

TITLE	PA STANDARDS ADDRESSED	GR LEVEL	LEXILE LEVEL	BOOK SUMMARY	VOCABULARY
All About the Moon ISBN 0022859330 6 PK ISBN 002286654X	3.4.7.D.a., 3.4.7.D.f., 3.4.7.D.g., 3.5.7.C.e.	Z	730	<i>All About the Moon</i> compares and contrasts Earth and the Moon, describes the history of the Moon landings, explains the motion of the Moon, and discusses the phases of the Moon.	crater lunar mare orbit satellite
Alloys ISBN 0022859381 6 PK ISBN 0022866574	3.2.7.A.d., 3.4.7.A.c. 3.5.7.B.c., 3.6.7.A.c. 3.6.7.C.a., 3.6.7.C.c. 3.6.7.C.e., 3.6.7.C.k. 3.7.7.A.a., 3.7.7.A.c. 3.8.7.A.b., 3.8.7.A.c. 3.8.7.C.a., 3.8.7.C.b	Y	860	<i>Alloys</i> describes historical uses of metals and alloys, such as bronze and iron. It also describes current applications of alloys and possible future uses of alloys.	alloy bronze corrosion iron steel
Amazing Water ISBN 0022859209 6 PK ISBN 0022866558	3.3.7.B.b., 3.4.7.A.c. 3.5.7.D.a., 3.5.7.D.b 3.5.7.D.c., 3.6.7.A.a.	T	560	The unique properties of water, uses of water, the water cycle, water pollution, and the possibility of water on other planets are described in <i>Amazing Water</i> .	condense evaporate precipitation solvent surface tension
Animal Migration ISBN 0022859179 6 PK ISBN 0022866426	3.3.7.A.c., 3.3.7.D.a.	S	670	<i>Animal Migration</i> explores the migration patterns of whales, monarch butterflies, warblers, and sea turtles. The life cycle of the Monarch butterfly is diagrammed, and maps are used to illustrate migration routes.	habitat metamorphosis migration plankton predator
Antarctica: Land of Snow and Ice ISBN 0022847324 6 PK ISBN 0022865179	3.3.7.A.a., 3.3.7.A.c. 3.3.7.D.a., 3.3.7.D.b., 3.6.7.A.a.	V	900	In <i>Antarctica: Land of Snow and Ice</i> , the terms <i>habitat</i> , <i>biome</i> , and <i>ecosystem</i> are defined. The climate and living things of Antarctica are described.	biome ecosystem glacier habitat microhabitat
Bacteria and Viruses ISBN 0022859292 6 PK ISBN 0022866442	3.3.7.A.a., 3.3.7.A.c. 3.3.7.B.c., 3.3.7.B.e. 3.3.7.C.e., 3.6.7.A.b. 3.8.7.A.c.	Y	660	<i>Bacteria and Viruses</i> begins with a discussion of early discoveries related to microscopes and microorganisms. Various types of bacteria are discussed and pictured. The role of bacteria in ecosystems and ways that bacteria impact humans are also discussed.	antibiotic microscope pasteurization virus

