SOUTHERN LEHIGH SCHOOL DISTRICT
5775 Main Street
Center Valley, PA 18034

Scope and Sequence for **Grade 7 Physical Sciences**

Pennsylvania Long-Term Transfer Goals for Science

1. Approach science as reliable and tentative way of knowing and explaining the natural world.
2. Weigh evidence and use scientific approaches to ask questions, investigate, and make informed decisions.
3. Make and use observations to analyze relationships and patterns in order to explain phenomena, develop models, and make predictions.
4. Evaluate systems, in order to connect how form determines function and how any change to one component affects the entire system.
5. Explain how the natural and designed worlds are interrelated and the application of scientific knowledge and technology can have beneficial, detrimental, or unintended consequences.

Big Idea: Matter can be understood in terms of the types of atoms present and the interactions both between and within atoms.
Essential Question: How can one explain the structure, properties, and interactions of matter?

NGSS Performance Expectations	PA Academic Standards for Science
MS-PS1 Matter and Its Interactions **PS1.A: Structure and Properties of Matter** **MS-PS1.1** Develop models to describe the atomic composition of simple molecules and extended structures. **MS-PS1.2** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. **MS-PS1.3** Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. **MS-PS1.4** Develop a model that predicts and describes changes in particle motion, temperature, and state of pure substance when thermal energy is added or removed. ***This section continues on the next page…***	**3.2.A Organisms and Cells** **1. Properties of Matter** **3.2.6.A1** Distinguish the differences in properties of solids, liquids, and gases. Differentiate between volume and mass. Investigate that equal volumes of different substances usually have different masses. **3.2.7.A1** Differentiate between **elements**, **compounds**, and **mixtures**. Identify groups of **elements** that have similar properties. Explain how materials are characterized y having specific amount of mass in each unit of volume (**density**). **3.2.8.A1** Differentiate between mas and weight **2. Structure of Matter** **3.2.6.A2** Compare and contrast pure substances with mixtures. **3.2.7.A2** Identify atoms as the basic building blocks of matter and that elements are composed of one type of atom. **3.2.8.A2** Identify characteristics of elements derived from the periodic table. ***This section continues on the next page…***

NGSS Performance Expectations	PA Academic Standards for Science
Continued... **PS1.B: Chemical Reactions** **MS-PS1-5** Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. **MS-PS1-6** Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.	***Continued…*** **3. Matter & Energy** **3.2.6.A3** Explain and give examples of how **mass** is conserved in a closed **system**. **3.2.7.A3** Explain how energy transfer can affect the chemical and physical properties of matter. **3.2.8.A3** Explain how changes in matter are accompanied by changes in energy. **4. Reactions** **3.2.6.A4** Differentiate between physical changes and chemical changes. **3.2.7.A4** Describe how reactions change into products in simple chemical reactions. **3.2.8.A4** Compare and contrast physical and chemical changes in terms of products. **5. Unifying Themes** **3.2.6.A5** CONSTANCY AND CHANGE Identify characteristic properties of matter that can be used to separate one substance from the other. **3.2.B Physics** **2. Energy storage and Transformations: Conservation Laws** **3.2.6.B2** Describe energy as a property of objects associated with heat, light, electricity, magnetism, mechanical motion, and sound. Differentiate between potential and kinetic energy. **3.2.7.B2** Describe how energy can be changed from one form to another (transformed) as it moves through a system or transferred from one system to another system. 3.2.8.B2 Identify situations where kinetic energy is transformed into potential energy, and vice versa.
Pennsylvania System of School Assessment (PSSA)	S8.A Nature of Science
S8.A.3 Systems, Models, and Patterns	
S8.A.3.1 Explain the parts of a simple system, their roles, and their relationships to the system as a whole.	**S8.A.3.1.3** Distinguish among system inputs, system processes, system outputs, and feedback (e.g., physical ecological, biological, informational.)
Pennsylvania System of School Assessment (PSSA)	S8.C Physical Sciences
S8.C.1 Structure, Properties, and Interaction of Matter and Energy	
S8.C.1.1 Explain concepts about the structure and properties (physical and chemical) of matter.	**S8.C.1.1.1** Explain the differences among elements, compounds, and mixtures.
	S8.C.1.1.2 Use characteristic physical or chemical properties to distinguish one substance from another (e.g., density, thermal expansion/contraction, freezing/melting points, streak test).
This section continues on the next page…	**S8.C.1.1.3** Identify and describe reactants and products of simple chemical reactions.

