIGHT ALLIANCE	449.45	0.00	0.00	0.00	0.00	449.45
852 - EHS GERMAN CLUB	1,150.16	0.00	0.00	0.00	0.00	1,150.16
853 - EHS GLOBAL CITIZENS CLUB	1,091.76	0.00	0.00	0.00	0.00	1,091.76
854 - EHS HABITAT FOR HUMANITY	717.21	0.00	0.00	0.00	0.00	717.21
855 - EHS HEALTH WELLNESS & FITNESS CLUB	2,195.65	0.00	0.00	0.00	0.00	2,195.65
856 - EHS INTERACT CLUB	1,493.42	0.00	(40.74)	0.00	0.00	1,452.68
857 - EHS INTEREST ACCUMULATION ACCOUNT	6,846.81	169.74	0.00	0.00	0.00	7,016.55
858 - EHS JASPER CLUB	1,600.36	0.00	0.00	0.00	0.00	1,600.36
859 - EHS KEY CLUB	3,020.86	0.00	0.00	0.00	0.00	3,020.86
860 - EHS KID TO KID / SADD	2,116.00	0.00	0.00	0.00	0.00	2,116.00
861 - EHS LATIN CLUB	54.83	0.00	0.00	0.00	0.00	54.83
863 - EHS MUDD CLUB	3,256.80	0.00	0.00	0.00	0.00	3,256.80
864 - EHS CHORAL CLUB	5,015.51	0.00	(1,254.24)	0.00	0.00	3,761.27
865 - EHS NATIONAL HONOR SOCIETY	5,630.76	0.00	0.00	0.00	0.00	5,630.76
867 - EHS NO PLACE FOR HATE	538.31	0.00	0.00	0.00	0.00	538.31
868 - EHS ORCHESTRA	4,334.97	0.00	0.00	0.00	0.00	4,334.97
869 - EHS PA MATH LEAGUE	474.28	0.00	0.00	0.00	0.00	474.28
870 - EHS PEDIATRIC CANCER CLUB	799.56	0.00	0.00	0.00	0.00	799.56
871 - EHS PEERS ASSISTING LEARNING SUPPORT	759.36	0.00	0.00	0.00	0.00	759.36
872 - EHS PHYSICS CLUB	2,253.64	0.00	0.00	0.00	0.00	2,253.64
873 - EHS RED CROSS	2,188.57	0.00	0.00	0.00	0.00	2,188.57

STUDENT ACTIVITY ACCOUNT SUMMARY

Fund: 80 - STUDENT ACTIVITY FUND From 08/01/2026 to 08/31/2026

Activity Account	Beginning Balance	Receipts	Expended	Adjustments	Transfer Amends	Ending Balance
874 - EHS ROBOTICS	1,428.70	0.00	(771.16)	0.00	0.00	657.54
875 - EHS SCHOOL STORE	8,452.39	0.00	0.00	0.00	0.00	8,452.39
876 - EHS SCIENCE OLYMPIAD	602.41	53.12	0.00	0.00	0.00	655.53
877 - EHS SPANISH CLUB	889.87	0.00	0.00	0.00	0.00	889.87
878 - EHS STINGER	2,512.50	0.00	0.00	0.00	0.00	2,512.50
880 - EHS STUDENT GOVERNMENT (SGA)	32,769.31	0.00	(749.90)	0.00	0.00	32,019.41
881 - EHS TATTLER-YEARBOOK	1,623.95	0.00	0.00	0.00	0.00	1,623.95
882 - EHS TRI-M MUSIC HONOR SOCIETY	476.27	0.00	0.00	0.00	0.00	476.27
883 - EHS MODEL UNITED NATIONS	251.04	0.00	0.00	0.00	0.00	251.04
884 - EHS YOUNG DEMOCRATS	1,524.29	0.00	0.00	0.00	0.00	1,524.29
885 - EHS YOUNG REPUBLICANS	120.70	0.00	0.00	0.00	0.00	120.70
886 - EHS AEVIDUM	2,543.96	0.00	0.00	0.00	0.00	2,543.96
888 - EHS SKI AND RIDE CLUB	3,702.62	0.00	0.00	0.00	0.00	3,702.62
890 - EHS POWER TECH CLUB	298.76	0.00	0.00	0.00	0.00	298.76
891 - EHS BLACK STUDENT UNION	254.66	0.00	0.00	0.00	0.00	254.66
892 - EHS HYROPONICS CLUB	328.80	0.00	0.00	0.00	0.00	328.80
893 - EHS THINK PINK CLUB	1,010.94	0.00	0.00	0.00	0.00	1,010.94
894 - EHS GROOVE CLUB	879.66	0.00	0.00	0.00	0.00	879.66
895 - EHS CHEM CLUB	118.43	0.00	0.00	0.00	0.00	118.43
896 - EHS BAKING CLUB	382.41	0.00	0.00	0.00	0.00	382.41
897 - EHS SCIENCE NHS	303.27	0.00	(300.00)	0.00	0.00	3.27
898 - EHS MORGANS MESSAGE	778.50	0.00	0.00	0.00	0.00	778.50
899 - EYER AVEDIUM	1,597.98	0.00	0.00	0.00	0.00	1,597.98
900 - EHS HOSA	168.03	0.00	0.00	0.00	0.00	168.03

STUDENT ACTIVITY ACCOUNT SUMMARY

Fund: 80 - STUDENT ACTIVITY FUND From 08/01/2026 to 08/31/2026

Activity Account	Beginning Balance	Receipts	Expended	Adjustments	Transfer Amends	Ending Balance
901 - EHS WORLD LANGUAGE H.S.	1,805.50	0.00	0.00	0.00	0.00	1,805.50
INSTRUCTIONAL ORG 20 TOTALS	**299,792.68**	**5,355.31**	**(3,505.04)**	**0.00**	0.00	**301,642.95**
FUND 80 TOTALS	**299,792.68**	**5,355.31**	**(3,505.04)**	**0.00**	0.00	**301,642.95**
GRAND TOTALS	**299,792.68**	**5,355.31**	**(3,505.04)**	**0.00**	0.00	**301,642.95**

PPL CENTER
LICENSE AGREEMENT

Licensee's Name: East Penn School District
State of Organization: Pennsylvania
Licensee's Address: 800 Pine Street
Emmaus, PA 18049
Date of Agreement: August 26, 2026

Facility ("Facility"): PPL Center
701 Hamilton Street
Allentown, PA 18101

Contact Person Name: Carrie Okken
Contact Person Phone #: 610-965-1670

Date(s)/Times(s) of use ("Term"): Sunday, June 6 2027, 1pm ceremony start time. Friday June 4 2027 rehearsal 8am
Expected attendance: 5,000

Area(s) of Facility that Licensee may use ("Licensed Areas"): PPL Center Arena

Description of event to be held ("Event"): 2027 HS Graduation Ceremony

Deposit amount & due date: 50% of fee ($11,000) due upon signing

Fee: Flat fee of Twenty Two Thousand Dollars ($22,000) plus any production related expenses. Per Section 2, any food and beverage must be purchased separately from the venue's food and beverage concessionaire and from no other party.

Fee due date: Thirty (30) Days after the receipt of the final invoice.

This License Agreement ("Agreement") is between Global Spectrum, L.P., a Delaware limited partnership, as agent on behalf of BDH Development, LLC ("Venue"), and the licensee listed above ("Licensee"). Venue and Licensee agree as follows:

1. Grant of License. Subject to the terms and conditions of this Agreement, Venue grants Licensee a limited license to enter the Facility and access the Licensed Areas during the Term for the purpose of holding the Event. The Term may not be extended without the Venue's prior written approval and any approved extension may result in additional fees.

2. Duties of the Venue. The Venue shall, at Licensee's sole cost, provide (or cause to be provided) personnel necessary to set-up and take-down the Event, security personnel and other necessary support services customarily provided by the Venue for a like event, and additional items, equipment, personnel and services which Licensee requests to be provided in connection with the Event and which the Venue is reasonably able to provide, such as personnel necessary for production requirements, and lighting and/or sound equipment, all of which shall be subject to the approval of the Venue. Food and beverage is not included in Fees and must be purchased separately from the Venue food and beverage concessionaire for the Facility and from no other party.

3. Fees. Licensee shall pay the Venue the Fee no later than the due date set forth above. In the event Licensee fails to make any payment when due, interest shall accrue at the rate of 1 ½ % per month (18% per annum), or the maximum rate permitted by law, whichever is less. The form of payment shall be money order, wire transfer, or certified check, unless agreed to otherwise by the Venue.

4. Non-Refundable Deposit. As set forth above, a non-refundable deposit has been paid to the Venue. Such deposit shall be credited to the Fee. Licensee shall not be entitled to the payment of any interest on the deposit. This deposit is non-refundable without regard to whether Licensee uses the Facility, unless such non-use is due to an Event

of Force Majeure under Section 11 or due to a termination of this Agreement by Licensee under Section 8. Failure to pay deposit may result in loss of preferred date set forth in this contract.

5. Licenses & Permits. Licensee shall secure in advance, prior to commencement of the Term, all licenses, permits and approvals required under applicable laws in connection with its use of the Facility for the Event, including, without limitation, any permits required by the fire department or licenses required by any performance rights organizations for music utilized in the Event.

6. Indemnification, Warranty, Survival.

a. Indemnification. Licensee hereby agrees to indemnify, defend, save and hold harmless the Venue, and their respective successors and assigns, and each of their respective partners, agents, officers, directors, employees and representatives (collectively, "Indemnitees") from and against claims, suits, losses, injuries, damages, liabilities and expenses, including, without limitation, reasonable attorneys' fees and expenses ("Claims or Costs"), occasioned in connection with, arising or alleged to arise from, wholly or in part, (i) any breach of this Agreement by Licensee, or (ii) any breach by Licensee of the privileges herein granted, or (iii) the negligent acts or omissions or violation of any applicable law, rule, regulation or order, of or by Licensee or any of its employees, agents, servants, officers, and directors, during the Term or any other time while the Facility (or any part thereof) is used by or are under the control of Licensee, but only to the extent that such Claims or Costs are proximately caused by the negligence of Licensee or any of its employees, agents, servants, officers, and directors. Licensee shall be obligated to indemnify, defend, save and hold harmless Indemnitees for COVID-19 related Claims or Costs, but only if arising out of the Licensee's negligent acts or omissions, and only to the extent that such Claims or Costs are proximately caused by the negligence of Licensee or any of its employees, agents, servants, officers, and directors. Licensee's agreement to indemnify, defend, save and hold harmless the Indemnities shall not apply to any Claims or Costs proximately caused by the negligence of the Indemnitees. It is further the intent of this Agreement that this indemnity provision shall apply to any claims against the Venue made by an employee of Licensee who received compensation under the Licensee's workers' compensation policy, provided that the Licensee's workers compensation policy includes coverage for indemnification liability protection.

b. Warranty. The Venue makes no warranty or representation to Licensee of any kind (express or implied) regarding the suitability of or compliance with applicable laws by the Facility for any aspect of Licensee's intended use. Notwithstanding that no warranty or representation to Licensee had been made as aforesaid, a claim or cause of action shall not be barred or waived if an injury to person or property is caused by the negligence of the Indemnitees. Further, notwithstanding that no warranty or representation to Licensee has been made as aforesaid, a claim or cause of action shall not be barred or waived if Venue is aware of or should have been aware of any defect, hazardous condition or code violation on or in the Facility, which causes an injury to person or property.

c. Licensee agrees that all of its property or property of others in or on the Facility shall be used and/or stored in the Facility at the sole risk of Licensee, and Licensee hereby waives and releases the Venue and the Indemnitees from any and all Claims or Costs related thereto to the fullest extent permitted by law, unless caused by the negligence of Venue.

d. The provisions of this Section 6 shall survive any expiration or termination of this Agreement.

7. Insurance.

a. Licensee shall obtain, at its own cost and expense, commercial general liability insurance in the name of Licensee which insures all operations of Licensee (including the operations of Licensee contemplated by this Agreement), and Licensee's contractual assumption of liability as set forth in this Agreement. Such insurance shall be written with a limit of at least One Million Dollars ($1,000,000.00) for bodily injury, property damage and personal injury. Licensee shall also cause the required policy to be endorsed to include the Indemnitees as additional insureds. Licensee shall cause such insurance to be deemed primary to and not contributory with any insurance coverage or self-insured program of any of the Indemnitees. Insurance effected or

procured by Licensee hereunder will not reduce or limit Licensee's contractual obligation to indemnify and defend the Indemnitees hereunder.

b Licensee shall also maintain, at its own cost and expense, workers' compensation insurance in respect of all employees, and any borrowed, leased or other person to whom such compensation may be payable by Licensee.

c. Licensee, at least thirty (30) days prior to the commencement of the Term (or immediately upon execution hereof, if less than thirty (30) days remain before the Term's commencement), shall provide to the Venue evidence of the insurance required in the form of a Certificate of Insurance. If the insurance policies terms and conditions permit, the Certificate of Insurance shall so note, that the coverages may not be canceled or that a major change in coverage may not be implemented without at least thirty (30) days' prior written notice given to the Venue. All insurance policies shall be issued by insurance companies rated by the Commonwealth of Pennsylvania or as otherwise agreed by the parties. All such policies shall be in such form and contain such provisions as are generally considered standard for the type of insurance involved.

d. The Venue shall also have the right to prohibit Licensee or any subcontractor of Licensee from entering the Facility until such Certificate(s) of Insurance or other evidence that insurance has been obtained in complete compliance with this Agreement is received by the Venue. Licensee's failure to maintain the insurance required herein may, at the sole discretion of the Venue, result in termination of this Agreement. IN THE EVENT OF SUCH TERMINATION BY the VENUE, THERE SHALL BE NO FURTHER LIABILITY OF ANY KIND OR NATURE WHATSOEVER BY THE VENUE TO LICENSEE, AND THE VENUE SHALL RETAIN THE RIGHT TO PROCEED WITH A LEGAL ACTION AGAINST LICENSEE TO RECOVER ANY AND ALL DAMAGES (INCLUDING WITHOUT LIMITATION LOSS OF PROFITS) SUSTAINED BY THE VENUE BY REASON OF LICENSEE'S DEFAULT HEREUNDER.

e. In the event that Licensee fails to procure and present the aforesaid insurance, the Venue shall have the right, but not the obligation, to do so on Licensee's behalf and at Licensee's expense and shall be entitled to reimbursement for the costs thereof as part of the Fee due and payable hereunder.

8. Termination. If either party fails to comply with any of the terms and conditions of this Agreement (including without limitation failure by Licensee to make any payment when due) and such failure is not remedied within 10 days of its receipt of written notice regarding such failure, the other party may terminate this Agreement by written notice, without prejudice to any other legal rights or remedies such other party may have. Notwithstanding the foregoing, in no event shall the Venue or Licensee be liable for any special, consequential, indirect, or punitive damages.

9. Compliance with Laws and Facility Rules. Venue and Licensee shall comply with, and shall cause any person under its direction and control in regard to the performance of this Agreement to comply with, all laws, regulations, and ordinances applicable to its performance under this Agreement ("Compliance Obligations"). The Compliance Obligations include, without limitation, compliance with all laws, regulations, ordinances and Facility rules implemented to reduce the risk of transmission of COVID-19. Unless otherwise expressly stated herein, any items or services provided by the Venue to Licensee to assist Licensee in performing its Compliance Obligations (such as providing facial coverings to protect against the spread of COVID-19) shall be the sole responsibility of Licensee and reimbursable to the Venue in accordance with Section 3. Licensee shall not use or attempt to use any part of the Premises for any use or proposed use which would be contrary to law, common decency or good morals or otherwise improper or detrimental to the reputation of Venue.

10. Use of the Facility.

a. Licensee shall not, without the Venue's prior written consent, sell or bring into the Facility any equipment, food or beverages or any other items, or engage in any commercial or fund raising activity.

b. Licensee shall use the Facility in a safe and careful manner. Licensee shall not (and shall ensure that its employees, agents and servants do not) mar, deface or injure any part of the Facility. Upon expiration of the Term, Licensee shall deliver the Facility in as good condition and repair and in the condition received at the beginning of the Term, normal wear and tear excepted. Licensee must fully comply with the fire code of the

jurisdiction where the Facility is located and all rules and standards of the local fire department, which may require securing a license or permit to conduct certain activities contemplated under this Agreement. Use of combustible material is forbidden. Licensee shall not (and shall ensure that its employees, agents and servants do not) cover or conceal in any manner whatsoever from public view or access the fire-fighting equipment in the Facility, such as fire extinguishers and fire hose cabinets and exits.

c. The use of the Facility shall be coordinated with a designated representative of the Venue, who shall have the right to be present at and supervise Licensee's activities. Licensee shall follow any and all reasonable instructions of the Venue's representative. The Venue does not relinquish the right to control the management of the Facility by virtue of Licensee's use. The Venue shall at all times have the right to limit the number of people attending the Event for the purpose of ensuring the safety of people and property at the Facility. In the event that Venue limits the number of people attending the Event to a number that is less than the Expected Attendance as set forth above, Licensee shall have the option to terminate this Agreement and in such event the Deposit shall be fully refunded to Licensee and the parties hereto shall have no liability to each other and this Agreement shall be void and of no force or effect. If, in the sole judgment of the Venue, Licensee's or its guests' or invitees' use of the Facility poses a danger to the safety of others, or a risk of damage to the Facility or any property, the Venue may eject people from the Facility as it sees fit, restrict Licensee's activities at the Facility or time period of use, and/or cancel the Event and terminate this Agreement.