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TITLE	PA STANDARDS ADDRESSED	GR LEVEL	LEXILE LEVEL	BOOK SUMMARY	VOCABULARY
Building a Biome * ISBN 0022847332 6 PK ISBN 0022865187	3.1.7.C.b., 3.1.7.C.c. 3.3.7.A.a., 3.3.7.A.c. 3.3.7.D.a., 3.6.7.A.c.	X	910	Construction of the deserts biome in the Indianapolis Zoo is described in Building a Biome . Characteristics of desert biomes are described and career opportunities at zoos are identified.	biome conservation ecosystem precipitation species
Carbon ISBN 0022859217 6 PK ISBN 0022866582	3.1.7.B.a., 3.1.7.C.b. 3.1.7.C.c., 3.3.7.D.e. 3.4.7.A.a., 3.4.7.A.c. 3.5.7.B.a., 3.5.7.B.b. 3.5.7.B.c., 3.8.7.C.a.	S	600	Carbon describes forms of carbon, uses of carbon, the role of carbon in living things, the carbon cycle, fossil fuels, and the greenhouse effect.	atom compound element organic compound respiration
Changes at Earth's Surface ISBN 0022847421 6 PK ISBN 0022865276	3.5.7.A.b., 3.5.7.A.c., 3.5.7.A.e., 3.5.7.D.e.	V	880	Changes at Earth's Surface describes physical and chemical weathering, erosion, deposition, and the changes that result from these processes.	chemical weathering deposition erosion gravity physical weathering
Chemical Changes * ISBN 0022859276 6 PK ISBN 0022866590	3.3.7.A.c., 3.3.7.D.a., 3.4.7.A.a., 3.4.7.A.d.	X	630	Chemical Changes contains a description of the signs that indicate a chemical change has occurred, everyday applications of chemical changes, and chemical changes that occur in organisms.	chemical change combustion compound element reaction
Discovering the Secrets of Cells * ISBN 0022859233 6 PK ISBN 0022866469	3.3.7.B.b., 3.3.7.B.c., 3.3.7.B.e., 3.3.7.C.b., 3.8.7.C.b.	X	720	Discovering the Secrets of Cells explores careers in cell biology, the function of organelles, and tools such as computers that are used in cell research.	cell DNA gene neuron nucleus
DNA Fingerprinting ISBN 0022859322 6 PK ISBN 0022866515	3.3.7.C.b., 3.3.7.C.f. 3.5.7.A.f., 3.8.7.A.b. 3.8.7.A.c., 3.8.7.C.a. 3.8.7.C.b.	Y	720	DNA Fingerprinting describes applications of DNA technology to solving crimes, tracing ancestry, solving historical mysteries, and tracking genetic diseases.	base DNA fingerprinting gene inherit mutation

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TITLE	PA STANDARDS ADDRESSED	GR LEVEL	LEXILE LEVEL	BOOK SUMMARY	VOCABULARY
Do Fossil Fuels Have a Future? * ISBN 0022847499 6 PK ISBN 0022865349	3.2.7.A.b., 3.5.7.B.a. 3.5.7.B.b., 3.5.7.B.c. 3.6.7.A.a., 3.6.7.A.d. 3.8.7.A.b., 3.8.7.C.a.	X	900	<i>Do Fossil Fuels Have a Future?</i> explains the formation of fossil fuels, methods of mining fossil fuels, consequences of the use of fossil fuels, and possible alternatives to fossil fuels.	acid rain coal decompose fossil fuel petroleum
Earth's Changing Climate * ISBN 002285925X 6 PK ISBN 0022866523	3.3.7.D.f., 3.5.7.C.b., 3.6.7.A.a., 3.8.7.C.a.	W	740	Climate, climate change, and the science of studying climates are discussed in <i>Earth's Changing Climate</i> .	climate climatologist core drought weather
Ecosystems ISBN 0022847316 6 PK ISBN 0022865160	3.3.7.A.c., 3.3.7.D.b. 3.3.7.D.f., 3.5.7.B.c. 3.8.7.C.a.	Y	910	<i>Ecosystems</i> discusses energy flow within ecosystems, human impact on ecosystems, and ways that individuals can have a positive impact on ecosystems.	conservation consumer decomposer ecosystem producer
Einstein, Newton, and Gravity ISBN 0022859489 6 PK ISBN 0022866639	3.1.7.A.f., 3.1.7.A.h. 3.2.7.A.a., 3.2.7.A.c. 3.2.7.A.d., 3.4.7.D.d. 3.4.7.D.g.	X	760	<i>Einstein, Newton, and Gravity</i> discusses the development of ideas about gravity and space-time, and highlights the cumulative nature of scientific knowledge.	force gravity inertia mass theory
Energy Hunter * ISBN 0022847367 6 PK ISBN 0022865225	3.1.7.A.c., 3.4.7.B.b. 3.5.7.B.a., 3.5.7.B.b. 3.5.7.B.d., 3.6.7.A.a. 3.6.7.A.d., 3.8.7.C.a.	X	810	<i>Energy Hunter</i> identifies sources of energy including biomass, geothermal, solar, fossil fuels, and nuclear reactions.	biomass geothermal energy nuclear fusion renewable solar energy
Exploring the Ocean Depths * ISBN 0022859268 6 PK ISBN 0022866566	3.2.7.A.d., 3.3.7.A.a., 3.3.7.A.c., 3.3.7.D.a., 3.8.7.C.b.	X	710	<i>Exploring the Ocean Depths</i> describes how technology is used to advance science by allowing humans to explore the deepest parts of the ocean.	adaptation bioluminescence geyser hydrothermal vent probe