NGSS Performance Expectations	PA Academic Standards for Science
Continued...	***Continued…***
Pennsylvania System of School Assessment (PSSA)	S8.C Physical Sciences
S8.C.2 Forms, Sources, Conversion, and Transfer of Energy	
S8.C.2.1 Describe energy sources, transfer of energy, or conversion of energy.	**S8.C.2.1.1** Distinguish among forms of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) and sources of energy (i.e., renewable and nonrenewable energy)
	S8.C.2.1.3 Describe how one form of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) can be concerted into a different form of energy.
S8.C.3 Principles of Motion and Force	
S8.C.3.1 Describe the effect of multiple forces on the movement, speed, or direction of an object.	**S8.C.3.1.2** Distinguish between kinetic and potential energy.

Big Idea: Interactions between any two objects can cause changes in one or both of them.
Essential Question: How can one explain and predict interactions between objects within systems.

NGSS Performance Expectations	PA Academic Standards for Science
MS-PS2 Motion and Stability: Forces and Interactions **PS2.A: Forces and Motion** **MS-PS2-1** For any pair of interacting objects, the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction. (Newton's third law) **MS-PS2-2** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. **PS2.B: Types of Interactions** **MS-PS2-3** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. **MS-PS2-4** Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. **MS-PS2-5** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. **MS-PS3 Energy** **PS3.A: Definitions of Energy** **MS-PS3.1** Construct and interpret graphical displays of data to describe the relationship of kinetic energy to the mass of an object and to the speed of an object. **MS-PS3.2** Develop a model to describe that when the arrangement of objects interacting at a distance changes different amounts of potential energy are stored in the system. **MS-PS3-3** Apply scientific principles to design, construct, and test a device that either minimizes or maximized thermal energy transfer **MS-PS3-4** Plan an investigation to determine the relationship among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the participles as measured by the temperature of the sample. ***This section continues on the next page…***	**3.2.B Physics** **1. Force & Motion of Particles and Ridged Bodies** **3.2.6.B1** Explain how changes in motion require force. **3.2.7.B1** Describe how unbalanced forces acting on an object change its velocity. Analyze how observations of displacement, velocity and acceleration provide necessary and sufficient evidence for the existence of forces. **3.2.8.B1** Explain how inertia is a measure of an object's mass. Explain how momentum is related to the forces acting on an object. **4. Electrical and Magnetic Energy** **3.2.6.B4** Describe how electric current produces magnetic forces and how moving magnetic produce electric current. Derive Ohm's Law through investigation of voltage, current, and resistance. **3.2.7.B4** Explain how electrical current is produced by the flow of electrons. Explain and demonstrate how electric current produces magnetic forces and how moving magnets produce electric current. **3.2.8.B4** Compare and contrast atomic properties of conductors and insulators. ***This section continues on the next page…***

NGSS Performance Expectations	PA Academic Standards for Science
Continued… **PS3.B: Conversation of Energy and Energy Transfer** **MS-PS3-5** Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.	***Continued…***

Pennsylvania System of School Assessment (PSSA)	S8.A Nature of Science
S8.A.1 Reasoning and Analysis	
S8.A.1.2 Identify and explain the impacts of applying scientific, environmental, or technological knowledge to address solutions to practical problems.	**S8.A.1.2.3** Describe fundamental scientific or technological concepts that could solve practical problems (e.g., Newton's laws of motion, Mendelian genetics)
S8.A.3 Systems, Models, and Patterns	
S8.A.3.3 Describe repeated processes or recurring elements in natural, scientific, and technological patterns.	**S8.A.3.3.1** Identify and describe patterns as repeated processes or recurring elements in human-mad systems (e.g, trusses, hub-and-spoke system in communications and transportation systems, feedback controls in regulated systems).