11. Force Majeure. Should the Facility or any material part thereof be destroyed or damaged by fire or by any other cause, or if any Event of Force Majeure (as defined below) shall render the fulfillment of this Agreement by the Venue impracticable, this Agreement shall terminate and the Venue shall not be liable or responsible to Licensee for any damage or loss caused thereby. In such event, and provided that such casualty loss of Event of Force Majeure was not caused by an act or omission of Licensee or its employees, agents or servants, the Venue shall return the Deposit or other advance payment to Licensee less any documented out-of-pocket costs incurred by the Venue in connection with the Event. Should it be impracticable or unreasonable for Licensee to take possession of the Facility for the Event as set forth above due to an Event of Force Majeure, without limiting the terms of the preceding two sentences, neither the Venue nor Licensee shall have any liability under the Agreement and Licensee, as its sole remedy and relief, shall receive a refund of any uncommitted or advance payments including its deposit. "Event of Force Majeure" means any occurrence or condition beyond the reasonable control of the party asserting it that as a matter of practicability or reasonableness prevents such party from performing its obligations under this Agreement and may include, without limitation, fire, earthquake, flood, act of God, strike, lockout or other labor dispute, pandemic, epidemic, or widespread virus or disease, governmental order or guidance, or governmental law, rule or regulation enacted after the effective date of this Agreement; provided, however, that under no circumstances shall the monetary inability of a party to perform be considered an Event of Force Majeure.

12. Notices. All notices shall be in writing and shall be deemed delivered 3 days after deposit in the U.S. mail, certified, return receipt requested, to the addresses set forth above. Alternatively, a notice may also be sent by email to an email address provided by the parties, which shall be deemed delivered by either a returned confirmation of receipt or proof that the email was sent on a date and time to the email address provided by the party.

13. Governing Law and Venue. This Agreement is governed by and is to be construed in accordance with the laws of the Commonwealth of Pennsylvania, without regard to the Commonwealth's conflict of laws principles. Any action arising out of or in connection with this Agreement or the conduct, or acts of the parties hereunder shall be brought in the Court of Common Pleas of Lehigh County, Pennsylvania, and the parties agree to submit to the exclusive jurisdiction of said court and consent to the venue in said court.

14. Ticketing.

a. Suites and Premium Seating. Licensee acknowledges that use of all suites and premium seating areas in the Facility are not part of the Licensed Premises and that any revenue derived from the utilization or license of such suites and other premium seating areas in connection with the Event shall be reserved for the Venue.

b. Seating. All admittance into the Facility for the Event shall be by ticket only. The tickets will be offered on a "general admission" basis, unless the parties mutually agree otherwise. The form and content of tickets shall be in accordance with any and all rules and regulations of the Venue. The Venue shall not permit tickets or passes in excess of the seating capacity of the Facility to be sold or distributed.

c. Box Office Services.

There are three options for ticketing services for your event at PPL Center.

1. No tickets are provided by PPL Center; Licensee reserves the right to print and use their own tickets for their event. No Box Office Cost associated with this option.

2. Hard Tickets, printed by PPL Center and provided to the Licensee, up to 7,500. This option has the cost associated with the staff needed to print the tickets requested by the Licensee.

3. Online Ticketing through TM.com. This option has a $1.00 per tickets charge paid by the Licensee upon settlement. Under this option, tickets purchased and redeemed carry this $1.00 per ticket charge.

Example - If 1,000 tickets are purchased/redeemed but only 500 tickets are scanned in for the event, Licensee is charged for the 1,000 purchased/redeemed.

15. Miscellaneous.

a. This Agreement constitutes the entire agreement and understanding of the parties with respect to its subject matter, and supersedes any and all prior agreements, understanding or communications between the parties whether written or oral. This Agreement may not be amended except by a writing signed by both parties. No waiver shall be effective unless it is in writing and is signed by the party to be charged. No delay or failure to exercise any right or remedy accruing to any party shall impair any such right or remedy, nor shall it be construed as a waiver of any future right or remedy. This Agreement shall be binding upon and inure to the benefit of all successors and permitted assigns. Licensee shall not assign or transfer this Agreement in whole or in part without the prior written consent of the Venue. If any provision of this Agreement is declared invalid or unenforceable by a court of competent jurisdiction, such provision shall be severed from the remainder of this Agreement, which shall remain in full force and effect. This Agreement may be executed in any number of counterparts (including by .pdf), each of which will be deemed an original, but all of which taken together shall constitute one single agreement.

b. Immunity. Nothing in this Agreement including the provisions of Sections 6 and 7 constitutes or shall be considered as a waiver of any provision of the applicable laws which affords protections in the nature of sovereign or governmental immunity to the Licensee or its employees, agents, servants, officers or directors.

In Witness Whereof, the parties hereto causes this Agreement to be executed in its name and on its behalf by the officers hereinafter named and on the dates as hereafter set forth.

Global Spectrum, L.P., as agent on behalf of BDH Development, LLC:	East Penn School District
	By:_____
By:_____	Name:_____
Name: Brian Krajewski	Title:_____
Title: General Manager	
Date: _____	Date: _____

EAST PENN SCHOOL DISTRICT

Budget Transfers

October 12, 2026

OVERVIEW

The administration recommends a budget transfer within the General Fund in the amount of $71,317 to reallocate existing budget authority from the Communities in Schools contractual services account to salary and benefit accounts for a Student Supports Coordinator at Eyer Middle School. The transfer reflects the decision to discontinue full-year Communities in Schools services at Eyer Middle School and instead provide those services through a District-employed position.

This budget transfer represents a redirection of existing budgeted funds and does not increase total General Fund expenditures. The 2026-2027 budget included $186,350 for Communities in Schools, while the Board-approved 2026-2027 contract totals $115,033, leaving $71,317 available to support the salary and benefit costs of the new Student Supports Coordinator position.

BUDGETARY TRANSFER PROOF

Year: 2026-27 FISCAL YEAR

Sort: Transfer ID

Transfer ID / Description	Transfer Date	Batch	Dt Posted / Entered By
20261019-01-AF	10/19/2026		
EYER STU SUPPORT COORDINATOR			AFREY

From Account Code / ASN / Description	From Amount	To Account Code	To Amount
10-2160-330-002-00-000-000-000-0000 COMMUNITIES IN SCHOOLS	(71,317.00)		
		10-2160-131-000-20-532-000-000-0000 STUDENT SUPPORTS COORDINATOR	39,500.00
		10-2160-211-000-20-532-000-000-0000 STUDENT SUPPORTS COORDINATOR	22,693.00
		10-2160-212-000-20-532-000-000-0000 STUDENT SUPPORTS COORDINATOR	688.00
		10-2160-213-000-20-532-000-000-0000 STUDENT SUPPORTS COORDINATOR	54.00
		10-2160-220-000-20-532-000-000-0000 STUDENT SUPPORTS COORDINATOR	1,511.00
		10-2160-230-000-20-532-000-000-0000 STUDENT SUPPORTS COORDINATOR	6,634.00
		10-2160-260-000-20-532-000-000-0000 STUDENT SUPPORTS COORDINATOR	237.00
Totals	**(71,317.00)**		**71,317.00**

EAST PENN SCHOOL DISTRICT

STUDENT ACTIVITY ACCOUNT ADVISORS AND OFFICERS

2026-2027

Student Activity Name	Acct #	Advisor	Advisor	President	Vice President	Secretary	Treasurer
EYER MIDDLE SCHOOL							
EYER BAND	760	Carrie England		Brandon (Myatt) Murphy	Esmy Carias	Elizabeth Becker	Amelia Alwine-Balliro
EYER BUILDERS CLUB	761	Kelsey Torpey		Alex Peters	Liya Srinath	Elizabeth Becker	Olivia Cancelerie
EYER MUSICAL	764	Jen Najarian		Maggie Kieres	Liya Srinath	Ava Schilleci	Elizabeth Becker
EYER ORCHESTRA	765	Ryan Williams		Alexis Michaud	Mia Lacertosa	Sampath Muthiah	Alex Peters
EYER PAWS	766	Misty Armstrong		Kayla Devenuto	Stella Shoenfelt	Nora Schoenfelt	Caroline Kackenmeister
EYER SCHOOL STORE	767	Chris Gaines	Donna Batz	Brianna Devenuto	Stella Shoenfelt	Nora Schoenfelt	Caroline Kackenmeister
EYER SKI & SNOWBOARD CLUB	768	Carrie England	Kate Berndt	Kayla Devenuto	Cali Haldemann	Logan Barnett	Liam Shirk
EYER STEM CLUB	769	Nicole Gillen		Lucas Weiss	Colton Getz	Emily Baker	Camilla Asanza
EYER STUDENT BODY	770	Tom Ruhf	Misty Armstrong		Harper Hittinger	Brody Nelson	Noah Nutas
EYER STUDENT COUNCIL	771	Dave Budinas		Jiya Patel	Stella Schoenfeldt	Liyashree Srinath	Kayla Devenuto
EYER CHORUS	773	August Matrisch		Caroline Kackenmeister	Avery Zarnas	Mia Lacertosa	Levi Marion Pinto
EYER AVEDIUM	889	Kevin Gee		FInn Candio	Kate Grubb	Eliana Ngo	Sarah Grubb
EYER GAME CHANGERS GUILD	775	Brendan Davis		Gavin Cairns	Peter Call	James Williams	Lance Colon
LOWER MACUNGIE MIDDLE SCHOOL							
LMMS BAND	710	Brian Langdon	Jennifer Shubzda	Erin Peters	Robie Abellera	Jack Fioriglio	Margaret Harries
LMMS BUILDERS CLUB	711	Megan Tucker		Katy Nero	Dominic Hyneman	Arianna Dayoub	Nashla Sanchez
LMMS CHORUS	713	Kelly McCartney	Jennifer Shubzda	Allijae Miller	Kara Rhyder	Maren Rhyder	Grace Whitaker
LMMS ORCHESTRA	716	Connie Arnold	Jennifer Shubzda	Madison Goldman	Ivan Remmen	Teo Ceron	Tilghman Reichert
LMMS PLAYS	717	Patrick Campbell	Jennifer Shubzda	Tilghman Reichert	Erin McDermott	Mia Ferro	Addie Meier
LMMS HIVE A	718	Megan Freeman		Addison Schantz	Arden Kenny	Lillian Fritz	Adelynn Klimas
LMMS SKI CLUB	719	Phillip"Rett" Fisher		Amelia Fisher	Hudson Barrett	Ellie Basile	Weston Binkley
LMMS STUDENT BODY	720	Dennine Leschinsky	Clare Harvey; Patrick Campbell	Henry Shutte	Amelia Fisher	Claire Shutte	Levi Smith
LMMS STUDENT COUNCIL	721	Heather Herman	Kadie Smith	Arshia Pasricha	Sarah Gruber	Diomary Febo	Levi Smith
LMMS SUCCESS TEAM	722	Katrina Rainford	Phillip Fisher; Lars Cederberg				
LMMS YEARBOOK	723	Madeline Richards		Lia Hernandez	Tessa Jaremenko	Adelynne Klimas	Emma Huff
LMMS 6TH GRADE CLASS	724	Lori Schaeffer	Tanya Scisly; Brian Miller	Sophia Miller	Daniel Swenson	Zachary Stoffa	Avery Lennon
LMMS 7TH GRADE CLASS	725	Anthony Toto	Michele Fowkes; Meaghan Buck; John Cari; Justin Solt	Nixon Trate	Veronica Felegy	Ella Finelli	Harper Comstock
LMMS 8TH GRADE CLASS	726	Nicole Plantier	Ron Malischewski; Allison Haas; Maddie Kohutka-Richards	Xella Sallit	Sarah Gruber	Tilghman Reichert	Amelia Ferro
LMMS NATIONAL JUNIOR HONOR SOCIETY	728	Lori Schaeffer	Megan Tucker	Charlotte Charnegie	Margaret Harries	Lauren Kichline	Kyper Palanski
EMMAUS HIGH SCHOOL							
ACADEMIC TEAM	811	Brent Ohl	Kevin Bisignani	Meenapriya Muthiah	Ian Hoenscheid	Laura Dreabit	Tyler Iyengar
ASTRONOMY CLUB	813	Andrew McConville		Chase Miller	Indra Bautista	Chase Frantzen	Kyra Limo
BUZZ MAGAZINE	815	Lori Babel		Keira Martino	Gabby Tranguch	Megan Martino	Reese Newhat
HORNET GRAPHICS	821	Steve Braglio		Danielle Rivera	Danielle Rivera	Danielle Rivera	Danielle Rivera
PICKLEBALL CLUB	823	Dian McKinney	Alon Hogan	Lia Duong	Tyler Eid	Tejas Kayam	Peter Tran
CLASS OF 2027	827	Rachel Richwine	Veronica Baez	Marjoley Bauer	Joshua Diaz	Magdelena Carolla	Carson Mosel
CLASS OF 2028	828	Dian McKinney	Lauren Gibson	Sullivan Hochbein	Sam Pechulis	Eleanor Lyons	Hannah Cox
CLASS OF 2029	829	Rachel Milliron	Kara Grice	Joyce Danial	Daniel Prosser	Daniel Santos	Ben Grice
THEATER CLUB	844	Jill Kuebler		Ashley Urland	Abigail Hotlz	Benjamin Wilks	Julia Visco
FBLA	847	Sarah Kinzel		Jeanne Chen	Krishna Nemani; Nina Zhang	Emmalyn Wachter	Danica Dela Cruz
FRENCH CLUB	850	Celine Pissarra		Natalie Curran	Desiree Brown	Laura Dreabit	Rachel Toussaint
GERMAN	852	Kevin Bisignani		Cole Creasy	Alison Arey	Lilliana Grois	Emersen Bennet
GLOBAL CITIZENS	853	Megan Maybray	Jess Morales	Nina Zhang; Ritz Abellerra		Merand Alnader	Merand Alnader
JASPER	858	Briana Luancing		Grace Remmel; Madison Rzonca	Mia Renninger	Cayden Saul	Maya Reeves

EAST PENN SCHOOL DISTRICT

STUDENT ACTIVITY ACCOUNT ADVISORS AND OFFICERS

2026-2027

Student Activity Name	Acct #	Advisor	Advisor	President	Vice President	Secretary	Treasurer
KEY CLUB	859	Melissa Brito		Arianna Simko	Brooke Raggi	Lila Williams; Addison Lausch	Emma Klicker; Hannah Barbehen
KID TO KID/SADD	860	Jeannine Ross		Megan Martino	Keria Martino	Abigail Knight	Reese Newhart
LATIN CLUB	861	Melissa Newcomer		Sage Christman	Allie Snyder	Rae Murphy	Ashley Hoppes
CHORAL CLUB	864	Julia Zimmer		Georgia Hoffman	Ellie Nichols; Gio Martinez	Varun Rajam; Liliana Scholz	Jocelynn Spengler
NATIONAL HONOR SOCIETY	865	Amy Kauntiz		Carson Mosel	Liz Mazzetti	Jeanne Chen	Justin Chan
NO PLACE FOR HATE	867	Stephanie Larkin		Jeanne Chen	Justin Chan	Tyler Iyengar	Margaret Anthony
ORCHESTRA	868	Connie Arnold		Fiona Harvey	Alex Walther	Santiago Ramirez Chavolla	James Reichert
PA MATH LEAGUE	869	Sarah Kinzel	Kimberly Adams	Justin Chan; Meenapriya Muthiah			Aaron Sallash
PHYSICS CLUB	872	Brent Ohl		Ian Hoenscheid		Blake Tillinghast	Meenapriya Muthiah
RED CROSS CLUB	873	Will Montepeque		Carson Mosel	Mia Consigli	Elizabeth Mazzetti	Chloe Mosel
ROBOTICS CLUB	874	Kevin Ruppert	Tyler Booth	Jonah Laughlin	Liam Alvarado	Jackson Iyengar	Jack Schwenk; Aaron Sallash
SCHOOL STORE	875	Jayne Espenshade		Brielle Huff			Mariah Pedraja
SPANISH CLUB	877	Will Montepeque		Justin Chan	Keylin Alarcon	Carleigh Reichert	Carleigh Reichert
STUDENT GOVERNMENT (SGA)	880	Justine Frantzen	Christina Simpkins	Rowan Barford	Abby Perez	Aubree Squilante	Clare Yoder; Vice Treasurer - Addison Trexler
TRI-M MUSIC HONOR SOCIETY	882	Julia Zimmer	Connie Arnold	Santiago Chavolla-Ramirez	Liliana Scholz	Varun Rajam	Justin Chan
YOUNG DEMOCRATS	884	Mark Spengler		Joclynn Spengler	Anastasia (Sage) Christman	Margaret Kelly	Dane Drozda
AVEDIUM	886	Amy Williams		Aubrey Huff	Addison McCartney	Makiyah Berger	Sarah Lysinger
EHS POWER TECH	890	Kevin Ruppert		Brynn Koberlein	Travis Kemmerer	Liam Alvarado	Jonah Laughlin
HYDROPONICS	892	Zach LaBar		Noah Russo	Ireane Newman	Natalie Garganta	Eva Melcher
CHEM CLUB	895	Rebecca Augustin		Isabella Nguyen-Horvath		Danielle Rivera	Kathryn Kapp
BAKING CLUB	896	Alon Hogan		Joya Creskoff; Genevieve Paige	Willow Trainer; Miah Pena	Ryleigh Quay	Naloni Amoakopoku
SCIENCE NATIONAL HONOR SOCIETY	897	Brent Ohl	Kristina Svencer	Carter Smith		Zoe Rachor	Carter Smith
MORGAN'S MESSAGE	898	Regan Palazzo		Madison Lenig	Emiliy Romano	Blair Stephens	Sofia Isaksson
WORLD LANGUAGE HONOR SOCIETY	901	Celine Pissarra	Steph Ardito	Aubrey Huff	Keylin Alarcon	Sebastian dela Cruz	Keylin Alarcon