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TITLE	PA STANDARDS ADDRESSED	GR LEVEL	LEXILE LEVEL	BOOK SUMMARY	VOCABULARY
Finding Our Way ISBN 0022859195 6 PK ISBN 0022866531	3.1.7.D.a., 3.1.7.D.b. 3.1.7.E.a., 3.8.7.A.b. 3.8.7.A.c., 3.8.7.C.b.	T	640	<i>Finding Our Way</i> describes methods of navigation, longitude and latitude, historic navigation tools, and modern navigation tools such as GPS.	astrolabe compass Global Positioning System (GPS) latitude longitude
Fire in the Sierra Nevada ISBN 0022847340 6 PK ISBN 0022865195	3.3.7.A.a., 3.3.7.A.c., 3.3.7.D.a., 3.3.7.D.b., 3.8.7.B.b.	Y	840	<i>Fire in the Sierra Nevada</i> describes the communities of living things found in the Sierra Nevada and the role that fire plays in keeping this ecosystem in balance.	chaparral ecosystem habitat ignite vegetation
Foods that Feed the World * ISBN 0022859225 6 PK ISBN 0022866434	3.1.7.E.a., 3.2.7.A.d. 3.3.7.B.e., 3.3.7.C.g. 3.3.7.D.b., 3.5.7.B.c. 3.6.7.A.e., 3.6.7.A.f. 3.8.7.A.c., 3.8.7.B.c.	X	730	<i>Foods That Feed the World</i> describes agriculture, food production, and ways that science has improved agricultural practices over time.	agriculture fertilizer pesticide breeding staple
Greenhouse Effect ISBN 0022847456 6 PK ISBN 0022865306	3.5.7.C.e., 3.6.7.A.a., 3.8.7.A.b., 3.8.7.C.a.	V	820	<i>Greenhouse Effect</i> describes the role of the greenhouse effect in making Earth habitable and describes ways that human activity impacts the greenhouse effect, the ozone layer, and global climate.	atmosphere carbon dioxide deforestation global warming greenhouse effect
Gregor Mendel * ISBN 0022859241 6 PK ISBN 0022866493	3.1.7.C.c., 3.1.7.E.b. 3.2.7.A.c., 3.2.7.A.d. 3.2.7.C.d., 3.2.7.C.f. 3.3.7.C.a., 3.3.7.C.b. 3.3.7.C.c., 3.3.7.C.d. 3.3.7.C.g.	W	710	In <i>Gregor Mendel</i> , the experimental methods used by Gregor Mendel are described. This book also describes how Mendel's results used ratios, discusses Mendel's laws, and identifies ways that Mendel's work impacted the work of other scientists.	dominant genetics heredity hybrid recessive
Hidden Life In A Pond ISBN 0022859314 6 PK ISBN 0022866477	3.2.7.A.b., 3.3.7.A.a., 3.3.7.A.c., 3.3.7.D.a., 3.8.7.C.b.	Y	720	<i>Hidden Life in a Pond</i> identifies microorganisms found in pond water and explains the history of the microscope.	algae bacteria food web habitat protozoa