Pennsylvania System of School Assessment (PSSA)	S8.C Physical Sciences
S8.C.3 Principles of Motion and Force	
S8.C.3.1 Describe the effect of multiple forces on the movement, speed, or direction of an object.	**S8.C.3.1.1** Describe forces acting on objects (e.g., friction, gravity, balanced versus unbalanced).
	S8.C.3.1.3 Explain that mechanical advantage helps to do work (physics) by either changing a forces or changing the direction of the applied force (e.g., simple machines, hydraulic systems).

Big Idea: Interactions of objects or systems of objects can be predicted and explained using the concept of energy transfer and conservation.

Essential Question: How is energy transferred and conserved?

NGSS Performance Expectations	PA Academic Standards for Science
MS-PS3 Energy **PS3.A: Definitions of Energy** **MS-PS3.2** Develop a model to describe that when the arrangement of objects interacting at a distance changes different amounts of potential energy are stored in the system. **MS-PS3-3** Apply scientific principles to design, construct, and test a device that either minimizes or maximized thermal energy transfer	**3.2.B Physics** **3. Heat/Heat Transfer** **3.2.6.B3** Give examples of how heat moves in predicable ways, normally flowing from warmer objects to cooler ones until they reach the same temperature. Explain the effect of heat on particle motion by describing what happens to particles during a phase change. **3.2.7.B3** Differentiate among **convection**, **conduction**, and **radiation**. Explain why heat energy consists of random motion and vibrations of the particles of matter. **3.2.8.B3** Explain how changes in temperature are accompanied by changes in kinetic energy. **6. Unifying Themes** **3.2.6.B6** ENERGY Demonstrate that heat moves in predictable ways from warmer objects to cooler ones. SCALE Investigate that materials may be composed of parts too small to be seen without magnification. **3.2.7.B6** ENERGY Demonstrate that heat is often produced as energy is transformed through a **system**. ENERGY Demonstrate how the transfer of heat energy causes temperature changes. **3.2.8.B6** PATTERNS Explain how physics principles underlie everyday phenomena and important technologies.

Pennsylvania System of School Assessment (PSSA)	S8.C Physical Sciences
S8.C.2 Forms, Sources, Conversion, and Transfer of Energy	
S8.C.2.1 Describe energy sources, transfer of energy, or conversion of energy.	**S8.C.2.1.1** Distinguish among forms of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) and sources of energy (i.e., renewable and nonrenewable energy)
	S8.C.2.1.2 Explain how energy is transferred from one place to another through convection, conduction, or radiation.
	S8.C.2.1.3 Describe how one form of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) can be concerted into a different form of energy.
S8.C.3 Principles of Motion and Force	
S8.C.3.1 Describe the effect of multiple forces on the movement, speed, or direction of an object.	**S8.C.3.1.2** Distinguish between kinetic and potential energy.

Big Idea: Waves are a repeating pattern of motion that transfers energy from place to place without overall displacement of matter.

Essential Question: How are waves used to transfer energy and information?

NGSS Performance Expectations	PA Academic Standards for Science
MS-PS4 Waves and Their Applications in Technologies for Information Transfer **PS4.A: Wave Properties** **MS-PS4.1** Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to energy wave. **MS-PS4-2** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. **PS4.C: Information Technologies and Instrumentation** **MS-PS4-3** Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	**3.2.B Physics** **5. Nature of Waves (Sound and Light Energy)** **3.2.7.B5** Demonstrate that visible light is a mixture of many colors. Explain the construct of the electromagnetic spectrum. Describe how sound and light energy are transmitted by waves. **3.2.8.B6** PATTERNS Explain how physics principles underlie everyday phenomena and important technologies.