Board Policy Updates **Second Reading**

Policy #	Existing Title	Title	Status	Original Adoption	Reviewers	1st Reading	2nd Reading	3rd Reading and Adoption
102	Academic Standards	Academic Standards	Existing	2/8/2016	AI, AS, S, BS	9/28/2026	10/12/2026	
105	Curriculum	Curriculum	Existing	2/8/2016	AI, AS, S, BS	9/28/2026	10/12/2026	
105.2	Exemption From Instruction	Exemption From Instruction	Existing	2/8/2016	AI, AS, S	9/28/2026	10/12/2026	
204.1		Virtual Attendance and Wellness Checks	New		AI, AS, S, BS	9/28/2026	10/12/2026	
209	Health Examinations/Screenings	Health Examinations/Screenings	Existing	6/3/2016	AI, AS, S, BS	9/28/2026	10/12/2026	
246	School Wellness	School Wellness	Existing	8/8/2016	AI, AS, S, BS	9/28/2026	10/12/2026	
249	Bullying/Cyberbullying	Bullying/Cyberbullying	Existing	8/8/2016	AI, AS, S, BS	9/28/2026	10/12/2026	
704	Maintenance	Maintenance	Existing	5/22/2017	AI, AS, S, BS	9/28/2026	10/12/2026	
803	School Calendar	School Calendar	Existing	7/10/2017	AI, AS, S, BS	9/28/2026	10/12/2026	
805.2	School Security Personnel	School Security Personnel	Existing	12/9/2019	AI, AS, S, BS	9/28/2026	10/12/2026	
822	Automated External Defibrillator (AED) / Cardiopulmonary Resuscitation (CPR)	Automated External Defibrillator (AED) / Cardiopulmonary Resuscitation (CPR)	Existing	9/7/2017	AI, AS, S, BS	9/28/2026	10/12/2026	

Key:
S= Superintendent
AS= Assistant Superintendent
BS= Board Solicitor
AI= Administrative Input

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

204.1 Virtual Attendance and Wellness Checks - NEW POLICY

POLICY NUMBER	VERSION	DOCUMENT STATUS	PRINTED
204.1	v2.3	DRAFT	10/8/2026

PURPOSE

This policy establishes standards for wellness checks for students who receive academic instruction exclusively through the district's virtual instruction program for the full school year. Wellness checks are conducted to verify attendance and to facilitate the safety and well-being of students.

AUTHORITY

The Board directs the maintenance of a wellness check process that complies with state law. [1]

This policy shall be posted on the district's publicly accessible website.[1]

DEFINITION

District employee/representative – a district teacher, administrator or other district representative who is subject to mandated reporter requirements for child abuse under the Child Protective Services Law.[2][3]

DELEGATION OF RESPONSIBILITY

The Superintendent or designee shall be responsible for implementing this policy.

It shall be the responsibility of the designated district employee/representative to administer wellness check procedures in accordance with applicable law and this policy.

GUIDELINES

Weekly Wellness Checks

Weekly wellness checks must be conducted for each student enrolled in the district's virtual instruction program who receives academic instruction exclusively through virtual means for the full school year.[1]

At least once during any week consisting of three (3) or more full or partial academic instructional days, a district employee/representative shall ensure that each student is visibly seen and communicated with in real time either, in person or through electronic means.[1]

Wellness Check Methods

Acceptable methods of conducting wellness checks include:[1]

1. A student turning on a webcam and the district employee/representative visibly seeing and communicating with the student during synchronous online instruction.
2. Virtual or face-to-face participation by the student in any of the following activities:
   a. Health screenings.
   b. Standardized testing.
   c. Advising sessions.
   d. Tutoring sessions.
   e. In person, school-sponsored activities chaperoned by a district employee/representative.

Excused Absence Exemptions

A student may be exempt from a wellness check on the day a check is attempted if the student has an excused absence pursuant to applicable attendance requirements.[1] [4][5]

If this occurs, the district shall conduct the wellness check on the next school day or another school day during the same week. If a student has an excused absence for all school days during the same week, the student shall be exempt from the wellness check requirement for that week.[1] [4][5]

Internet or Power Outage Exemptions

A student may be exempt from a wellness check when the student's household experiences a documented Internet or power outage during the day and time of the attempted wellness check.[1]

If this occurs, the district shall conduct the wellness check on the next school day or another school day during the same week following resolution of the outage.[1]

The student’s parent/guardian shall provide documentation of the outage to the district as soon as possible.[1]

Failure to Complete a Required Wellness Check

Within one (1) school day after a student fails to complete a required wellness check, the district shall:[1]

1. Make documented and ongoing efforts to complete the required wellness check and contact the student's parent/guardian using at least two (2) different methods of communication; and

2. Provide written notice to the parent/guardian, in the parent's/guardian's preferred language, stating that the required wellness check has not been completed.

Wellness Review Conference

If the required wellness check is not completed within three (3) school days following the issuance of written notice, the district shall immediately schedule a wellness review conference to occur within one (1) school day. The wellness review conference may be conducted in person or through electronic means.[1]

The wellness review conference will be conducted to:[1]

1. Complete the required wellness check through real-time visual interaction with the student;
2. Reestablish communication with the student and the student’s parent/guardian; and
3. Identify interventions to facilitate future participation in wellness checks.

The wellness review conference shall convene as scheduled regardless of whether the student or the student’s parent/guardian participates.[1]

In-Person Wellness Check

If a student does not participate in the wellness review conference, the district must conduct an in-person wellness check within twenty-four (24) hours of the scheduled conference, even if this time period falls on a weekend or holiday.[1]

When the district is unable to establish contact with or obtain a response from the student, the Superintendent or designee shall determine appropriate next steps based on the circumstances. Such action may include requesting a welfare check from local law enforcement and/or making a referral to Children and Youth Services.

Wellness Check Records

The district shall maintain accurate records of all wellness checks, including the date, time, method, and outcome of each check.[1]

District administrators are prohibited from altering attendance records for wellness checks after a wellness check has been performed, except to correct an identified error.[1]

Reporting Requirements

Any district employee/representative who observes an indications of abuse, neglect or harm to a child during a wellness check, wellness review conference, or related contact, the district employee/representative is required to report the concerns in accordance with law and Board policy.[1][2][3]

The district shall maintain documentation sufficient to demonstrate compliance with this policy and applicable law.[1]

Such documentation shall be provided to the Pennsylvania Department of Education (PDE) upon request. Failure to comply with the with such requests may result in:[1]

1. A requirement to report to PDE the date, time and method of each wellness check for each student enrolled exclusively in the district's virtual instruction program.
2. Mandating district educators, administrators and staff to complete child abuse recognition, prevention and reporting training annually.
3. Requiring the district to meet in person with each student enrolled in a virtual instruction program at least once during the school year following the school year in which the district was found to be out of compliance.
4. Prohibiting the district from being awarded a competitive state grant by PDE until the district demonstrates compliance.

Legal Footnotes

[1] **24 P.S. 1327.4**
LEGAL REFERENCE

[2] **23 Pa. C.S.A. 6301 et seq**
LEGAL REFERENCE

[3] **Pol. 806 — Child Abuse**
POLICY REFERENCE

[4] **24 P.S. 1329**
LEGAL REFERENCE

[5] **Pol. 204 — Attendance**
POLICY REFERENCE

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

102 Academic Standards - DRAFT

POLICY NUMBER	ADOPTED	REVISED	VERSION
102	2/8/2016	3/9/2026	v1.4
DOCUMENT STATUS	**PRINTED**		
DRAFT	10/8/2026		

PURPOSE

The Board recognizes the importance of developing, assessing and expanding academic standards to challenge students to achieve at their highest level possible. To this end, the district shall establish rigorous academic standards in accordance with, and may expand upon, those adopted by the State Board of Education.[1][2]

DEFINITION

Academic standards - what a student should know and be able to do at a specified grade level. Academic standards encompasses Pennsylvania Core Standards, Pennsylvania Integrated Standards, state academic standards and local academic standards.[2][3]

AUTHORITY

The Board shall approve academic standards for district students to attain, in the following content areas:[2]

1. English Language Arts - PA Core Standards.
2. Mathematics - PA Core Standards.
3. Science, Technology, Engineering, Environmental Literacy and Sustainability (K-12) - PA Integrated Standards.
4. Social Studies – to include reading and writing - PA Core Standards.
5. Arts and Humanities.
6. Career Education and Work.
7. Health, Safety and Physical Education.
8. Family and Consumer Sciences.
9. World Languages.
10. Computer and Business Applications.
11. Library.
12. Counseling.

13. English Language Development.
14. Personal Finance.

GUIDELINES

The district's curriculum shall be designed to provide students with the planned instruction needed to attain established academic standards. Such standards require the incorporation of education on social media literacy.[2] [4] [5]

The district shall address social media literacy by providing instruction to students on the potential health and academic impacts, and safety and security concerns associated with social media use.[9]

The district shall assess individual student attainment of established academic standards and provide assistance for students having difficulty attaining academic standards.[2] [6] [7]

Students with disabilities may attain academic standards by completion of their Individualized Education Programs in accordance with law, regulations and Board policy.[2] [8]

Legal Footnotes

[1] 22 PA Code 4.11
LEGAL REFERENCE

[2] 22 PA Code 4.12
LEGAL REFERENCE

[3] 22 PA Code 4.3
LEGAL REFERENCE

[4] Pol. 105 — Curriculum
POLICY REFERENCE

[5] Pol. 107 — Provision for Planned Instruction
POLICY REFERENCE

[6] Pol. 127 — Assessment System
POLICY REFERENCE

[7] Pol. 213
POLICY REFERENCE
Referenced policy is not available in this policy book.

[8] Pol. 113 — Special Education
POLICY REFERENCE

[9] 24 P.S. 1556 — 24-P-S-1556
LEGAL REFERENCE

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

105 Curriculum - DRAFT

POLICY NUMBER	ADOPTED	REVISED	VERSION
105	2/8/2016	3/9/2026	v1.3
DOCUMENT STATUS	**PRINTED**		
DRAFT	10/8/2026		

PURPOSE

The Board recognizes its responsibility for the development, assessment and improvement of the educational program of the schools. To this end, the curriculum shall be evaluated, developed and modified on a continuing basis and in accordance with a plan for curriculum improvement.[1]

DEFINITION

Curriculum - a series of planned instruction aligned with established academic standards in each subject that is coordinated, articulated and implemented in a manner designed to result in the achievement of academic standards at the proficient level by all students.[2][3] **[4]**

AUTHORITY

The Board shall be responsible for the curriculum of the district's schools. The curriculum shall be designed to provide students the opportunity to achieve the academic standards established by the Board. Attaining the academic standards requires students to demonstrate the acquisition and application of knowledge.[1][2] **[4]**

In order to provide a quality educational program for district students, the Board shall adopt a curriculum plan that includes the requirements for courses to be taught; subjects to be taught in the English language; courses adapted to the age, development and needs of students; and strategies for assisting those students having difficulty attaining the academic standards.[1][2][5][6] **[7]** **[8]**

Special Instruction/Observances

The district's curriculum plan must also include provisions for special instruction and observances to comply with state and federal law including, but not limited to, Constitution Day and Citizenship Day, and the Bill of Rights Week.[9][10][11]

GUIDELINES

The district's curriculum shall provide the following:

1. Continuous learning through effective collaboration among the schools of this district.
2. Continuous access for all students to sufficient programs and services of a library/media facility and classroom collection to support the educational program. [12]
3. Guidance and counseling services for all students to assist in career and academic planning. [13]
4. A continuum of educational programs and services for all students with disabilities, pursuant to law and regulation. [14]
5. Language Instruction Educational Program for Multilingual Learner students, pursuant to law and regulation. [15] [16]
6. Compensatory education programs for students, pursuant to law and regulation.
7. Equal educational opportunity for all students, pursuant to law and regulation. [17] [18]
8. Career awareness and vocational education, pursuant to law and regulation. [19]
9. Educational opportunities for identified gifted students, pursuant to law and regulation. [20]
10. Regular and continuous instruction in required safety procedures. [21]

DELEGATION OF RESPONSIBILITY

As the educational leader of the district, the Superintendent shall be responsible to the Board for the district's curriculum. The Superintendent shall establish procedures for curriculum development, evaluation and modification, which ensure the utilization of available resources, and effective participation of teaching staff, students, and Board members, as appropriate. [1]

A listing of all curriculum materials shall be made available for the information of parents/guardians, students, staff and Board members. [1] [22]

With Board notification, the Superintendent may conduct pilot programs as deemed necessary to the continuing improvement of the instructional program. The Superintendent shall report periodically to the Board on the status of each pilot program, along with its objectives, evaluative criteria, and costs.

The Board encourages, where it is feasible and in the best interest of district students, participation in state-initiated pilot programs of educational research.

The Board directs the Superintendent to pursue actively state and federal aid in support of research activities.

Legal Footnotes

[1] **22 PA Code 4.4**
LEGAL REFERENCE

[2] **22 PA Code 4.12**
LEGAL REFERENCE

[3] 22 PA Code 4.3
LEGAL REFERENCE

[4] Pol. 102 — Academic Standards
POLICY REFERENCE

[5] 24 P.S. 1511
LEGAL REFERENCE

[6] 24 P.S. 1512
LEGAL REFERENCE

[7] Pol. 107 — Provision for Planned Instruction
POLICY REFERENCE

[8] Pol. 127 — Assessment System
POLICY REFERENCE

[9] 36 U.S.C. 106
LEGAL REFERENCE

[10] P.L. 108-447
LEGAL REFERENCE

[11] 24 P.S. 1541-1555
LEGAL REFERENCE

[12] Pol. 109 — Resource Materials
POLICY REFERENCE

[13] Pol. 112 — Guidance Counseling
POLICY REFERENCE

[14] Pol. 113 — Special Education
POLICY REFERENCE

[15] 22 PA Code 4.26
LEGAL REFERENCE

[16] Pol. 138 — Language Instruction Educational Program for English Learners
POLICY REFERENCE

[17] Pol. 103 — Discrimination/Title IX Sexual Harassment Affecting Students
POLICY REFERENCE

[18] Pol. 103.1 — Nondiscrimination — Qualified Students with Disabilities
POLICY REFERENCE

[19] Pol. 115 — Career and Technical Education
POLICY REFERENCE

[20] Pol. 114 — Gifted Education
POLICY REFERENCE

[21] Pol. 805 — Emergency Preparedness and Response
POLICY REFERENCE

[22] Pol. 105.1
POLICY REFERENCE
Referenced policy is not available in this policy book.

Legal References

Additional References

24 P.S. 1512.1
LEGAL REFERENCE

24 P.S. 1556 — 24-P-S-1556
LEGAL REFERENCE

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

105.2 Exemption From Instruction - DRAFT

POLICY NUMBER	ADOPTED	REVISED	VERSION
105.2	2/8/2016	3/9/2026	v1.2
DOCUMENT STATUS	**PRINTED**		
DRAFT	10/8/2026		

AUTHORITY

The Board adopts this policy to ensure that parents/guardians have the right to have their children excused from specific instruction that conflicts with their sincerely held religious and/or moral beliefs.[1][2]

The right to be exempt from instruction which conflicts with sincerely held religious beliefs extends to parents/guardians of students enrolled in this district when the students are under the age of eighteen (18), and to the students themselves when the student is eighteen (18) or older.

The right to be exempt from instruction which conflicts with moral beliefs extends to the parents/guardians of students enrolled in this district.

DELEGATION OF RESPONSIBILITY

The Superintendent or designee shall notify parents/guardians of this policy at least annually, at the beginning of each school year, and within a reasonable time after any substantive changes regarding the contents of this policy.

GUIDELINES

The district shall excuse any student from specific instruction, subject to the following conditions:

1. To assist the school district in ensuring that the student is excused from the correct specific instruction, the request must be made in writing and must detail the specific instruction from which the student is to be excused, including the reason(s) for the request.

2. The written request to be excused shall be sent by the parent/guardian or student who is eighteen (18) or older to the building principal. One (1) copy of the request shall be retained in the student's permanent school records, one (1) copy kept by the school principal, and one (1) copy submitted to the teacher from whose instruction the student is to be excused.
3. The written request must contain a statement that the specific instruction described conflicts with the sincerely held religious and/or moral beliefs of the student or of the parents/guardians.
4. The parent/guardian and/or student may request suggested replacement educational activities. The only permissible educational activity for this purpose shall be substantially similar instruction that is consistent with the learning objectives set for the course.
5. The building principal shall determine where the student shall report during the time the student is excused.
6. All students excused from specific instruction shall be required to achieve the academic standards established by the district as necessary for graduation. [3] [4]

Exemption from Dissection Activities

Students have the right to decline participation in an education project involving dissection, vivisection, incubation, capture or other harm or destruction of an animal or any part of an animal.[5]

The district must notify students and parents/guardians of their right to decline participation in such activities at least three (3) weeks prior to the start of the education project. Students who do not participate in such activities will be assigned an alternative education project.[5]

Legal Footnotes

[1] 22 PA Code 4.4
LEGAL REFERENCE

[2] 22 PA Code 11.7
LEGAL REFERENCE

[3] Pol. 102 — Academic Standards
POLICY REFERENCE

[4] Pol. 217 — Graduation
POLICY REFERENCE

[5] 24 P.S. 1523
LEGAL REFERENCE

Exemption From Specific Instruction Under Board Policy 105.2

Eligible Student Request Form

Please use this form to identify the exact instruction from which an exemption is requested. Please send this completed request to the student's building principal. Submit it as soon as the instruction is known so the school can coordinate the student's learning and supervision.