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TITLE	PA STANDARDS ADDRESSED	GR LEVEL	LEXILE LEVEL	BOOK SUMMARY	VOCABULARY
How Do Toys Work? * ISBN 0022859284 6 PK ISBN 0022866620	3.4.7.B.c., 3.4.7.C.a., 3.4.7.C.c., 3.4.7.D.d.	W	710	<i>How Do Toys Work?</i> applies concepts of physics, such as motion, forces, friction, and momentum to toys such as yo-yos and model airplanes.	energy force friction gravity momentum
Microorganisms ISBN 0022859187 6 PK ISBN 0022866450	3.2.7.A.c., 3.3.7.B.c. 3.3.7.C.e., 3.3.7.D.a. 3.3.7.D.d. 3.6.7.A.b., 3.8.7.A.c., 3.8.7.C.a.	S	570	<i>Microorganisms</i> identifies types of microorganisms, discusses the development of the microscope, and explains the role of microorganisms in disease and in food production.	antibiotic bacteria microbe protist vaccine
Microwaves and Cooking ISBN 0022847480 6 PK ISBN 0022865330	3.2.7.A.d., 3.4.7.B.c., 3.8.7.A.b., 3.8.7.C.a.	W	820	<i>Microwaves and Cooking</i> describes the accidental discovery that microwaves cook food, development of the microwave oven over time, and the process of scientific invention.	electron magnetron microwave nonionizing radiation patent
Nuclear Medicine ISBN 0022859349 6 PK ISBN 0022866604	3.3.7.B.d., 3.8.7.A.c., 3.8.7.C.a., 3.8.7.C.b.	Y	750	<i>Nuclear Medicine</i> describes the application of radioactive materials in medicine. The book describes X rays, bone scans, MRI, and radiation therapy.	barium CT scan MRI nuclear medicine X ray
Power for Our Future ISBN 0022847375 6 PK ISBN 0022865233	3.1.7.E.a., 3.2.7.A.d. 3.3.7.D.b., 3.4.7.B.c. 3.5.7.B.c., 3.6.7.A.a. 3.6.7.A.d., 3.6.7.C.j., 3.8.7.A.b., 3.8.7.C.a.	Y	940	<i>Power For Our Future</i> describes the need for renewable energy resources such as solar energy, geothermal energy, fuel cells, and biomass fuels.	geothermal energy hydrogen solar power renewable tidal energy
Powered by the Sun ISBN 0022847472 6 PK ISBN 0022865322	3.1.7.E.a., 3.4.7.B.b. 3.4.7.B.c., 3.4.7.D.f. 3.8.7.A.a., 3.8.7.A.b. 3.8.7.A.c., 3.8.7.B.b. 3.8.7.C.a.	Y	890	<i>Powered By the Sun</i> describes nuclear fusion in the Sun and the role of the Sun's energy in the water cycle and fossil fuel formation. It also describes ways that solar energy can be captured and used to make electricity, heat water, heat homes, and power spacecraft.	array insulation nuclear fusion renewable resource solar energy

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TITLE	PA STANDARDS ADDRESSED	GR LEVEL	LEXILE LEVEL	BOOK SUMMARY	VOCABULARY
Skates Bikes, and Rockets ISBN 0022859470 6 PK ISBN 0022866612	3.1.7.E.a., 3.4.7.C.a. 3.4.7.D.f., 3.6.7.A.c. 3.6.7.C.j.	S	830	Skates, Bikes, and Rockets describes how Newton's laws of motion are demonstrated by inline skates, ice skates, bicycles, and rockets.	force friction gravity inertia newton
Sun Storms * ISBN 0022847464 6 PK ISBN 0022865314	3.4.7.B.b., 3.4.7.D.f., 3.4.7.D.h., 3.8.7.C.b.	X	900	Sun Storms describes solar events such as solar flares and sunspots and the way these events affect Earth. It also describes methods scientists use to study the Sun.	corona magnetic field plasma solar flare sunspot
The Ring of Fire ISBN 0022847413 6 PK ISBN 0022865268	3.5.7.A.b., 3.5.7.A.e., 3.8.7.C.b.	Z	940	The Ring of Fire describes the most severe earthquakes and volcanic events associated with the Ring of Fire. Tsunamis and tsunami warning systems are also discussed.	aftershock earthquake seismic tsunami volcano
The Story of DNA ISBN 0022859446 6 PK ISBN 0022866485	3.2.7.A.d., 3.3.7.C.a. 3.3.7.C.b., 3.3.7.C.d 3.3.7.C.f., 3.3.7.C.g 3.8.7.A.b., 3.8.7.A.c. 3.8.7.C.a.	S	840	The Story of DNA highlights the discoveries of Watson and Crick, Mendel, Wilkins and Franklin, and Francis Collins. It discusses the role of DNA in the inheritance of traits and new developments in DNA technology.	cell DNA gene genetics mutate
Tracing the Food Web ISBN 0022847286 6 PK ISBN 0022865144	3.3.7.A.c., 3.3.7.D.a., 3.3.7.D.b., 3.4.7.B.c.	V	860	The flow of energy in a variety of ecosystems is described in Tracing the Food Web . Human impact on the world's ecosystems is also described.	Consumer decomposer ecosystem food chain food web
Tsunami! * ISBN 0022847391 6 PK ISBN 002286525X	3.5.7.A.b., 3.5.7.A.e., 3.8.7.C.b.	X	880	Tsunami! describes the formation and aftermath of the tsunami of December 26, 2004, as well as ways that tsunamis can be predicted and prepared for.	geologist lithosphere meteorite Richter scale tectonic plate