Pennsylvania System of School Assessment (PSSA)	S8.A Nature of Science
S8.A.3 Systems, Models, and Patterns	
S8.A.3.3 Describe repeated processes or recurring elements in natural, scientific, and technological patterns.	**S8.A.3.3.2** Describe repeating structure patterns in nature (e.g., veins in a leaf, tree ring, crystals, water waves) or periodic patterns (e.g., daily, monthly, annually).

Pennsylvania System of School Assessment (PSSA)	S8.C Physical Sciences
S8.C.2 Forms, Sources, Conversion, and Transfer of Energy	
S8.C.2.1 Describe energy sources, transfer of energy, or conversion of energy.	**S8.C.2.1.1** Distinguish among forms of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) and sources of energy (i.e., renewable and nonrenewable energy)
	S8.C.2.1.2 Explain how energy is transferred from one place to another through convection, conduction, or radiation.
	S8.C.2.1.3 Describe how one form of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) can be concerted into a different form of energy.

Pennsylvania Inquiry and Design Practices (Grades 6-8)

Asking questions and defining problems

- Ask questions that arise from careful observation of phenomena, models, or unexpected results, to clarify and/or seek additional information.
- Ask questions to identify and/or clarify evidence and/or the premise(s) of an argument.
- Ask questions to determine relationships between independent and dependent variables and relationships in models.
- Ask questions to clarify and/or refine a model, an explanation, or an engineering problem.
- Ask questions that require sufficient and appropriate empirical evidence to answer.
- Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles.
- Ask questions that challenge the premise(s) of an argument or the interpretation of a data set.
- Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions.

Developing and using models

- Evaluate limitations of a model for a proposed object or tool.
- Develop or modify a model—based on evidence – to match what happens if a variable or component of a system is changed.
- Use and/or develop a model of simple systems with uncertain and less predictable factors.
- Develop and/or revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena.
- Develop and/or use a model to predict and/or describe phenomena.
- Develop a model to describe unobservable mechanisms.
- Develop and/or use a model to generate data to test ideas about phenomena in natural or designed systems, including those representing inputs and outputs, and those at unobservable scales.

Planning and carrying out investigations

- Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.
- Conduct an investigation and/or evaluate and/or revise the experimental design to produce data to serve as the basis for evidence that meet the goals of the investigation.
- Evaluate the accuracy of various methods for collecting data.
- Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions.
- Collect data about the performance of a proposed object, tool, process or system under system under a range of conditions.

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Pennsylvania Inquiry and Design Practices (Grades 6-8)

Continued…

Constructing explanations and designing solutions

- Construct an explanation that includes qualitative or quantitative relationships between variables that
- Construct an explanation using models or representations.
- Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) 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.
- Apply scientific ideas, principles, and/or evidence to construct, revise and/or use an explanation for real-world phenomena, examples, or events.
- Apply scientific reasoning to show why the data or evidence is adequate for the explanation or conclusion. Apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process or system.
- Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints.
- Optimize performance of a design by prioritizing criteria, making tradeoffs, testing, revising, and re- testing.

Analyzing and interpreting data

- Construct, analyze, and/or interpret graphical displays of data and/or large data sets to identify linear and nonlinear relationships.
- Use graphical displays (e.g., maps, charts, graphs, and/or tables) of large data sets to identify temporal and spatial relationships.
- Distinguish between causal and correlational relationships in data.
- Analyze and interpret data to provide evidence for phenomena.
- Apply concepts of statistics and probability (including mean, median, mode, and variability) to analyze and characterize data, using digital tools when feasible.
- Consider limitations of data analysis (e.g., measurement error), and/or seek to improve precision and accuracy of data with better technological tools and methods (e.g., multiple trials).
- Analyze and interpret data to determine similarities and differences in findings.
- Analyze data to define an optimal operational range for a proposed object, tool, process or system that best meets criteria for success.