Student Information

Student name	School
Grade	Course or class
Teacher	Anticipated date or unit

Type of Request per policy 105.2

☐ Religious belief

☐ Moral belief

☐ Animal dissection

Specific Instruction

Identify the lesson, activity, text, media, discussion, assignment, project, or assessment component. Include dates, titles, pages, unit names, or other details that will help the school excuse the student from the correct instruction. Attach another page if needed.

Instruction from which exemption is requested

_____

_____

_____

_____

Reason and Required Statement

Briefly explain the reason for the request. The district does not require proof of religious affiliation or agreement with the belief, but it needs enough information to identify and implement the requested exemption.

Reason for the request

_____

_____

_____

Replacement Learning

Any replacement assigned under Policy 105.2 will be substantially similar instruction consistent with the course learning objectives.

Animal Dissection and Related Activities

Complete this section only if the student is declining participation in or observation of an activity involving dissection, vivisection, incubation, capture, or other harm or destruction of an animal or animal part. A religious or moral objection is not required.

☐ The student declines participation in the activity.

☐ The student declines observation of the activity.

☐ The student requests an alternative project or test that does not involve harmful use of an animal or animal parts.

Activity, course, teacher, and anticipated date, if known

_____
_____

Requester Information and Signature

I certify that I am authorized to make this request and that the information provided is accurate to the best of my knowledge. I understand that the student remains responsible for district academic standards and applicable course-credit and graduation requirements.

Requester printed name	Relationship to student
Email address	Telephone
Signature	Date

For School Use

Date received	Received by
☐**complete ☐ clarification requested**	Date clarification received
Instruction and dates covered	Student reporting location
Replacement activity or assessment	Teacher or staff responsible
Principal signature	Date family notified

Required distribution: one copy to the student's permanent school record, one copy retained by the building principal, and one copy to the teacher whose instruction is affected.

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

209 Health Examinations/Screenings - DRAFT

POLICY NUMBER	ADOPTED	REVISED	VERSION
209	6/13/2016	10/14/2019	v1.5
DOCUMENT STATUS	**PRINTED**		
DRAFT	10/8/2026		

AUTHORITY

In compliance with applicable law and regulations, and Board-approved health and safety plans, the Board shall require that district students submit to health and dental examinations, screenings and health monitoring in order to protect the school community from the spread of communicable disease and to ensure that the student's participation in health, safety and physical education courses meets the student's individual needs and that the learning potential of each student is not lessened by a remediable physical disability.[1][2][3][4]

GUIDELINES

Each student shall receive a comprehensive health examination either conducted by the school physician or a private licensed medical provider upon original entry, in sixth grade, and in eleventh grade.[2][4][5]

Each student shall receive a comprehensive dental examination conducted by the school dentist or a private dental provider upon original entry, in third grade, and in seventh grade.[3][4][5]

A private health and/or dental examination conducted at the parents'/guardians' request and expense shall be accepted in lieu of the school examination. The district shall accept reports of privately conducted physical and dental examinations completed within one (1) year prior to a student’s entry into the grade where an exam is required.[5]

The school nurse or medical technician shall administer to each student vision tests, hearing tests, tuberculosis tests and other tests deemed advisable at intervals established by the district. Height and weight measurements shall be used to calculate the student’s weight-for-height ratio.[2][4][6]

The school nurse or other health care practitioner shall conduct measurements of height and weight for each student for the purpose of tracking growth patterns. Height and weight measurements will be conducted at intervals established by the district and in a manner that protects student confidentiality. Parents/Guardians have the right to request an exemption from height and weight measurements for their child, and the district must provide notification of the exemption request procedure.[2][22]

Parents/Guardians of students who are to receive physical and dental examinations or screenings shall be notified. The notice shall include the date and location of the examination or screening and notice that the parents/guardians may attend. The notice shall encourage the parent/guardian to have the examination or screening conducted by the student's private physician or dentist at the parent's/guardian's expense to promote continuity of care. Such statement may also include notification that the student may be exempted from such examination or screening if it is contrary to the parent's/guardian's religious beliefs.[10][11][12]

A student who presents a statement signed by the parent/guardian that a health examination is contrary to the student's or parent's/guardian's religious beliefs shall be examined only when the Secretary of Health determines that facts exist indicating that certain conditions would present a substantial menace to the health of others in contact with the student if the student is not examined for those conditions.[7][8]

Where it appears to school health officials or teachers that a student deviates from normal growth and development, or where school examinations reveal conditions requiring health or dental care, the parent/guardian shall be notified of the apparent need for a special examination by the student's private physician or dentist. The parent/guardian shall report to the school whether a special examination occurred. If the parent/guardian fails to report whether the examination occurred within a reasonable time after being notified of the apparent need and the abnormal condition persists, appropriate school health personnel shall arrange a special health examination for the student.[2][4][9]

The first notice to comply with the policy of health or dental examinations will be mailed on or about October 1. The second notice to comply with the policy of health or dental examinations will be mailed on or about December 1. If the health or dental examination, as requested through the Department of Health and/or the East Penn School District, is not completed and proof submitted to the appropriate school nurse by the last day of the second marking period of the school year in question, the student will be excluded from school.

In the event that the parent/guardian objects to or refuses to obtain a regular or special health or dental examination or refuses to permit the child to be examined as arranged by the school nurse or school physician, the school nurse, in consultation with the school physician, shall determine whether the student appears to have unaddressed health conditions such that under the circumstances the refusal should be reported to the Pennsylvania Department of Health or other appropriate authorities.

Where school health officials or staff have reasonable cause to suspect that a student may be the victim of child abuse, the school employee shall immediately make a report of suspected child abuse in accordance with law and Board policy.[16] **[17]**

Health Monitoring

The Board directs district staff to monitor student health in accordance with applicable Board policy and the Board-approved health and safety plan.[23]

A student may request an alternative method of monitoring as a religious accommodation, and designated district staff shall assess and respond to such request in accordance with applicable law, regulations and Board policy. A request for an accommodation that would unreasonably impair safety or cause undue hardship will not be granted.[24]

A student with a health condition that may render a monitoring method ineffective should notify designated staff so that alternative or supplemental methods may be considered.[24] [25]

Students who may be exhibiting symptoms that indicate health concerns shall be referred to the school nurse or designated staff for further assessment and response, in accordance with Board policy.[23]

Health Records

The district shall maintain for each student a comprehensive health record which includes a record of immunizations and the result of tests, measurements, regularly scheduled examinations and special examinations.[2]

All health records shall be confidential and shall be disclosed only when necessary for the health of the student or when requested by the parent/guardian, in accordance with law and Board policy.[13] **[14]** **[18]**

The district may disclose information from health records to appropriate parties in connection with an emergency when necessary to protect the health or safety of the student or other individuals, in accordance with applicable law and Board policy.[13] **[14]** **[18]** [19][20] **[21]**

Designated district staff shall request from the transferring school the health records of students transferring into district schools. Staff shall respond to such requests for the health records of students transferring from district schools to other schools.[13]

If no health record of a student transferring into district schools is received or the health record indicates that a mandated screening or examination has not been completed at the appropriate level, the student shall be examined as soon as possible after the transfer by a school physician or school dentist, unless a private examination meeting the requirements of this policy has been furnished.

The district shall destroy student health records only after the student has not been enrolled in district schools for at least two (2) years.[13] **[15]**

DELEGATION OF RESPONSIBILITY

The Superintendent or designee shall instruct all staff members to continually observe students for conditions that indicate health problems or disability and to promptly report such conditions to the school nurse.[2]

The Superintendent or designee shall ensure that educational information and materials regarding eating disorder awareness and education are made available to students in grades six through twelve. Eating disorder awareness and educational materials must also be posted on the district's website.[26][27]

The Superintendent or designee shall ensure that notice is provided to all parents/guardians regarding the existence of and eligibility for the Children's Health Insurance Program (CHIP).[9]

Legal Footnotes

[1] 24 P.S. 1401
LEGAL REFERENCE

[2] 24 P.S. 1402
LEGAL REFERENCE

[3] 24 P.S. 1403
LEGAL REFERENCE

[4] 22 PA Code 12.41
LEGAL REFERENCE

[5] 24 P.S. 1407
LEGAL REFERENCE

[6] 28 PA Code 23.1 et seq
LEGAL REFERENCE

[7] 24 P.S. 1419
LEGAL REFERENCE

[8] 28 PA Code 23.45
LEGAL REFERENCE

[9] 24 P.S. 1406
LEGAL REFERENCE

[10] 24 P.S. 1405
LEGAL REFERENCE

[11] 28 PA Code 23.2
LEGAL REFERENCE

[12] 20 U.S.C. 1232h
LEGAL REFERENCE

[13] 24 P.S. 1409
LEGAL REFERENCE

[14] Pol. 216 — Student Records
POLICY REFERENCE

[15] Pol. 800 — Records Management
POLICY REFERENCE

[16] 23 Pa. C.S.A. 6311
LEGAL REFERENCE

[17] Pol. 806 — Child Abuse
POLICY REFERENCE

[18] Pol. 113.4 — Confidentiality of Special Education Student Information
POLICY REFERENCE

[19] 20 U.S.C. 1232g
LEGAL REFERENCE

[20] 34 CFR Part 99
LEGAL REFERENCE

[21] **Pol. 805 — Emergency Preparedness and Response**
POLICY REFERENCE

[22] **28 PA Code 23.7**
LEGAL REFERENCE

[23] **Pol. 203 — Immunizations and Communicable Diseases**
POLICY REFERENCE

[24] **Pol. 103 — Discrimination/Title IX Sexual Harassment Affecting Students**
POLICY REFERENCE

[25] **Pol. 103.1 — Nondiscrimination — Qualified Students with Disabilities**
POLICY REFERENCE

[26] **24 P.S. 1408**
LEGAL REFERENCE

[27] **24 P.S. 1426 — 24-P-S-1426**
LEGAL REFERENCE

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

246 School Wellness - DRAFT

POLICY NUMBER	ADOPTED	REVISED	VERSION
246	8/8/2016	1/24/2022	v1.6
DOCUMENT STATUS	**PRINTED**		
DRAFT	10/8/2026		

PURPOSE

East Penn School District recognizes that student wellness and proper nutrition are related to students' physical well-being, growth, development and readiness to learn. The Board is committed to providing a school environment that promotes student wellness, proper nutrition, nutrition education and promotion, and regular physical activity as part of the total learning experience. In a healthy school environment, students will learn about and participate in positive dietary and lifestyle practices that can improve student achievement.

AUTHORITY

The Board adopts this policy based on the recommendations of the Wellness Committee and in accordance with federal and state laws and regulations.[1][2][3]

To ensure the health and well-being of all students, the Board establishes that the district shall provide to students:

1. A comprehensive nutrition program consistent with federal and state requirements.
2. Access at reasonable cost to foods and beverages that meet established nutrition guidelines.
3. Physical education courses and opportunities for developmentally appropriate physical activity during the school day.
4. Curriculum and programs for grades K-12 that are designed to educate students about proper nutrition and lifelong physical activity, in accordance with State Board of Education curriculum regulations and academic standards.

DELEGATION OF RESPONSIBILITY

The Superintendent or designee shall be responsible for the implementation and oversight of this policy to ensure each of the district's schools, programs and curriculum is compliant with this policy, related policies and established guidelines or administrative regulations.[2][3]

Each building principal or designee shall annually report to the Superintendent or designee regarding compliance in their school.[3]

Staff members responsible for programs related to school wellness shall report to the Superintendent or designee regarding the status of such programs.

The Superintendent or designee shall annually report to the Board on the district's compliance with law and policies related to school wellness. The report may include:

1. Assessment of school environment regarding school wellness issues.
2. Evaluation of food services program.
3. Review of all foods and beverages sold in schools for compliance with established nutrition guidelines.
4. Listing of activities and programs conducted to promote nutrition and physical activity.
5. Recommendations for policy and/or program revisions.
6. Suggestions for improvement in specific areas.
7. Feedback received from district staff, students, parents/guardians, community members and the Wellness Committee.

The Superintendent or designee and the established Wellness Committee shall conduct an assessment at least once every three (3) years on the contents and implementation of this policy as part of a continuous improvement process to strengthen the policy and ensure implementation. This triennial assessment shall be made available to the public in an accessible and easily understood manner and include:[2][3]

1. The extent to which each district school is in compliance with law and policies related to school wellness.
2. The extent to which this policy compares to model wellness policies.
3. A description of the progress made by the district in attaining the goals of this policy.

At least once every three (3) years, the district shall update or modify this policy as needed, based on the results of the most recent triennial assessment and/or as district and community needs and priorities change; wellness goals are met; new health science, information and technologies emerge; and new federal or state guidance or standards are issued.[3]

The district shall annually inform and update the public, including parents/guardians, students, and others in the community, about the contents, updates and implementation of this policy via the district website, student handbooks, newsletters, posted notices and/or other efficient communication methods. This annual notification shall include information on how to access the School Wellness policy; information about the most recent triennial assessment; information on how to participate in the development, implementation and periodic review and update of the School Wellness policy; and a means of contacting Wellness Committee leadership.[2][3]

GUIDELINES

Recordkeeping

The district shall retain records documenting compliance with the requirements of the School Wellness policy, which shall include:[3][4]

1. The written School Wellness policy.
2. Documentation demonstrating that the district has informed the public, on an annual basis, about the contents of the School Wellness policy and any updates to the policy.
3. Documentation of efforts to review and update the School Wellness policy, including who is involved in the review and methods used by the district to inform the public of their ability to participate in the review.
4. Documentation demonstrating the most recent assessment on the implementation of the School Wellness policy and notification of the assessment results to the public.

Wellness Committee

The district shall establish a Wellness Committee comprised of, but not necessarily limited to, at least one (1) of each of the following: School Board member, district administrator, district food service representative, student, parent/guardian, school health professional, physical education teacher and member of the public. It shall be the goal that committee membership will include representatives from each school building and reflect the diversity of the community.[2]

The Wellness Committee shall serve as an advisory committee regarding student health issues and shall be responsible for developing, implementing and periodically reviewing and updating a School Wellness policy that complies with law to recommend to the Board for adoption.

The Wellness Committee shall review and consider evidence-based strategies and techniques in establishing goals for nutrition education and promotion, physical activity and other school based activities that promote student wellness as part of the policy development and revision process.[3]

Advisory Health Council

An Advisory Health Council may be established by the Superintendent to study student health issues and to assist in organizing follow-up programs.[5]

The Advisory Health Council may examine related research, assess student needs and the current school environment, review existing Board policies and administrative regulations, and raise awareness about student health issues.

The Advisory Health Council may survey parents/guardians and/or students; conduct community forums or focus groups; collaborate with appropriate community agencies and organizations; and engage in similar activities, within the budget established for these purposes.

The Advisory Health Council shall provide periodic reports to the Superintendent or designee regarding the status of its work, as required.

Individuals who conduct student medical and dental examinations shall submit to the Advisory Health Council annual reports and later reports on the remedial work accomplished during the year, as required by law.[5]

Nutrition Education

Nutrition education will be provided within the sequential, comprehensive health education program in accordance with curriculum regulations and the academic standards for Health, Safety and Physical Education, and Family and Consumer Sciences.[6] **[7]** **[8]**

Nutrition education in the district shall teach, model, encourage and support healthy eating by students. Promoting student health and nutrition enhances readiness for learning and increases student achievement.

Nutrition education lessons and activities shall be age-appropriate.

School food service and nutrition education classes shall cooperate to create a learning laboratory.

Lifelong lifestyle balance shall be reinforced by linking nutrition education and physical activity.

Nutrition education shall extend beyond the school environment by making resources available for families and the community.

Nutrition Promotion

Nutrition promotion and education positively influence lifelong eating behaviors by using evidence-based techniques and nutrition messages, and by creating food environments that encourage healthy nutrition choices and encourage participation in school meal programs.

District schools shall promote nutrition through the implementation of Farm to School activities, where possible. Activities may include, but not be limited to, the initiation/maintenance of school gardens, taste-testing of local products in the cafeteria and classroom, classroom education about local agriculture and nutrition, field trips to local farms and incorporation of local foods into school meal programs.

District food service personnel shall review and implement research-based, behavioral economics techniques in the cafeteria to encourage consumption of more whole grains, fruits, vegetables and legumes, and to decrease plate waste.

Consistent nutrition messages shall be disseminated and displayed throughout the district, schools, classrooms, cafeterias, homes, community and media.

District schools shall offer resources about health and nutrition to encourage parents/guardians to provide healthy meals for their children.

Physical Activity

District schools shall strive to provide opportunities for developmentally appropriate physical activity during the school day for all students.

District schools shall contribute to the effort to provide students opportunities to accumulate at least sixty (60) minutes of age-appropriate physical activity daily, as recommended by the Centers for Disease Control and Prevention. Opportunities offered at school will augment physical activity outside the school environment, such as outdoor play at home, sports, etc.

Age-appropriate physical activity opportunities, such as outdoor and indoor recess, before and after school programs, during lunch, clubs, intramurals and interscholastic athletics, shall be provided to meet the needs and interests of all students, in addition to planned physical education.

A physical and social environment that encourages safe and enjoyable activity for all students shall be maintained.