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Pennsylvania Academic Standards for Science and Technology

3.1.7 Unifying Themes

Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:

- 3.1.7.A. Explain the parts of a simple system and their relationship to each other.
- 3.1.7.A.a. • Describe a system as a group of related parts that work together to achieve a desired result (e.g., digestive system).
- 3.1.7.A.b. • Explain the importance of order in a system.
- 3.1.7.A.c. • Distinguish between system inputs, system processes and system outputs.
- 3.1.7.A.d. • Distinguish between open loop and closed loop systems.
- 3.1.7.A.e. • Apply systems analysis to solve problems.
- 3.1.7.A.f. • Identify and apply models as tools for prediction and insight.
- 3.1.7.A.g. • Apply appropriate simple modeling tools and techniques.
- 3.1.7.A.h. • Identify theories that serve as models (e.g., molecules).
- 3.1.7.B. Describe the use of models as an application of scientific or technological concepts.
- 3.1.7.B.a. • Identify and describe different types of models and their functions.
- 3.1.7.B.b. • Apply models to predict specific results and observations (e.g., population growth, effects of infectious organisms).
- 3.1.7.B.c. • Explain systems by outlining a system's relevant parts and its purpose and/or designing a model that illustrates its function.
- 3.1.7.C. Identify patterns as repeated processes or recurring elements in science and technology.
- 3.1.7.C.a. • Identify different forms of patterns and use them to group and classify specific objects.
- 3.1.7.C.b. • Identify repeating structure patterns.
- 3.1.7.C.c. • Identify and describe patterns that occur in physical systems (e.g., construction, manufacturing, transportation), informational systems and biochemical-related systems.
- 3.1.7.D. Explain scale as a way of relating concepts and ideas to one another by some measure.
- 3.1.7.D.a. • Apply various applications of size and dimensions of scale to scientific, mathematical, and technological applications.
- 3.1.7.D.b. • Describe scale as a form of ratio and apply to a life situation.
- 3.1.7.E. Identify change as a variable in describing natural and physical systems.
- 3.1.7.E.a. • Describe fundamental science and technology concepts that could solve practical problems.
- 3.1.7.E.b. • Explain how ratio is used to describe change.
- 3.1.7.E.c. • Describe the effect of making a change in one part of a system on the system as a whole.

3.2.7 Inquiry and Design

Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:

- 3.2.7.A. Explain and apply scientific and technological knowledge.
 - 3.2.7.A.a. • Distinguish between a scientific theory and a belief.
 - 3.2.7.A.b. • Answer “What if” questions based on observation, inference or prior knowledge or experience.
 - 3.2.7.A.c. • Explain how skepticism about an accepted scientific explanation led to a new understanding.
 - 3.2.7.A.d. • Explain how new information may change existing theories and practice.
- 3.2.7.B. Apply process knowledge to make and interpret observations.
 - 3.2.7.B.a. • Measure materials using a variety of scales.
 - 3.2.7.B.b. • Describe relationships by making inferences and predictions.
 - 3.2.7.B.c. • Communicate, use space / time relationships, define operationally, raise questions, formulate hypotheses, test and experiment,
 - 3.2.7.B.d. • Design controlled experiments, recognize variables, and manipulate variables.
 - 3.2.7.B.e. • Interpret data, formulate models, design models, and produce solutions.
- 3.2.7.C. Identify and use the elements of scientific inquiry to solve problems.
 - 3.2.7.C.a. • Generate questions about objects, organisms and/or events that can be answered through scientific investigations.
 - 3.2.7.C.b. • Evaluate the appropriateness of questions.
 - 3.2.7.C.c. • Design an investigation with limited variables to investigate a question.
 - 3.2.7.C.d. • Conduct a two-part experiment.
 - 3.2.7.C.e. • Judge the significance of experimental information in answering the question.
 - 3.2.7.C.f. • Communicate appropriate conclusions from the experiment.
- 3.2.7.D. Know and use the technological design process to solve problems.
 - 3.2.7.D.a. • Define different types of problems.
 - 3.2.7.D.b. • Define all aspects of the problem, necessary information and questions that must be answered.
 - 3.2.7.D.c. • Propose the best solution.
 - 3.2.7.D.d. • Design and propose alternative methods to achieve solutions.
 - 3.2.7.D.e. • Apply a solution.
 - 3.2.7.D.f. • Explain the results, present improvements, identify and infer the impacts of the solution.

3.3.7 Biological Sciences

Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:

- 3.3.7.A. Describe the similarities and differences that characterize diverse living things.
 - 3.3.7.A.a. • Describe how the structures of living things help them function in unique ways.

- 3.3.7.A.b. • Explain how to use a dichotomous key to identify plants and animals.
 - 3.3.7.A.c. • Account for adaptations among organisms that live in a particular environment.
 - 3.3.7.B. Describe the cell as the basic structural and functional unit of living things.
 - 3.3.7.B.a. • Identify the levels of organization from cell to organism.
 - 3.3.7.B.b. • Compare life processes at the organism level with life processes at the cell level.
 - 3.3.7.B.c. • Explain that cells and organisms have particular structures that underlie their functions.
 - 3.3.7.B.d. • Describe and distinguish among cell cycles, reproductive cycles and life cycles.
 - 3.3.7.B.e. • Explain disease effects on structures or functions of an organism.
 - 3.3.7.C. Know that every organism has a set of genetic instructions that determines its inherited traits.
 - 3.3.7.C.a. • Identify and explain inheritable characteristics.
 - 3.3.7.C.b. • Identify that the gene is the basic unit of inheritance.
 - 3.3.7.C.c. • Identify basic patterns of inheritance (e.g., dominance, recessive, co-dominance).
 - 3.3.7.C.d. • Describe how traits are inherited.
 - 3.3.7.C.e. • Distinguish how different living things reproduce (e.g., vegetative budding, sexual).
 - 3.3.7.C.f. • recognize that mutations can alter a gene.
 - 3.3.7.C.g. • Describe how selective breeding, natural selection and genetic technologies can change genetic makeup of organisms.
 - 3.3.7.D. Explain basic concepts of natural selection.
 - 3.3.7.D.a. • Identify adaptations that allow organisms to survive in their environment.
 - 3.3.7.D.b. • Describe how an environmental change can affect the survival of organisms and entire species.
 - 3.3.7.D.c. • know that differences in individuals of the same species may give some advantage in surviving and reproducing.
 - 3.3.7.D.d. • recognize that populations of organisms can increase rapidly.
 - 3.3.7.D.e. • Describe the role that fossils play in studying the past.
 - 3.3.7.D.f. • Explain how biologic extinction is a natural process.
- Ecosystem Standards are in the Environment and Ecology Standard Category (4.6).

3.4.7 Physical Science, Chemistry and Physics

Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:

- 3.4.7.A. Describe concepts about the structure and properties of matter.
- 3.4.7.A.a. • Identify elements as basic building blocks of matter that cannot be broken down chemically.
- 3.4.7.A.b. • Distinguish compounds from mixtures.
- 3.4.7.A.c. • Describe and conduct experiments that identify chemical and physical properties.
- 3.4.7.A.d. • Describe reactants and products of simple chemical reactions.
- 3.4.7.B. Relate energy sources and transfers to heat and temperature.