Using mathematics and computational thinking

- Use digital tools (e.g., computers) to analyze very large data sets for patterns and trends.
- Use mathematical representations to describe and/or support scientific conclusions and design solutions.
- Create algorithms (a series of ordered steps) to solve a problem.
- Apply mathematical concepts and/or processes (e.g., ratio, rate, percent, basic operations, simple algebra) to scientific and engineering questions and problems.
- Use digital tools and/or mathematical concepts and arguments to test and compare proposed solutions to an engineering design problem.

Engaging in argument from evidence

- Compare and critique two arguments on the same topic and analyze whether they emphasize similar or different evidence and/or interpretations of facts.
- Respectfully provide and receive critiques about one's explanations, procedures, models, and questions by citing relevant evidence and posing and responding to questions that elicit pertinent elaboration and detail.
- Construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.
- Make an oral or written argument that supports or refutes the advertised performance of a device, process, or system based on empirical evidence concerning whether or not the technology meets relevant criteria and constraints.
- Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.

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Pennsylvania Inquiry and Design Practices (Grades 6-8)

Continued…

Obtaining, evaluating, and communicating information

- Critically read scientific texts adapted for classroom use to determine the central ideas and/or obtain scientific and/or technical information to describe patterns in and/or evidence about the natural and designed world(s).
- Integrate qualitative and/or quantitative scientific and/or technical information in written text with that contained in media and visual displays to clarify claims and findings.
- Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence.
- Evaluate data, hypotheses, and/or conclusions in scientific and technical texts in light of competing information or accounts.
- Communicate scientific and/or technical information (e.g. about a proposed object, tool, process, system) in writing and/or through oral presentations.

Pennsylvania System of School Assessment (PSSA)	S8.A Nature of Science
S8.A.1 Reasoning and Analysis	
S8.A.1.1 Explain, interpret, and apply scientific environmental, or technological knowledge presented in a variety of formats (e.g., visuals, scenarios, graphs.)	**S8.A.1.1.1** Distinguish between a scientific theory and an opinion, explaining how theory is supported with evidence, or how new data/information may change existing theories and practices.
	S8.A.1.1.2 Explain how certain questions can be answered through scientific inquiry and/or technological design.
	S8.A.1.1.3 Use evidence, such as observations or experimental results, to support inferences about a relation.
	S8.A.1.1.4 Develop descriptions, explanations, predictions, and models using evidence.
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Pennsylvania Inquiry and Design Practices (Grades 6-8)

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Pennsylvania System of School Assessment (PSSA)	S8.A Nature of Science
S8.A.2 Processes, Procedures, and Tools of Scientific Investigation	
S8.A.2.1 Apply knowledge of scientific investigation or technological design in different contexts to make inferences to solve problems.	**S8.A.2.1.1** Use evidence, observations, or a variety of scales (e.g., mass, distance, volume, temperature) to describe relationships.
	S8.A.2.1.2 Use space/time relationships, define concepts operationally, raise testable questions, or formulate hypotheses.
	S8.A.2.1.3 Design a controlled experiment by specifying how the independent variables will be manipulated, how the dependent variable will be measured, and which variables will be held constant.
	S8.A.2.1.4 Interpret data/observations; develop relationships among variables based on data/observations to design models as solutions.
	S8.A.2.1.5 Use evidence from investigations to clearly communicate and support conclusions.
	S8.A.2.1.6 Identify a design flaw in a simple technological system and devise possible working solutions.
S8.A.2.2 Apply appropriate instruments for a specific purpose and describe the information the instrument can provide.	**S8.A.2.2.1** Describe the appropriate use of instruments and scales to accurately and safely measure time, mass, distance, volume, or temperature under a variety of conditions.
	S8.A.2.2.2 Apply appropriate measurement systems (e.g., time, mass, distance, volume, temperature) to record and interpret observations under varying conditions.
	S8.A.2.2.3 Describe ways technology (e.g., microscope, telescope, micrometer, hydraulic, barometer,) extends and enhances human abilities for specific purposes.
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Pennsylvania Inquiry and Design Practices (Grades 6-8)