Before and/or after-school programs shall provide developmentally appropriate physical activity for participating children.

District schools shall promote physical activity through encouragement of walking and biking as a means of transportation to and from school.

Students and their families shall be encouraged to utilize district-owned physical activity facilities, such as playgrounds and fields, outside school hours in accordance with established district rules.

Extended periods of student inactivity, two (2) hours or more, shall be discouraged.

Physical activity shall not be used or withheld as a form of punishment.

Physical Education

A sequential physical education program consistent with curriculum regulations and Health, Safety and Physical Education academic standards shall be developed and implemented. All district students must participate in physical education. **[7]** **[8]** [9]

Instruction involving the collection of a student's height and weight measurements must be conducted in a manner that protects student confidentiality. The calculation of body mass index (BMI) is prohibited.[9]

Quality physical education instruction that promotes lifelong physical activity and provides instruction in the skills and knowledge necessary for lifelong participation shall be provided.

Physical education classes shall be the means through which all students learn, practice and are assessed on developmentally appropriate skills and knowledge necessary for lifelong, health-enhancing physical activity.

A comprehensive physical education course of study that focuses on providing students the skills, knowledge and confidence to participate in lifelong, health-enhancing physical activity shall be implemented.

Students shall be moderately to vigorously active as much time as possible during a physical education class. Documented medical conditions and disabilities shall be accommodated during class.

Safe and adequate equipment, facilities and resources shall be provided for physical education courses.

Physical education shall be taught by certified health and physical education teachers.

Physical education classes shall have a teacher-student ratio comparable to those of other courses for safe and effective instruction.

A varied and comprehensive curriculum that promotes both team and individual activities and leads to students becoming and remaining physically active for a lifetime shall be provided in the physical education program.

Appropriate professional development shall be provided for physical education staff.

Social Media

A social media literacy program consistent with curriculum regulations and academic standards shall be developed and implemented to address the following: **[7]** **[8]** [23]

1. Mental, psychological and physical effects of social media and mobile device use.
2. Potential impacts of social media and mobile device use on academic growth and learning.
3. Safe use of social media, including how to recognize suspicious online behavior including, but not limited to:
   a. Cyberbullying.
   b. Predatory behavior.
   c. Potential human trafficking.
4. Personal security and privacy on mobile devices.

Other School Based Activities

Safe drinking water shall be available and accessible to students, without restriction and at no cost to the student, at all meal periods and throughout the school day.[10][11][21][24]

Nutrition professionals who meet hiring criteria established by the district and in compliance with federal regulations shall administer the school meals program. Professional development and continuing education shall be provided for district nutrition staff, as required by federal regulations. **[12]** [13][14][15]

District schools shall provide adequate space, as defined by the district, for eating and serving school meals.

Students shall be provided a clean and safe meal environment.

Meal periods shall be scheduled at appropriate hours, as required by federal regulations and as defined by the district.[10]

Students shall have access to hand washing or sanitizing before meals and snacks.

Nutrition content of school meals shall be available to students and parents/guardians.

Fundraising projects submitted for approval shall be supportive of healthy eating and student wellness.

The district shall maintain a healthy school environment to optimize conditions for learning and minimize potential health risks to students, in accordance with the district's school environmental health program and applicable laws and regulations

District schools may implement alternative service models to increase school breakfast participation where possible, such as breakfast served in the classroom, "grab and go breakfast" and breakfast after first period to reinforce the positive educational behavioral and health impacts of a healthy breakfast.

Access to the food service operation shall be limited to authorized staff.

Students and parents/guardians may be involved in menu selections through various means, such as taste testing and surveys.

The district shall provide awareness to staff on the components of the School Wellness policy.

Nutrition Guidelines for All Foods/Beverages at School

All foods and beverages available in district schools during the school day shall be offered to students with consideration for promoting student health and reducing obesity.

Foods and beverages provided through the National School Lunch or School Breakfast Programs shall comply with established federal nutrition standards.[10][11][13][14]

Foods and beverages offered or sold at school-sponsored events outside the school day, such as athletic events and dances, shall offer healthy alternatives in addition to more traditional fare.

Competitive Foods -

Competitive foods available for sale shall meet or exceed the established federal nutrition standards (USDA Smart Snacks in School). These standards shall apply in all locations and through all services where foods and beverages are sold to students, which may include, but are not limited to: a la carte options in cafeterias, vending machines, school stores, snack carts and fundraisers.[3][16][17]

Competitive foods - foods and beverages offered or sold to students on school campus during the school day, which are not part of the reimbursable school breakfast or lunch.

School campus - any area of property under the jurisdiction of the school that students may access during the school day.[3][16]

School day - the period from midnight before school begins until thirty (30) minutes after the end of the official school day.[3][16]

The district may impose additional restrictions on competitive foods, provided that the restrictions are not inconsistent with federal requirements.[16]

Fundraiser Exemptions -

Fundraising activities held during the school day involving the sale of competitive foods shall be limited to foods that meet the Smart Snacks in School nutrition standards, unless an exemption is approved in accordance with applicable Board policy and administrative regulations. **[18]**

The district may allow a limited number of exempt fundraisers as permitted by the Pennsylvania Department of Education each school year: up to five (5) exempt fundraisers in elementary and middle school buildings, and up to ten (10) exempt fundraisers in high school buildings. Exempt fundraisers are fundraisers in which competitive foods are available for sale to students that do not meet the Smart Snacks in School nutrition standards.[16]

The district shall establish administrative regulations to implement fundraising activities in district schools, including procedures for requesting a fundraiser exemption.

Non-Sold Competitive Foods -

Non-sold competitive foods available to students, which may include but are not limited to foods and beverages offered as rewards and incentives, at classroom parties and celebrations, or as shared classroom snacks, shall meet or exceed the standards established by the district.

If the offered competitive foods do not meet or exceed the Smart Snacks in School nutrition standards, the following standards shall apply:

1. Rewards and Incentives:
    a. Foods and beverages shall not be used as a reward for classroom or school activities unless the reward is an activity that promotes a positive nutrition message (e.g., guest chef, field trip to a farm or farmers market, etc.).
2. Classroom Parties and Celebrations:
    a. Parents/Guardians shall be informed through newsletters or other efficient communication methods that foods/beverages should only be brought in when requested for scheduled parties.
    b. Classroom parties shall offer a minimal amount of foods (maximum 2-3 items) containing added sugar as the primary ingredient (e.g., cupcakes, cookies) and will provide the following:
        i. Fresh fruits/vegetables; and
        ii. Water, 100 percent juice, 100 percent juice diluted with water, low-fat milk or nonfat milk.
    c. When possible, foods/beverages for parties and celebrations shall be provided by the food service department to help prevent food safety and allergy concerns.

3. Shared Classroom Snacks:
    a. Ingredients of shared classroom snacks will be reviewed by the classroom teacher to ensure that no ingredients are contained which have been identified as allergens outlined in the individual student 504 plans or contained in the Allergy List provided by the school nurse.

The district shall provide a list of suggested nonfood ideas and healthy food and beverage alternatives to parents/guardians and staff, which may be posted via the district website, student handbooks, newsletters, posted notices and/or other efficient communication methods.

Marketing/Contracting -

Any foods and beverages marketed or promoted to students on the school campus during the school day shall meet or exceed the established federal nutrition standards (USDA Smart Snacks in School) and comply with established Board policy and administrative regulations. [3][16]

Exclusive competitive food and/or beverage contracts shall be approved by the Board, in accordance with provisions of law. Existing contracts shall be reviewed and modified to the extent feasible to ensure compliance with established federal nutrition standards, including applicable marketing restrictions.[19]

Management of Food Allergies in District Schools

The district shall establish Board policy and administrative regulations to address food allergy management in district schools in order to: **[20]**

1. Reduce or eliminate the likelihood of severe or potentially life-threatening allergic reactions.
2. Ensure a rapid and effective response in case of a severe or potentially life-threatening allergic reaction.
3. Protect the rights of students by providing them, through necessary accommodations when required, the opportunity to participate fully in all school programs and activities.

Safe Routes to School

The district shall assess and, to the extent possible, implement improvements to make walking and biking to school safer and easier for students.

Legal Footnotes

[1] **24 P.S. 1422.1**
LEGAL REFERENCE

[2] **42 U.S.C. 1758b**
LEGAL REFERENCE

[3] **7 CFR 210.31**
LEGAL REFERENCE

[4] **7 CFR 210.15**
LEGAL REFERENCE

[5] 24 P.S. 1422
LEGAL REFERENCE

[6] 24 P.S. 1513
LEGAL REFERENCE

[7] Pol. 102 — Academic Standards
POLICY REFERENCE

[8] Pol. 105 — Curriculum
POLICY REFERENCE

[9] 24 P.S. 1512.1
LEGAL REFERENCE

[10] 7 CFR 210.10
LEGAL REFERENCE

[11] 7 CFR 220.8
LEGAL REFERENCE

[12] Pol. 808 — Food Services
POLICY REFERENCE

[13] 42 U.S.C. 1751 et seq
LEGAL REFERENCE

[14] 42 U.S.C. 1773
LEGAL REFERENCE

[15] 7 CFR 210.30
LEGAL REFERENCE

[16] 7 CFR 210.11
LEGAL REFERENCE

[17] 7 CFR 220.12
LEGAL REFERENCE

[18] Pol. 229 — Student Fundraising
POLICY REFERENCE

[19] 24 P.S. 504.1
LEGAL REFERENCE

[20] Pol. 209.1 — Food Allergy Management and Dietary Needs
POLICY REFERENCE

[21] 24 P.S. 701
LEGAL REFERENCE

[23] 24 P.S. 1556 — 24-P-S-1556
LEGAL REFERENCE

[24] 24 P.S. 742.1
LEGAL REFERENCE

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Ala Carte-Food/Snacks *Foods offered through the National School Lunch or School Breakfast Programs may qualify towards meeting this requirement if the item is also offered for sale as an ala carte item. ** Includes any item served as a competitive food whether it is part of a reimbursable school meal or solely a competitive food.	The following standards apply to <u>all</u> foods offered as ala carte. • Portion sizes will not exceed the serving size of food served in the National School Lunch or School Breakfast Program and/or items will be packaged in single serving sizes. • A selection/variety of whole grains will be available on a daily basis. * (Table 1) • A minimum of 1 fresh fruit and vegetable will be offered daily. A variety of fruits and vegetables will be offered from day to day.* • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis.* • No foods will be on-site deep fat fried. This does not include stir-fried or sautéed foods. Pre-fried or flash fried foods will not be offered more than 4 times per week.** • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be	The following standards apply to <u>all</u> foods offered as ala carte. • Except for entrees, items will provide <200 calories per serving. • Portion sizes will not exceed the serving size of food served in the National School Lunch or School Breakfast Program and/or items will be packaged in single serving sizes. • At least 50% of grains offered will be whole grains.* (Table 1) • A minimum of 2 fruits and 2 vegetables will be offered daily (including fresh/raw). A variety of fruits and vegetables will be offered from day to day.* • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis.* • No foods will be on-site deep fat fried. This does not include stir-fried or sautéed foods. Pre-fried or flash fried foods will not be offered more than 3 times per week.** These 3 items are exempt from the total fat and	The following standards apply to <u>all</u> foods offered as ala carte. • Items will provide <200 calories per serving. • Portion sizes will not exceed the serving size of food served in the National School Lunch or School Breakfast Program and/or items will be packaged in single serving sizes. • At least 50% of grains offered will be whole grain.* (Table 1) • A minimum of 3 fruits and 3 vegetables will be offered daily (at least 1 of each being fresh/raw). A variety of fruits and vegetables will be offered from day to day.* • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis.* • No foods will be on-site deep fat fried. This does not include stir-fried or sautéed foods. Pre-fried or flash fried foods will not be offered more than 2 times per week.** These 2 items are exempt from the total fat and saturated fat restrictions listed below. • Foods of Minimal Nutritional

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Ala Carte-Food/Snacks – cont. *Foods offered through the National School Lunch or School Breakfast Programs may qualify towards meeting this requirement if the item is also offered for sale as an ala carte item. ** Includes any item served as a competitive food whether it is part of a reimbursable school meal or solely a competitive food.	available anytime during the school day. In addition, the majority of items offered will: • Not contain added sugar as the first ingredient. (Table 3) • Provide minimal to no trans fatty acids. (Table 4) Marketing, pricing and nutrition education strategies will be used to encourage selection of the healthier foods. K-5 will not offer more than 5 ala carte food items in total.	saturated fat restrictions listed below. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. In addition, a minimum of 75% of items available will contain: • <35% of calories from total fat (excluding nuts, seeds, nut butters, and reduced fat cheeses). • <10% of calories from saturated fat (excluding reduced fat cheeses). • <35% sugar by weight (excluding naturally occurring sugars and low fat yogurts) and added sugar will not be listed as the first ingredient. • Minimal to no trans fatty acids. Marketing, pricing and nutrition education strategies will be used to encourage the selection of foods meeting these standards. K-5 will not offer more than 5 ala carte food items in total. **Table 5 contains formulas for calculating	Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. In addition, all food items will contain: • <35% of calories from total fat (excluding nuts, seeds, nut butters, and reduced fat cheeses). • <10% of calories from saturated fat (excluding reduced fat cheeses). • <35% sugar by weight (excluding naturally occurring sugars and low fat yogurts) and added sugar will not be listed as the first ingredient. • Minimal to no trans fatty acids. (Table 4) K-5 will not offer more than 5 ala carte food items in total. Ala carte items will supplement the reimbursable meal (limited to 1-2 items); not replace the reimbursable meal. Ala carte items will not be available until the end of each meal period. **Table 5 contains formulas for calculating total fat, saturated fat, and sugar by weight.

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
		total fat, saturated fat, and sugar by weight.	
Ala carte-Beverages	A minimum of 75% of the beverages offered will be: • Water, unflavored (any size). • 100% fruit juice (not to exceed 12 oz). • Milk, 1% lowfat or nonfat (not to exceed 16 oz), flavored or unflavored (not to exceed 30 grams of sugar per 8 ounce serving, inclusive of naturally occurring sugar). Preferably packaged in plastic resealable containers. Marketing, pricing and nutrition education strategies will be used to encourage the selection of the beverages listed above. Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day.	A minimum of 75% of the beverages offered will be: • Water, unflavored (any size). • 100% fruit juice (not to exceed 6 oz). • Milk, 1% lowfat or nonfat (not to exceed 8 oz), flavored or unflavored (not to exceed 30 grams of sugar, inclusive of naturally occurring sugar). Preferably packaged in plastic resealable containers. Marketing, pricing and nutrition education strategies will be used to encourage the selection of the beverages listed above. Any beverage that does not meet the criteria in the above mentioned standards (not to surpass 25% of items available) will not exceed: • 150 calories • 35 grams of sugar Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day.	All beverages will meet these criteria. • Water, unflavored (any size). • 100% fruit juice (not to exceed 6 oz). • A minimum of 75% of milk selections will be 1% lowfat or nonfat (not to exceed 8 oz), flavored or unflavored (not to exceed 30 grams of sugar, inclusive of naturally occurring sugar). Preferably packaged in plastic resealable containers.

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Vending-Food/Snacks	Vending will not be available for students in grades K-5, and, at most, should only be available in limited quantities for grades 6-8. Including grades 9-12, the following standards apply to all foods offered through vending machines. • Packages will be in single serving sizes. • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. In addition, the majority of items offered will: • Not be fried. (Table 2) • Not contain added sugar as the first ingredient. (Table 3) • Provide minimal to no trans fatty acids. (Table 4) Marketing, pricing and nutrition	• Vending will not be available for students in grades K-5, and, at most, should only be available in limited quantities for grades 6-8. Including grades 9-12, the following standards apply to all foods offered through vending machines. • Items will provide <200 calories per serving. • Packages will be in single serving sizes. • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. In addition, a minimum of 75% of items available will contain: • <35% of calories from total fat (excluding nuts, seeds, nut butters and reduced fat cheeses). • <10% of calories from saturated fat.	Vending will not be available for students in grades K-5, and, at most, should only be available in limited quantities for grades 6-8. Including grades 9-12, the following standards apply to all foods offered through vending machines. • Items will provide <200 calories per serving. • Packages will be in single serving sizes. • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis. • Fruits and vegetables will be available at every vending area. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. In addition, all food items available will contain: • <35% of calories from total fat (excluding nuts, seeds, nut butters and reduced fat cheeses). • <10% of calories from saturated fat. • <35% sugar by weight (excluding

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Vending-Food/Snacks-cont.	education strategies will be used to encourage selection of the healthier foods. The school Food Service Director can provide assistance in identifying foods that meet these criteria.	• <35% sugar by weight (excluding naturally occurring sugars and low fat yogurts) and added sugar will not be listed as the first ingredient. • Provide minimal to no trans fatty acids. (Table 4) Marketing, pricing and nutrition education strategies will be used to encourage the selection of foods meeting these standards. The school Food Service Director can provide assistance in identifying foods that meet these criteria. ****Table 5 contains formulas for calculating total fat, saturated fat, and sugar by weight.**	naturally occurring sugars and low fat yogurts) and added sugar will not be listed as the first ingredient. • Provide minimal to no trans fatty acids. (Table 4) The school Food Service Director can provide assistance in identifying foods that meet these criteria. ****Table 5 contains formulas for calculating total fat, saturated fat, and sugar by weight.**

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Vending-Beverages	Vending will not be available for students in grades K-5. All beverages offered through vending will be: • Water, unflavored (any size). • 100% fruit juice (not to exceed 12 oz). • A minimum of 75% of milk selections will be 1% lowfat or nonfat (not to exceed 16 oz), flavored or unflavored (not to exceed 30 grams of sugar per 8 ounce serving, inclusive of naturally occurring sugar). Preferably packaged in plastic resealable containers. The school Food Service Director can provide assistance in identifying foods that meet these criteria.	Vending will not be available for students in grades K-5. All beverages offered through vending will be: • Water, unflavored (any size). • 100% fruit juice (not to exceed 6 oz). • A minimum of 75% of milk selections will be 1% lowfat or nonfat (not to exceed 8 oz), flavored or unflavored (not to exceed 30 grams of sugar inclusive of naturally occurring sugar). Preferably packaged in plastic resealable containers. The school Food Service Director can provide assistance in identifying foods that meet these criteria.	Vending will not be available for students in grades K-5. All beverages offered through vending will be: • Water, unflavored (any size). • 100% fruit juice (not to exceed 6 oz). • A minimum of 75% of milk selections will be 1% lowfat or nonfat (not to exceed 8 oz), flavored or unflavored (not to exceed 30 grams of sugar inclusive of naturally occurring sugar). Preferably packaged in plastic resealable containers. The school Food Service Director can provide assistance in identifying foods that meet these criteria.