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Pennsylvania System of School Assessment (PSSA)	S8.A Nature of Science
S8.A.3 Systems, Models, and Patterns	
S8.A.3.1 Explain the parts of a simple system, their roles, and their relationships to the system as a whole.	**S8.A.3.1.1** Describe a system as a group of related parts with specific roles that work together to achieve an observed result.
S8.A.3.2 Apply knowledge of models to make predictions, draw inferences, or explain technological concepts.	**S8.A.3.2.1** Describe how scientists use models to explore relationships in natural systems (e.g., an ecosystem, river system, the solar system.)
	S8.A.3.2.2 Describe how engineers use models to develop new and improved technologies to solve problems.
	S8.A.3.2.3 Given a model showing simple cause-and-effect relationships in a natural system, predict results that can be used to test the assumptions in the model (e.g., photosynthesis, water cycle, diffusion, infiltration).

Big Ideas	**Essential Questions**
Big Idea 1: Asking questions and defining problems are essential to developing scientific habits of mind.	What kinds of questions do scientists and engineers ask?
Big Idea 2: Scientists construct mental and conceptual models of phenomena to represent current understandings, aid in developing questions and experiments, and to communicate ideas to others.	How do scientists and engineers develop and use models?
Big Idea 3: Scientists and engineers plan and investigate the world to systematically describe it and to develop and test theories and explanations about how the world works.	What do scientists and engineers do to find out more about our world and how it functions?
Big Idea 4: Data must be presented in a form that can reveal any patterns and relationships and that allows results to be communicated to others.	In what ways are data analyzed, interpreted, and communicated?
Big Idea 5: Mathematics enables numerical representation of variables, symbolic representation of relationships between physical entities, and prediction of outcomes.	How is mathematics utilized in doing science?
Big Idea 6: Scientific theories are developed to provide explanations about the nature of particular phenomena, predict future events, or make inferences about past events.	Why are theories valuable constructs in helping scientists understand and explain our world?
Big Idea 7: Scientists and engineers use reasoning and argumentation to make a justified claim about the world.	How do scientists and engineers communicate to others in order to advance science and engineering?
Big Idea 8: Science and engineering are ways of knowing that are represented and communicated by words, diagrams, charts, graphs, images, symbols, and mathematics.	In what ways do scientists and engineers communicate their knowledge?

Pennsylvania Core Standards for Reading in Science and Technical Subjects

Key Ideas and Details
CC.3.5.6-8.A. Cite specific textual evidence to support analysis of science and technical texts.
CC.3.5.6-8.B. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
CC.3.5.6-8.C. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Craft and Structure
CC.3.5.6-8.D. 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 6–8 texts and topics.
CC.3.5.6-8.E. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

Integration of Knowledge and Ideas
CC.3.5.6-8.G. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
CC.3.5.6-8.H. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
CC.3.5.6-8.I. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Range and Level of Complex Texts
CC.3.5.6-8.J. By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.

Pennsylvania Core Standards for Writing in Science and Technical Subjects

Text Types and Purposes
CC.3.6.6-8.A. Write arguments focused on *discipline-specific content.*

- Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
- Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
- Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.
- Establish and maintain a formal style.
- Provide a concluding statement or section that follows from and supports the argument presented.

CC.3.6.6-8.B. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

- Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
- Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
- Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
- Use precise language and domain-specific vocabulary to inform about or explain the topic.
- Establish and maintain a formal style and objective tone.
- Provide a concluding statement or section that follows from and supports the information or explanation presented.

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Pennsylvania Core Standards for Writing in Science and Technical Subjects

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Production and Distribution of Writing
CC.3.6.6-8.C. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CC.3.6.6-8.D. With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
CC.3.6.6-8.E. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

Research to Build and Present Knowledge
CC.3.6.6-8.F. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
CC.3.6.6-8.G. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
CC.3.6.6-8.H. Draw evidence from informational texts to support analysis reflection, and research.

Range of Writing
CC.3.6.6-8.J.I. 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.