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	**A Starting Point** (July 1, 2006)	**Better** (July 1, 2007)	**Best** (July 1, 2008)

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Fundraisers (non-vending)	All food items sold as fundraisers, available for sale during the school day, will follow the standards listed below. • Packages will be in single serving sizes. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. • Foods will not be fried. (Table 2) • Foods will not contain added sugar as the first ingredient. (Table 3) • Provide minimal to no trans fatty acids. (Table 4) Marketing, pricing and nutrition education strategies will be used to encourage selection of the healthier foods. The school Food Service Director can provide assistance in identifying foods that meet these criteria.	All food items sold as fundraisers, available for sale during the school day, will follow the standards listed below. • Items will provide <200 calories per serving. • Packages will be in single serving sizes. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. • Total fat will be <35% of the total calories (excluding nuts, seeds, nut butters and reduced fat cheeses). • Saturated fat will be <10% of the total calories. • Sugar content will be <35% by weight (excluding naturally occurring sugars and low fat yogurts) and added sugar will not be listed as the first ingredient. • Items will contain minimal to no trans fatty acids. (Table 4) Foods sold as fundraisers that are available for sale outside of the school	All food items sold as fundraisers, available for sale during the school day, will follow the standards listed below. • Items will provide <200 calories per serving. • Packages will be in single serving sizes. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. • Total fat will be <35% of the total calories (excluding nuts, seeds, nut butters and reduced fat cheeses.) • Saturated fat will be <10% of the total calories. • Sugar content will be <35% by weight (excluding naturally occurring sugars and low fat yogurts) and added sugar will not be listed as the first ingredient. • Items will contain minimal to no trans fatty acids. (Table 4) Food items will be available no earlier than 30 minutes after the last meal period of the day. Alternate revenue generating sources will be developed. Following are resources:

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Fundraisers (non-vending)		day will support healthy eating by limiting foods high in added sugar, fat, sodium or trans fat content. The school Food Service Director can provide assistance in identifying foods that meet these criteria. ****Table 5 contains formulas for calculating total fat, saturated fat, and sugar by weight.**	www.kidseatwell.org/flyers/twentywaystoraisefunds.pdf.; www.newenglanddairycouncil.org/pdf/creativefinancing.pdf. Foods sold as fundraisers that are available for sale outside of the school day will support healthy eating by limiting foods high in added sugar, fat, sodium or trans fat content. The school Food Service Director can provide assistance in identifying foods that meet these criteria. ****Table 5 contains formulas for calculating total fat, saturated fat, and sugar by weight.**

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Classroom Parties/ Holiday Celebrations	Classroom parties will offer minimal amount of foods (maximum 2-3 items) that contain added sugar as the first ingredient (Table 3) and will provide the following: • Fresh fruits and vegetables. • Water, 100% fruit juice or milk.	Classroom parties will offer minimal amount of foods (maximum 2-3 items) that contain added sugar as the first ingredient (Table 3) and will provide the following: • Fresh fruits and vegetables. • Water, 100% fruit juice or milk.	In addition, Food Service Departments will offer party lists/menus that include food and beverage choices that: • Are moderate in sodium content. • Provide minimal to no trans fatty acids. • Provide items that contain > 2 grams of fiber/serving. • Offer fresh fruits and vegetables • Offer water, 100% fruit juice or milk as the beverage choices. • Do not offer any Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220). Parents and teachers will be encouraged to purchase foods and beverages from this menu of items.

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Rewards	Food will not be used as a reward for classroom or school activities unless the reward is an activity that promotes a positive nutrition message (ie., guest chef, field trip to a farm or farmers market, etc.). Alternate ideas can be found at: www.msue.msu.edu/fnh/tn/foodrewards.pdf; www.cspinet.org/nutritionpolicy/constructive_rewards.pdf	Food will not be used as a reward for classroom or school activities unless the reward is an activity that promotes a positive nutrition message (ie., guest chef, field trip to a farm or farmers market, etc.). Alternate ideas can be found at: www.msue.msu.edu/fnh/tn/foodrewards.pdf; www.cspinet.org/nutritionpolicy/constructive_rewards.pdf	Food will not be used as a reward for classroom or school activities unless the reward is an activity that promotes a positive nutrition message (ie., guest chef, field trip to a farm or farmers market, etc.). Alternate ideas can be found at: www.msue.msu.edu/fnh/tn/foodrewards.pdf; www.cspinet.org/nutritionpolicy/constructive_rewards.pdf
Foods from Home		Parents/caregivers will be encouraged to promote their child's participation in the school meals programs. If their child does not participate in the school meals programs, parents/caregivers will be encouraged to provide or encourage the purchase of healthy alternatives. All nutrition standards will be explained to parents/caregivers. They will continuously be provided with nutrition education and encouraged to comply with the nutrition policies to the best of their ability and knowledge. Examples of nutrition education outreach include newsletters, open houses, back to school nights, family nights, etc.	Parents/caregivers will be encouraged to promote their child's participation in the school meals programs. If their child does not participate in the school meals programs, parents/caregivers will be encouraged to provide a healthy alternative. All nutrition standards will be explained to parents/caregivers. They will continuously be provided with nutrition education and encouraged to comply with the nutrition policies to the best of their ability and knowledge. Examples of nutrition education outreach include newsletters, open houses, back to school nights, family nights, etc.

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
School Stores-Foods/Snacks	The following standards apply to all foods sold in school stores. • Packages will be in single serving sizes. • A minimum of 1 fresh fruit and vegetable will be offered daily. • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis. • No foods will be on-site deep fat fried. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. In addition, the majority of items offered will: • Not be fried. (Table 2) • Not contain added sugar as the first ingredient. (Table 3) • Provide minimal to no trans fatty acids. (Table 4) Marketing, pricing and nutrition education strategies will be used to	The following standards apply to all foods sold in school stores. • Items will provide <200 calories per serving. • Packages will be in single serving sizes. • At least 50% of grains offered will be whole grain. (Table 1) • A minimum of 2 fruits and 2 vegetables will be offered daily (including fresh or raw). A variety of fruits and vegetables will be offered. • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. In addition, a minimum of 75% of items available will contain: • <35% of calories from total fat (excluding nuts, seeds, nut butters, and reduced fat cheeses). • <10% of calories from saturated fat.	The following standards apply to all foods sold in school stores. • Items will provide <200 calories per serving. • Packages will be in single serving sizes. • At least 50% of grains offered will be whole grain. (Table 1) • A minimum of 2 fruits and 2 vegetables will be offered daily (including fresh or raw). A variety of fruits and vegetables will be offered. • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. In addition, all food items available will contain: • <35% of calories from total fat (excluding nuts, seeds, nut butters, and reduced fat cheeses). • <10% of calories from saturated fat. • <35% sugar by weight (excluding

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
School Stores-Foods/Snacks-cont.	encourage the selection of foods meeting these standards. The school Food Service Director can provide assistance in identifying foods that meet these criteria.	• <35% sugar by weight (excluding naturally occurring sugars) and added sugar will not be listed as the first ingredient. • Provide minimal to no trans fatty acids. (Table 4) Marketing, pricing and nutrition education strategies will be used to encourage the selection of foods meeting these standards. The school Food Service Director can provide assistance in identifying foods that meet these criteria. ****Table 5 contains formulas for calculating total fat, saturated fat, and sugar by weight.**	naturally occurring sugars) and added sugar will not be listed as the first ingredient. • Provide minimal to no trans fatty acids. (Table 4) School stores will not sell food until 30 minutes after the last meal period of the day. The school Food Service Director can provide assistance in identifying foods that meet these criteria. ****Table 5 contains formulas for calculating total fat, saturated fat, and sugar by weight.**
School Stores-Beverages	A minimum of 75% of the beverages offered will be: • Water, unflavored (any size). • 100% fruit juice (not to exceed 12 oz). • Milk, 1% lowfat or nonfat (not to exceed 16 oz), flavored or unflavored (not to exceed 30 grams of sugar per 8 ounce serving inclusive of naturally	A minimum of 75% of the beverages offered will be: • Water, unflavored (any size). • 100% fruit juice (not to exceed 6 oz). • Milk, 1% lowfat or nonfat (not to exceed 8 oz), flavored or unflavored (not to exceed 30 grams of sugar inclusive of naturally occurring sugar).	All beverages will meet these criteria. • Water, unflavored (any size). • 100% fruit juice (not to exceed 6 oz). • A minimum of 75% of milk selections will be 1% lowfat or nonfat (not to exceed 8 oz), flavored or unflavored (not to exceed 30 grams of sugar inclusive of naturally occurring sugar).

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
School Stores-Beverages - cont.	occurring sugar). Preferably packaged in plastic resealable containers. Marketing, pricing and nutrition education strategies will be used to encourage the selection of the beverages listed above. Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. The school Food Service Director can provide assistance in identifying foods that meet these criteria.	Preferably packaged in plastic resealable containers. Marketing, pricing and nutrition education strategies will be used to encourage the selection of the beverages listed above. Any beverage that does not qualify in the above-mentioned standards (not to surpass 25% of items available) will not exceed: • 150 calories • 35 grams of sugar Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. The school Food Service Director can provide assistance in identifying foods that meet these criteria.	Preferably packaged in plastic resealable containers. The school Food Service Director can provide assistance in identifying foods that meet these criteria.

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Faculty Lounges	Faculty is encouraged to set the example for students. Students are not likely to believe that nutrition policies are beneficial if they see faculty consuming foods and beverages that do not align with the school policy.	Faculty is encouraged to set the example for students. Students are not likely to believe that nutrition policies are beneficial if they see faculty consuming foods and beverages that do not align with the school policy.	Faculty is encouraged to set the example for students. Students are not likely to believe that nutrition policies are beneficial if they see faculty consuming foods and beverages that do not align with the school policy.
Other	Student Input-Students will be an active part of menu planning through regularly scheduled meetings and taste testing.	Vegetarian Options-Students will be surveyed yearly for their interest in vegetarian entrees as part of the reimbursable meal or ala carte. If interest is indicated, efforts should be made to include appealing vegetarian choices. Student Input-Students will be an active part of menu planning through regularly scheduled meetings and taste testing.	Vegetarian Options-Students will be surveyed yearly for their interest in vegetarian entrees as part of the reimbursable meal or ala carte. If interest is indicated, efforts should be made to include appealing vegetarian choices. Student Input-Students will be an active part of menu planning through

East Penn School District Guidelines for Competitive Foods

Table 1- Whole Grains

A whole grain food is one labeled with the whole grain as first ingredient. The Food and Drug Administration requires foods that bear the "whole grain health claim" to contain 51% or more whole grain ingredients by weight per reference amount and be low in fat. Whole grains will usually contain at least 2 grams of fiber per serving. Examples of whole grain terms are: "cracked," "crushed," "whole," "entire," or "groats." Examples of whole grain ingredients are:	
Whole/entire wheat flour	Whole grain barley (hulled or lightly pearled)
Whole oats/oatmeal	Wild rice
Cracked/crushed wheat	Buckwheat
Graham flour	Wheat berries (whole wheat kernels)
Old fashioned oatmeal	Triticale
Quick cooking oats	Bulgur
Cornmeal	Millet
Whole grain corn	Quinoa
Popcorn	Sorghum
Brown rice	Spelt
Whole rye	
Generally, if the first ingredient is "fortified" or "enriched," it is probably not a whole grain. These items are generally not whole grains:	
Unbleached flour	Organic, unbleached flour
Wheat flour	Enriched flour
Semolina	Degerminated (cornmeal)
Durum wheat	Multigrain (may describe several whole grains or several refined grains)

Sources include the USDA Food Buying Guide for Child Nutrition Programs, Dietary Guidelines for Americans 2005, Whole Grains Council.

East Penn School District Guidelines for Competitive Foods

Table 2-Fried Foods

Fried Foods: Foods that are cooked by total immersion into hot oil or other fat, commonly referred to as "deep fat frying." This definition does not include foods that are stir fried or sautéed, but does include foods that have been pre-fried, flash fried, or deep-fat fryed.

Table 3-Added Sugar

Brown Sugar	Invert sugar
Corn sweetener	Lactose*
Corn syrup	Maltose*
Dextrose	Malt syrup
Fructose*	Molasses
Fruit juice concentrate	Raw sugar
Glucose*	Sucrose
High fructose corn syrup	Sugar
Honey	Syrup
*Naturally occurring. Will not show up on food ingredient list unless added. Will be included as "sugars" listed on the food label.	

Table 4-Trans Fatty Acids (Trans Fats)

Trans fats: Occurs in food when manufacturers use hydrogenation, a process in which hydrogen is added to vegetable oil to turn the oil into a more solid (saturated) fat. Sources of trans fatty acids include hydrogenated/partially hydrogenated vegetable oils that are used to make shortening and commercially prepared baked goods, snack foods, fried foods, and margarine. Trans fatty acids are present in foods that come from ruminant animals (e.g., cattle and sheep). Such foods include dairy products, beef and lamb. Federal labeling of trans fats on all food products is required by January 1, 2006.

East Penn School District Guidelines for Competitive Foods

Table 5-Formulas

% Total fat:	1. Multiply grams of total fat per serving times 9 2. Divide by calories per serving 3. Multiply times 100
% Saturated fat:	1. Multiply grams of saturated fat per serving times 9 2. Divide by calories per serving 3. Multiply times 100
% Sugar by weight:	1. Divide grams of sugar per serving by gram weight for the serving size 2. Multiply times 100

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

249 Bullying/Cyberbullying - DRAFT

POLICY NUMBER	ADOPTED	REVISED	VERSION
249	8/8/2016	3/24/2025	v1.8
DOCUMENT STATUS	**PRINTED**		
DRAFT	10/8/2026		

PURPOSE

The Board recognizes that bullying and cyberbullying creates an atmosphere of fear and intimidation, detracts from the safe environment necessary for student learning, and may lead to more serious violence. The Board is committed to providing a safe, positive learning environment for district students that is free from bullying and cyberbullying.

DEFINITIONS

Artificial Intelligence-Generated or Modified Media - text, code, images, audio or video data that has been created or modified from its original source data through the use of artificial intelligence technology, programs or platforms.[1]

Bullying - an intentional electronic, written, verbal or physical act or series of acts directed at another student or students, which occurs in a school setting and/or outside a school setting, that is severe, persistent or pervasive and has the effect of doing any of the following:[1]

1. Substantially interfering with a student's education; or
2. Creating a threatening environment; or
3. Substantially disrupting the orderly operation of the school setting.

Cyberbullying - bullying through the use of electronic technology or communication, including data, computer software or online platforms regardless of their origin, using a device, system network, internet service, email, social media or other digital means, including artificial intelligence–generated or modified media. Cyberbullying includes bullying conduct which occurs in a school setting and/or outside a school setting.[1]

School setting - in the school, on school grounds, in school vehicles, at a designated bus stop or at any activity sponsored, supervised or sanctioned by the school.[1]

AUTHORITY

The Board prohibits all forms of bullying and cyberbullying by district students and requires that this policy be accessible in every classroom. The policy shall be posted in a prominent location within each school building and on the district website.[1]

The Board encourages students who believe they or others have been bullied to promptly report such incidents to the building principal or designee.

The Board directs that complaints of bullying and cyberbullying be investigated promptly, and appropriate corrective or preventative action be taken when allegations are substantiated. The Board directs that any complaint of bullying or cyberbullying brought pursuant to this policy also be reviewed for conduct which may not be proven to be bullying or cyberbullying under this policy but merits review and possible action under other Board policies.

Confidentiality

Confidentiality of all parties, witnesses, the allegations, the filing of a complaint and the investigation shall be handled in accordance with applicable law, regulations, this policy and the district's legal and investigative obligations.

Retaliation

Reprisal or retaliation relating to reports of bullying or cyberbullying or participation in an investigation of allegations of bullying or cyberbullying is prohibited and shall be subject to disciplinary action.

DELEGATION OF RESPONSIBILITY

Each student shall be responsible to respect the rights of others and to ensure an atmosphere free from bullying and cyberbullying.

The Superintendent or designee shall develop administrative regulations to support this policy.

The Superintendent or designee shall ensure that this policy and administrative regulations are reviewed annually with students.[1]

The Superintendent or designee, in cooperation with other appropriate administrators, shall review this policy every three (3) years and recommend necessary revisions to the Board.[1]

District administration shall annually provide the following information with the school safety and security incident report:[1] **[6]**

1. Board's Bullying/Cyberbullying Policy.
2. Report of bullying and cyberbullying incidents.
3. Information on the development and implementation of any bullying and cyberbullying prevention, intervention or education programs.

GUIDELINES

Reports of bullying or cyberbullying may be made orally or in writing and may be anonymous, except where made by district staff. Students are encouraged to use the district's reporting form attached to this policy, or to submit a written complaint; however, oral complaints will be accepted, documented and investigated.

Any individual receiving a complaint shall handle the report objectively, neutrally and professionally, setting aside personal biases that might favor or disfavor any person involved.

District staff who observe bullying/cyberbullying or receive a report of bullying/cyberbullying shall not conduct an independent investigation but shall take appropriate action to protect the safety of involved students and promptly provide a summary of the observed or reported conduct to the building principal or designee.

For purposes of this policy, a reporter is an individual, other than district staff, who reports alleged bullying/cyberbullying directed at one or more students. A complainant is the alleged victim or target of the conduct. In some circumstances, the same individual may serve as both reporter and complainant.

The building principal or designee shall encourage the complainant or reporter to complete the district's designated report form. If, due to age, disability or other incapacity, the complainant or reporter is unable to complete the form, the building principal or designee shall document the report and complete the form on the individual's behalf. If the report is made by someone other than the complainant, the complainant shall be notified promptly, informed of the report, and encouraged to complete the district reporting form.

As soon as practicable after the receipt of a report of bullying or cyberbullying, the district shall notify the parent(s)/guardian(s) of any student involved in the incident.

If the complainant, district staff, or other professionals with knowledge of the complainant's health and well-being indicate that notifying a parent/guardian could place the complainant or another person at risk of abuse, neglect or other imminent harm, the building principal, in consultation with the Superintendent and legal counsel, and as appropriate, law enforcement, child welfare authorities and other qualified professionals, may determine whether parental notification should be delayed as permitted by law. The basis for the delay must be documented, and parent/guardian notification shall occur as soon as legally and safely practicable.[14][15]

Every report of bullying/cyberbullying shall be reviewed and investigated promptly and sufficiently to address the alleged misconduct, even if the report is anonymous or the complainant requests that no action be taken.

Threat Assessment

When a student's behavior indicates a threat to the safety of the student, other students, school employees, school facilities, the community, or others, district staff shall make a referral to the district's threat assessment team in accordance with applicable law and Board policy.[2] **[3]**

Discrimination/Harassment

If, at the time of the report or at any time during the investigation of the alleged bullying/cyberbullying, there is reason to believe that the conduct may fall within the provisions of the district's discrimination/harassment policies, the Title IX Coordinator must be promptly notified. Upon notification, the Title IX Coordinator will immediately initiate steps to comply with appropriate policies and procedures. The investigation will be handled as a joint and concurrent investigation to address all applicable allegations and legal requirements. [4] [5]

Investigation Procedures

After determining that the matter does not require handling under Policy 103, the building principal shall determine whether the investigation may be conducted by the principal or designee or whether the matter must be referred to the Superintendent or another appropriate administrator.

If law enforcement has been notified, a law enforcement report has been filed, or substantiated allegations could result in expulsion, the building principal shall consult with the Superintendent or appropriate administrator, who may seek advice from legal counsel.

Investigations shall be timely, impartial, thorough and comprehensive. The investigation may include:

1. Interviewing the complainant.
2. Interviewing the individual(s) accused of the conduct.
3. Interviewing witnesses.
4. Reviewing physical, electronic or documentary evidence.
5. Reviewing any other relevant information provided during the investigation.
6. Conducting any additional inquiry reasonably necessary to determine the facts and address proven misconduct.

Investigative Findings

The investigator shall prepare findings that summarize the investigation, determine whether the allegations have been substantiated, identify any violation of Board policy or applicable law, and recommend appropriate corrective action.

As soon as practicable after determining that an incident of bullying or cyberbullying has occurred, the district shall notify the parent(s)/guardian(s) of any student involved in the incident of the determination of the investigation.

The complainant/reporter and the accused shall be informed of the outcome of the investigation within a reasonable period of time, consistent with the Family Educational Rights and Privacy Act (FERPA) and other applicable laws. The accused shall not be informed of any individual remedies provided to the complainant.[16]

District Response and Corrective Action

If an investigation results in a finding that bullying or cyberbullying or other misconduct occurred, the district shall take prompt and appropriate corrective action designed to stop the conduct, prevent its recurrence, protect affected students, eliminate any hostile or disruptive environment, and prevent retaliation.[1]

The district shall document corrective actions taken and, when permitted by law, inform the complainant or reporter of responsive measures. District administrators shall monitor the effectiveness of corrective actions and take additional measures when necessary.[1]

If an investigation reveals violations of other Board policies or circumstances requiring additional review, referral, discipline or intervention, the district shall address those matters through the appropriate disciplinary, administrative or support processes.

Any disciplinary action imposed shall be consistent with the Code of Student Conduct, Board policies and administrative regulations, applicable collective bargaining agreements, and state and federal law, and may include:[1] **[6]** **[8]** **[11]** **[12]**

1. Counseling within the school.
2. Parental conference.
3. Loss of school privileges.
4. Transfer to another school building, classroom or school bus.
5. Exclusion from school-sponsored activities.
6. Detention.
7. Suspension.
8. Expulsion.
9. Counseling/Therapy outside of school.
10. Referral to law enforcement authorities.

The Student Discipline Code, which shall contain this policy, shall be disseminated annually to students.[1][7] **[8]**

Education

The district shall develop, implement and evaluate bullying and cyberbullying prevention and intervention programs and activities. Programs and activities shall provide district staff and students with appropriate training for effectively responding to, intervening in and reporting incidents of bullying and cyberbullying.[1][9][10]

School Safety and Security Incidents Report

Annually, by July 31, the Superintendent shall report on the designated form, to the PA Department of Education, all new incidents as required by state law. The report must include the total number of bullying and cyberbullying incidents that occurred during the school year, including the number of cyberbullying incidents suspected to involve artificial intelligence-generated or modified media. **[6]** [18]

Legal Footnotes

[1] 24 P.S. 1303.1-A
LEGAL REFERENCE

[2] 24 P.S. 1302-E
LEGAL REFERENCE

[3] Pol. 236.1 — Threat Assessment
POLICY REFERENCE

[4] Pol. 103 — Discrimination/Title IX Sexual Harassment Affecting Students
POLICY REFERENCE

[5] Pol. 103.1 — Nondiscrimination — Qualified Students with Disabilities
POLICY REFERENCE

[6] Pol. 805.1 — Relations With Law Enforcement Agencies
POLICY REFERENCE

[7] 22 PA Code 12.3
LEGAL REFERENCE

[8] Pol. 218 — Student Discipline
POLICY REFERENCE

[9] 20 U.S.C. 7118
LEGAL REFERENCE

[10] 24 P.S. 1302-A
LEGAL REFERENCE

[11] Pol. 236 — Student Assistance Program
POLICY REFERENCE

[12] Pol. 233 — Suspension and Expulsion
POLICY REFERENCE

[14] 23 Pa. C.S.A. 6301 et seq
LEGAL REFERENCE

[15] Pol. 806 — Child Abuse
POLICY REFERENCE

[16] Pol. 216 — Student Records
POLICY REFERENCE

[18] 24 P.S. 1319-B
LEGAL REFERENCE

Legal References

Additional References

Pol. 815.1
LEGAL REFERENCE

DISCRIMINATION/SEXUAL HARASSMENT/BULLYING/
HAZING/DATING VIOLENCE/RETALIATION
REPORT FORM

The Board declares it to be the policy of this district to provide a safe, positive learning and working environment that is free from bullying, hazing, dating violence, sexual harassment and other discrimination, and retaliation. If you have experienced, or if you have knowledge of, any such actions, we encourage you to complete this form. The Title IX Coordinator will be happy to support you by answering any questions about the report form, reviewing the report form for completion and assisting as necessary with completion of the report. The Title IX Coordinator's contact information is:

Position: Head of Human Resources

Address: 800 Pine Street, Emmaus, PA 18049

Email: hr@eastpennsd.org

Phone Number: 610-966-8377

Retaliation Prohibited

The district, its employees and others are prohibited from intimidating, threatening, coercing, or discriminating against you for filing this report. Please contact the Title IX Coordinator immediately if you believe retaliation has occurred.

Confidentiality

Confidentiality of all parties, witnesses, the allegations and the filing of a report shall be handled in accordance with applicable law, regulations, Board policy, procedures, and the district's legal and investigative obligations. The school will take all reasonable steps to investigate and respond to the report, consistent with a request for confidentiality as long as doing so does not preclude the school from responding effectively to the report. If you have any questions regarding how the information contained in this report may be used, please discuss them with the Title IX Coordinator prior to filing the report. Once this report is filed, the district has an obligation to investigate the information provided.

***Note**: For purposes of Title IX sexual harassment, this Report Form serves initially as an informal report, <u>not</u> a formal complaint of Sexual Harassment under Title IX.*

I. Information About the Person Making This Report:

Name: _____

Address: _____

Phone Number: _____

School Building: _____

I am a:

☐ Student ☐ Parent/Guardian ☐ Employee ☐ Volunteer ☐ Visitor

☐ Other _____ (please explain relationship to the district)

If you are not the victim of the reported conduct, please identify the alleged victim:

Name: _____

The alleged victim is: ☐ Your Child ☐ Another Student ☐ A District Employee

☐ Other: _____ (please explain relationship to the alleged victim)

II. Information About the Person(s) You Believe is/are Responsible for the Bullying, Hazing, Harassing or Other Discrimination You are Reporting

What is/are the name(s) of the individual(s) you believe is/are responsible for the conduct you are reporting?

Name(s):

The reported individual(s) is/are:

☐ Student(s) ☐ Employee(s)

☐ Other _____ (please explain relationship to the district)

III. Description of the Conduct You are Reporting

In your own words, please do your best to describe the conduct you are reporting as clearly as possible. Please attach additional pages if necessary:

When did the reported conduct occur? (Please provide the specific date(s) and time(s) if possible):

Where did the reported conduct take place?

Please provide the name(s) of any person(s) who was/were present, even if for only part of the time.

Please provide the name(s) of any other person(s) that may have knowledge or related information surrounding the reported conduct.

Have you reported this conduct to any other individual prior to giving this report?

☐Yes ☐ No

If yes, who did you tell about it?

If you are the victim of the reported conduct, how has this affected you?

I affirm that the information reported above is true to the best of my knowledge, information and belief.

_____	_____
Signature of Person Making the Report	Date
_____	_____
Received By	Date

FOR OFFICIAL USE ONLY

This section is to be completed by the Title IX Coordinator based on reviewing the report with the complainant or other individual making the report.

The purpose of this form is to assist the Title IX Coordinator in gathering information necessary to properly assess the circumstances surrounding the reported conduct to determine if the allegations fall under the definition of Title IX sexual harassment or if the matter merits review and action under the Code of Student Conduct and/or other Board policies. The Title IX Coordinator shall gather as much information as possible in cases of incomplete or anonymous reports (including those that may be received through the Safe2Say Something program) to assess the report.

Upon receipt of the report, The Title IX Coordinator shall promptly contact the complainant regarding the report to gather additional information as necessary, and to discuss the availability of supportive measures as described in Policy 103 and Attachment 3. The Title IX Coordinator shall consider the complainant's wishes with respect to supportive measures.

I. Reporter Information:

Name: _____

Address: _____

Phone Number: _____

School Building: _____

Reporter is a:

☐ Student ☐ Parent/Guardian ☐ Employee ☐ Volunteer ☐ Visitor

☐ Other _____ (please explain relationship to the district)

If the reporter is not the victim of the reported conduct, please identify the alleged victim:

Name: _____

The alleged victim is: ☐ Reporter's Child ☐ Another Student ☐ Another Employee

☐ Other: _____ (please explain relationship to the alleged victim)

II. Respondent Information

Please state the name(s) of the individual(s) believed to have conducted the reported violation:

Name(s):

The reported respondent(s) is/are:

☐ Student(s) ☐ Employee(s)

☐ Other _____ (please explain relationship to the district)

III. Level of Report:

☐ Informal ☐ Formal (see additional information below on Title IX formal complaints)

IV. Type of Report:

☐ Title IX Sexual Harassment ☐ Discrimination ☐ Retaliation ☐ Bullying

☐ Hazing ☐ Dating Violence ☐ Other _____

Nature of the Report (check all that apply):

☐ Race
☐ Color
☐ Religion
☐ Sexual Orientation
☐ National Origin
☐ Marital Status
☐ Handicap/Disability
☐ Hazing
☐ Age
☐ Creed
☐ Sex
☐ Sexual Harassment (Title IX)
☐ Ancestry
☐ Pregnancy
☐ Bullying
☐ Dating Violence

V. Reported Conduct

Describe the reported conduct below, including specific actions, dates, times, locations and any other details necessary to properly assess the reported incident(s).

How often did the conduct occur?

Is it being repeated? ☐ Yes ☐ No

Do the circumstances involve a student identified as a student with a disability under the Individuals with Disabilities Education Act or Section 504 of the Rehabilitation Act?

☐ No.

☐ Yes, please identify the student with a disability and contact the Director of Special Education.

Date Director of Special Education was contacted: _____

How has the conduct affected the alleged victim's ability to fully participate in the school's academic, programs, activities or school employment?

What is the alleged victim's relationship with the alleged respondent?

Insert names, descriptions, and/or contact information of individuals believed to have observed the conduct or who otherwise may have knowledge of the conduct and/or related circumstances.

Additional observations or evidence including pictures, texts, emails, video or other information submitted to the Title IX Coordinator.

VI. Safety Concerns

Are there safety concerns that may require Emergency Removal of or Administrative Leave for a respondent? (This requires an individualized safety and risk analysis as to whether there is an immediate threat to the physical health or safety of a student or other individual.)

☐ No.

☐ Yes, please describe:

VII. Other Reports

Has the conduct been reported to the police or any other agency?

□ No

□ Yes Date reported: _____ Agency: _____

VIII. Identification of Policies Implicated by Reported Conduct

Check all that apply:

□ Policy 103. Discrimination/Title IX Sexual Harassment Affecting Students
□ Policy 104. Discrimination/Title IX Sexual Harassment Affecting Staff
□ Policy 247. Hazing
□ Policy 249. Bullying

□ Other _____

To meet the definition of Title IX sexual harassment, the conduct must have taken place during a district education program or activity involving a person in the United States. An **education program or activity** includes the locations, events or circumstances over which the district exercises substantial control over both the respondent and the context in which the sexual harassment occurs. Title IX applies to all of a district's education programs or activities, whether such programs or activities occur on-campus or off-campus.

Did the incident occur during a during a school program or activity involving a person in the United States?

□ Yes

□ No

To meet the definition of Title IX sexual harassment, the conduct needs to satisfy one or more of the following (please check all that apply):

□ A district employee conditioning the provision of an aid, benefit, or district service on an individual's participation in unwelcome sexual conduct, commonly referred to as quid pro quo sexual harassment.

□ Unwelcome conduct determined by a reasonable person to be so severe, pervasive and objectively offensive that it effectively denies a person equal access to a district education program or activity.

□ Sexual assault, dating violence, domestic violence or stalking.

Dating violence means violence committed by a person who is or has been in a social relationship of a romantic or intimate nature with the victim and where the existence of such a relationship is determined by the following factors:

- Length of relationship.
- Type of relationship.
- Frequency of interaction between the persons involved in the relationship.

Domestic violence includes felony or misdemeanor crimes of violence committed by a current or former spouse or intimate partner of the victim, by a person with whom the victim shares a child in common, by a person who is cohabitating with or has cohabitated with the victim as a spouse or intimate partner, by a person similarly situated to a spouse of the victim under the domestic or family violence laws of the jurisdiction receiving federal funding, or by any other person against an adult or youth victim who is protected from that person's acts under the domestic or family violence laws of the jurisdiction.

Sexual assault means a sexual offense under a state or federal law that is classified as a forcible or nonforcible sex offense under the uniform crime reporting system of the Federal Bureau of Investigation.

Stalking means stalking on the basis of sex, for example when the stalker desires to date a victim. Stalking means to engage in a course of conduct directed at a specific person that would cause a reasonable person to either:

1. Fear for their safety or the safety of others.
2. Suffer substantial emotional distress.

IX. Recommended Course of Action

After consultation with the complainant and consideration of the reported information, the Title IX Coordinator directs the report to proceed under the provisions of (check all that apply):

☐ No further action at this time. Reason:

☐ Policy 247. Hazing
☐ Policy 249. Bullying

☐ Other _____

☐ Policy 103 Discrimination/Title IX Sexual Harassment Affecting Students: Attachment 2 Discrimination Complaint Procedures

□ Policy 104 Discrimination/Title IX Sexual Harassment Affecting Staff: Attachment 2 Discrimination Complaint Procedures

□ Policy 103. Discrimination/Title IX Sexual Harassment Affecting Students: Attachment 3 Title IX Sexual Harassment Procedures and Grievance Process for Formal Complaints
□ Policy 104. Discrimination/Title IX Sexual Harassment Affecting Staff: Attachment 3 Title IX Sexual Harassment Procedures and Grievance Process for Formal Complaints

X. Title IX Information to Complainant

What supportive measures were discussed with the complainant, and what were the complainant's wishes with respect to supportive measures?

Upon designating a course of action under Title IX sexual harassment, the Title IX Coordinator will promptly:

1. Explain to the complainant the process for filing a formal complaint.

2. Inform the complainant of the continued availability of supportive measures with or without the filing of a formal complaint.

3. The Title IX Coordinator shall contact a student complainant's parents/guardians and provide them with information regarding the report and Title IX sexual harassment procedures and grievance process for formal complaints.

   If the complainant/reporter, school staff or others with professional knowledge relating to the complainant's health and well-being indicate that notifying the parents/guardians could cause serious harm to the health or well-being of the complainant or other person(s), the Title IX Coordinator will determine, in consultation with such individuals and upon advice of legal counsel, whether to withhold or delay notification of the report from the complainant's parents/guardians.

4. Determine what supportive measures may be offered to the respondent.

5. Determine whether the complainant wishes this report to be treated as a formal complaint.

XI. Title IX Coordinator Signature

I recommend the above course of action based on my consultation with the complainant and the information available at this time.

Title IX Coordinator: _____

Date: _____

XII. Title IX Formal Complaint Action

The Title IX Coordinator shall have the complainant check the appropriate box and sign and date below to indicate whether or not the complainant wishes to have this form serve as a formal complaint pursuant to Title IX.

I would like my report to be treated as a formal complaint pursuant to Title IX.

☐ Yes ☐ No

Complainant's Signature: _____

Date: _____

If the complainant does not wish this report to be treated as a formal complaint pursuant to Title IX, the Title IX Coordinator must assess whether actions limited to supportive measures are a sufficient response to alleged behavior, or whether a formal complaint process is necessary to investigate and address the situation adequately. For example, if disciplinary action would be warranted if allegations are true, if the respondent is an employee, or if further investigation is needed to assess the extent of the behavior and impact on others, it may be clearly unreasonable not to initiate the formal complaint process. The Title IX Coordinator may consult with the school solicitor and other district officials in making this decision.

As Title IX Coordinator, I have determined that, notwithstanding the complainant's preference, it is necessary to proceed with the Grievance Process for Formal Complaints for the following reasons:

Therefore, I am signing this form for the purpose of serving as the formal complaint initiating that process:

Title IX Coordinator's Signature: _____

Date: _____

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EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

704 Maintenance - DRAFT

POLICY NUMBER	ADOPTED	VERSION	DOCUMENT STATUS
704	5/22/2017	v1.4	DRAFT

PRINTED
10/8/2026

PURPOSE

Adequate maintenance of buildings, property and equipment is essential for the efficient management of district facilities in a fiscally responsible manner.

AUTHORITY

The Board directs that a continuous program of inspection and maintenance of all district buildings, property and equipment be established and implemented. Wherever possible, maintenance shall be preventative.[1][2]

DELEGATION OF RESPONSIBILITY

The Superintendent or designee shall develop and supervise a maintenance program which shall include:

1. Regular program of maintenance, repair and improvement of buildings and facilities.
2. Testing lead levels in drinking water.[2]
3. Equipment replacement program.
4. Long-range plans for building modernization and conditioning.

The Facilities Director or designee, in conjunction with each building principal and head custodian, shall conduct a physical inspection of the building on an annual basis.

Building maintenance needs will be prioritized and reviewed by the Superintendent and Business Manager for inclusion in the annual budget.

Legal Footnotes

[1] 24 P.S. 701
LEGAL REFERENCE

[2] 24 P.S. 742.1
LEGAL REFERENCE

Legal References

Additional References

25 PA Code 171.1 et seq
LEGAL REFERENCE

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

803 School Calendar - DRAFT

POLICY NUMBER	ADOPTED	REVISED	VERSION
803	7/10/2017	10/28/2024	v1.5
DOCUMENT STATUS	**PRINTED**		
DRAFT	10/8/2026		

PURPOSE

The Board recognizes that preparation of an annual school calendar is necessary for the efficient operation of the district and communication with students, staff, parents/guardians and the school community.

AUTHORITY

The Board shall determine annually the days and the hours when the schools will be in session for instructional purposes, in accordance with state law and regulations. This may include, as appropriate, activities qualifying as instructional days or hours under the direction of certified school employees for fulfilling the minimum required days or hours of instruction under law, regulations and state guidance.[1][2][3][4][5][6][7][8][9]

The school calendar shall normally consist of a minimum of 180 student days or 900 hours of instruction at the elementary level and 990 hours of instruction at the secondary level.[1][2][8][10]

The Board reserves the right to alter the school calendar when it is in the best interests of the district, including in cases of emergency, in accordance with applicable law and regulations. The Board shall take action to establish temporary provisions in cases of emergency, in accordance with law, and shall document such actions with the PA Department of Education when required.[2][5][6][7][9][11][12][13] **[14]**

Temporary provisions established in accordance with law may include but are not limited to: [1][2][5][6][7][8][9][12][13] **[15]**

1. Keeping schools in session such days and hours as the Board deems necessary, which shall include maintaining the requirement for a minimum of 180 student days or 900 hours of instruction at the elementary level and 990 hours of instruction at the secondary level.
2. Reducing the length of time of daily instruction for courses and classes.

3. Implementing remote and other alternative methods of delivering instruction under the direction of certified school employees.

Each year, prior to finalizing the school calendar, the Board must discuss the use or potential use of flexible instructional days and remote or virtual instructional days at a public Board meeting.[7] [14]

DELEGATION OF RESPONSIBILITY

The Superintendent shall annually prepare a school calendar for Board consideration.

The Superintendent or designee shall document alterations to the school calendar and any temporary provisions in accordance with law, regulations, guidance from the PA Department of Education and Board policy. [15]

Legal Footnotes

[1] 24 P.S. 133
LEGAL REFERENCE

[2] 24 P.S. 1501
LEGAL REFERENCE

[3] 24 P.S. 1502
LEGAL REFERENCE

[4] 24 P.S. 1503
LEGAL REFERENCE

[5] 24 P.S. 1504
LEGAL REFERENCE

[6] 24 P.S. 1505
LEGAL REFERENCE

[7] 24 P.S. 1506
LEGAL REFERENCE

[8] 22 PA Code 11.1
LEGAL REFERENCE

[9] 22 PA Code 11.2
LEGAL REFERENCE

[10] 22 PA Code 4.4
LEGAL REFERENCE

[11] 24 P.S. 520
LEGAL REFERENCE

[12] 24 P.S. 520.1
LEGAL REFERENCE

[13] 24 P.S. 1501.3
LEGAL REFERENCE

[14] Pol. 006 — Meetings
POLICY REFERENCE

[15] Pol. 805 — Emergency Preparedness and Response
POLICY REFERENCE

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

805.2 School Security Personnel - DRAFT

POLICY NUMBER	ADOPTED	REVISED	VERSION
805.2	12/9/2019	1/13/2025	v1.4
DOCUMENT STATUS	**PRINTED**		
DRAFT	10/8/2026		

AUTHORITY

The Board shall employ, contract for and/or assign staff to coordinate the safety and security of district students, staff, visitors and facilities.

The district shall employ or contract for at least one (1) full-time school security personnel who has completed the training required by law and this Board policy to be on duty during the school day.[1]

The district shall certify to the state School Safety and Security Committee annually that it has met the requirements for school security personnel or has received a waiver, in accordance with applicable law.[1]

DEFINITIONS

School security personnel - school police officers, school resource officers and school security guards.[2]

School Resource Officer (SRO) - a law enforcement officer commissioned and employed by a law enforcement agency whose duty station is located in the district and whose stationing is established by an agreement between the law enforcement agency and the district. The term includes an active certified sheriff or deputy sheriff whose stationing in the district is established by a written agreement between the county, the sheriff's office and the district.[2]

School day - the hours between the morning opening of a school building and the afternoon dismissal of students on a day which classes are in session.[1]

DELEGATION OF RESPONSIBILITY

The Superintendent shall appoint a school administrator to serve as the School Safety and Security Coordinator, in accordance with law. When a vacancy occurs in the role of the School Safety and Security Coordinator, the Superintendent shall appoint another school

administrator to serve as the School Safety and Security Coordinator within thirty (30) days of the vacancy and shall notify the Board regarding the appointment.[3]

The Superintendent or designee shall submit the name and contact information for the appointed School Safety and Security Coordinator to the state's School Safety and Security Committee within thirty (30) days of the appointment.[3]

The School Safety and Security Coordinator shall report directly to the Superintendent, and shall be responsible for the following:[3]

1. Oversee all School Resource Officers (SROs).
2. Review and provide oversight of all Board policies, administrative regulations and procedures related to school safety and security, and ensure compliance with federal and state laws and regulations regarding school safety and security.
3. Coordinate training and resources for students and staff related to situational awareness, trauma-informed approaches, behavioral health awareness, suicide awareness and prevention and bullying and cyberbullying awareness and prevention, substance use awareness, emergency procedures and training drills, and identification or recognition of student behavior that may indicate a threat to the safety of the student, other students, school employees, other individuals, school facilities or the community, in accordance with the standards established by the state's School Safety and Security Committee and the requirements of applicable law and regulations.[4] **[5] [6] [7] [8] [9] [10] [11] [12] [13]**
4. Coordinate a tour of the district's buildings and grounds biennially, or when a building is first occupied or reconfigured, with law enforcement and first responders responsible for protecting and securing the district to discuss and coordinate school safety and security matters.
5. Serve as the liaison with law enforcement and other state committees and agencies on matters of school safety and security.
6. Serve on the district's threat assessment team(s) and participate in required training and the threat assessment process. **[8]** [14]
7. Coordinate School Safety and Security Assessments, School Safety and Security grant requirements and respond to School Safety and Security surveys, as applicable. **[12]** [15]

The School Safety and Security Coordinator shall, within one (1) year of appointment, complete required training as specified by the state's School Safety and Security Committee for serving in the role of a School Safety and Security Coordinator. This training shall be in addition to other training requirements for school administrators, but shall count toward professional education credit, where applicable.[3][16][17][18]

By June 30 of each year, the School Safety and Security Coordinator shall make a report to the Board at an executive session on the district's current safety and security practices, and identify strategies to improve school safety and security.[3] **[19]**

The Board directs the School Safety and Security Coordinator to include the following information in the annual report:

1. Threat assessment team information, including verification of compliance with law and regulations, the number and composition of the district's threat assessment team(s), the total number of threats assessed in the past year and additional information on threat assessment required by the Superintendent or designee, in accordance with Board policy. **[8]** [14]
2. The number and type(s) of school security personnel contracted or employed by the district, including: [3]
   a. The number of school security personnel that are armed, listed by type(s) of personnel.
   b. The school building at which each school security personnel is assigned, listed by type(s) of personnel.
   c. The training, including the type of training and completion dates, of each school security personnel, listed by type(s) of personnel.
   d. A listing of other individuals utilized by the district for school safety-related duties.
3. Reports of required emergency preparedness, fire, bus evacuation and school security drills. **[12]**
4. Information on required school safety and security training and resources provided to students and staff. **[12]**
5. Safe2Say Something aggregate data, including a breakdown of Life Safety and Non-Life Safety reports received.
6. Behavioral health and school climate information, including aggregate data from surveys and assessments issued in the district, information on referrals and services accessed by students and families, and identification of additional resources needed in the district. **[20]**
7. School safety and security incident reports for the previous year(s) and/or data collected to date for the current year. **[21]**
8. Updates regarding the district's Memorandum of Understanding with law enforcement authorities. **[21]**
9. Updates to laws, regulations and/or Board policies related to school safety and security.
10. Information on grants or funding applied for and/or received in support of school safety and security efforts.

A copy of the report, including the required information on threat assessment and school security personnel, shall be submitted to the state's School Safety and Security Committee. [3]

The Superintendent or designee shall implement job descriptions and procedures to address the responsibilities and requirements of the School Resource Officers (SROs) in carrying out their duties.

School Resource Officers (SROs) shall carry weapons, including firearms, in performance of their duties only if, and to the extent, authorized by the Board.

GUIDELINES

School Resource Officers (SROs)

The district shall establish an agreement with any law enforcement agency that has jurisdiction, in accordance with the provisions of law, for the assignment of a School Resource Officer(s) to specified district schools.[2] **[22]**

The agreement shall address the powers and duties conferred on SROs, which shall include but not be limited to:[23]

1. Assist in identification of physical changes in the environment which may reduce crime in or around a school.
2. Develop and educate students in crime prevention and safety.
3. Address crime and violence issues, gangs and drug activities affecting or occurring in or around a school.
4. Other duties as agreed upon between the district and municipal agency

Prior to assignment in the district, the district shall confirm that law enforcement authorities have completed a law enforcement authority background investigation and received the SRO's separation record, when required, in compliance with applicable law and regulations. The district shall coordinate with law enforcement authorities in making required reports regarding hiring and separation, and maintaining all required records, in accordance with applicable law and regulations.[24][25]

SROs shall successfully complete required training, in accordance with law.[23]

Legal Footnotes

[1] **24 P.S. 1316-C**
LEGAL REFERENCE

[2] **24 P.S. 1301-C**
LEGAL REFERENCE

[3] **24 P.S. 1309-B**
LEGAL REFERENCE

[4] **24 P.S. 1310-B**
LEGAL REFERENCE

[5] **Pol. 146.1 — Trauma-Informed Approach**
POLICY REFERENCE

[6] **Pol. 227 — Controlled Substances/Paraphernalia**
POLICY REFERENCE

[7] **Pol. 236 — Student Assistance Program**
POLICY REFERENCE

[8] **Pol. 236.1 — Threat Assessment**
POLICY REFERENCE

[9] **Pol. 249 — Bullying/Cyberbullying**
POLICY REFERENCE

[10] **Pol. 333 — Professional Development**
POLICY REFERENCE

[11] **Pol. 351 — Controlled Substance Abuse**
POLICY REFERENCE

[12] **Pol. 805 — Emergency Preparedness and Response**
POLICY REFERENCE

[13] **Pol. 819 — Suicide Awareness, Prevention and Response**
POLICY REFERENCE

[14] **24 P.S. 1302-E**
LEGAL REFERENCE

[15] **24 P.S. 1305-B**
LEGAL REFERENCE

[16] **24 P.S. 1316-B**
LEGAL REFERENCE

[17] **24 P.S. 1205.1**
LEGAL REFERENCE

[18] **24 P.S. 1205.5**
LEGAL REFERENCE

[19] **Pol. 006 — Meetings**
POLICY REFERENCE

[20] **Pol. 235.1 — Surveys**
POLICY REFERENCE

[21] **Pol. 805.1 — Relations With Law Enforcement Agencies**
POLICY REFERENCE

[22] **Pol. 909 — Municipal Government Relations**
POLICY REFERENCE

[23] **24 P.S. 1313-C**
LEGAL REFERENCE

[24] **44 Pa. C.S.A. 7301 et seq**
LEGAL REFERENCE

[25] **37 PA Code 241.1 et seq**
LEGAL REFERENCE

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

822 Automated External Defibrillator (AED)/Cardiopulmonary Resuscitation (CPR) - DRAFT

POLICY NUMBER	ADOPTED	VERSION	DOCUMENT STATUS
822	9/11/2017	v1.6	DRAFT

PRINTED
10/8/2026

PURPOSE

The Board is committed to providing a safe and healthy environment for the school community.

Maintaining automated external defibrillator (AED) units and staff trained in cardiopulmonary resuscitation (CPR) in the schools enables responders to deliver early defibrillation and resuscitation to victims.

DEFINITION

Automated external defibrillator (AED) - a portable device that uses electric shock to restore a stable heart rhythm to an individual in cardiac arrest.[2]

AUTHORITY

Each school building shall have one (1) person trained and certified in the use of an AED and CPR during the school day when school is in session and students are present.[1][3]

Beginning May 13, 2029, each school nurse or designee, coach of an athletic activity, marching band director, physical education teacher and athletic trainer in the district must participate in instruction in the use of an AED and CPR and maintain their certification.[3]

The AED units are owned by the district and shall be properly maintained and tested, and located in secure and accessible locations.

Beginning May 13, 2029, the district shall have an AED in a readily accessible location for students participating in interscholastic athletics and practices. Individuals trained in the use of an AED and CPR will be present during these times.[4][5]

The AED units shall be used in accordance with approved district procedures.

GUIDELINES

A core team shall be trained in CPR and AED procedures by completing a training program offered by approved providers. Members of the team shall be provided opportunities for annual training and retraining.

The district shall make instruction in the use of an AED available to all its employees and volunteers at least once every two (2) years. The instruction is optional and shall be conducted by an approved provider that may be through the Internet or other electronic means.[3]

The district may make instruction on the principles and techniques of CPR and the use of operating an AED available to students.[3]

Written guidelines for medical emergencies related to the use of AED units shall be provided to all employees instructed in the use of an AED.

Responders' use of AED units shall not replace the care provided by emergency medical services (EMS) providers. Patient care shall be transferred to the EMS providers upon their arrival.

DELEGATION OF RESPONSIBILITY

The Superintendent or designee shall develop and disseminate administrative regulations that support this policy.

The Superintendent or designee shall annually, by June 30, report to the PA Department of Education detailing the number, condition, age, expiration date and placement of AEDs in each school building.[6]

Legal Footnotes

[1] 24 P.S. 1424
LEGAL REFERENCE

[2] 24 P.S. 1401
LEGAL REFERENCE

[3] 24 P.S. 1423.1 — 24-P-S-1423-1
LEGAL REFERENCE

[4] 24 P.S. 1423.3 — 24-P-S-1423-3
LEGAL REFERENCE

[5] Pol. 123 — Interscholastic Athletics
POLICY REFERENCE

[6] 24 P.S. 1423.2 — 24-P-S-1423-2
LEGAL REFERENCE