- 3.4.7.B.a. • Identify and describe sound changes in moving objects.
 - 3.4.7.B.b. • Know that the sun is a major source of energy that emits wavelengths of visible light, infrared and ultraviolet radiation.
 - 3.4.7.B.c. • Explain the conversion of one form of energy to another by applying knowledge of each form of energy.
 - 3.4.7.B.d. • Explain the parts and functions in an electrical circuit.
 - 3.4.7.C. Identify and explain the principles of force and motion.
 - 3.4.7.C.a. • Describe the motion of an object based on its position, direction and speed.
 - 3.4.7.C.b. • Classify fluid power systems according to fluid used or mode of power transmission (e.g., air, oil).
 - 3.4.7.C.c. • Explain various motions using models.
 - 3.4.7.C.d. • Explain how convex and concave mirrors and lens change light images.
 - 3.4.7.C.e. • Explain how sound and light travel in waves of differing speeds, sizes and frequencies.
 - 3.4.7.D. Describe essential ideas about the composition and structure of the universe and the earth's place in it.
 - 3.4.7.D.a. • Compare various planets' characteristics.
 - 3.4.7.D.b. • Describe basic star types and identify the sun as a star type.
 - 3.4.7.D.c. • Describe and differentiate comets, asteroids and meteors.
 - 3.4.7.D.d. • Identify gravity as the force that keeps planets in orbit around the sun and governs the rest of the movement of the solar system and the universe.
 - 3.4.7.D.e. • Illustrate how the positions of stars and constellations change in relation to the Earth during an evening and from month to month.
 - 3.4.7.D.f. • Identify equipment and instruments that explore the universe.
 - 3.4.7.D.g. • Identify the accomplishments and contributions provided by selected past and present scientists in the field of astronomy.
 - 3.4.7.D.h. • Identify and articulate space program efforts to investigate possibilities of living in space and on other planets.
- Refer to Technology Standard Category 3.6 for applied uses of these concepts and principles.

3.5.7 Earth Sciences

Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:

- 3.5.7.A. Describe earth features and processes.
- 3.5.7.A.a. • Describe major layers of the earth.
- 3.5.7.A.b. • Describe the processes involved in the creation of geologic features (e.g., folding, faulting, volcanism, sedimentation) and that these processes seen today (e.g., erosion, weathering crustal plate movement) are similar to those in the past.
- 3.5.7.A.c. • Describe the processes that formed Pennsylvania geologic structures and resources including mountains, glacial formations water gaps and ridges.
- 3.5.7.A.d. • Explain how the rock cycle affected rock formations in the state of Pennsylvania.
- 3.5.7.A.e. • Distinguish between examples of rapid surface changes (e.g., landslides, earthquakes) and slow surface changes (e.g., weathering).
- 3.5.7.A.f. • Identify living plants and animals that are similar to fossil forms.
- 3.5.7.B. Recognize earth resources and how they affect everyday life.
- 3.5.7.B.a. • Identify and locate significant earth resources (e.g., rock types, oil, gas, coal deposits) in Pennsylvania.
- 3.5.7.B.b. • Explain the processes involved in the formation of oil and coal in Pennsylvania.

- 3.5.7.B.c. • Explain the value and uses of different earth resources (e.g., selected minerals, ores, fuel sources, agricultural uses).
 - 3.5.7.B.d. • Compare the locations of human settlements as related to available resources.
 - 3.5.7.C. Describe basic elements of meteorology.
 - 3.5.7.C.a. • Explain weather forecasts by interpreting weather data and symbols.
 - 3.5.7.C.b. • Explain the oceans' impact on local weather and the climate of a region.
 - 3.5.7.C.c. • Identify how cloud types, wind directions and barometric pressure changes are associated with weather patterns in different regions of the country.
 - 3.5.7.C.d. • Explain and illustrate the processes of cloud formation and precipitation.
 - 3.5.7.C.e. • Describe and illustrate the major layers of the earth's atmosphere.
 - 3.5.7.C.f. • Identify different air masses and global wind patterns and how they relate to the weather patterns in different regions of the U.S.
 - 3.5.7.D. Explain the behavior and impact of the earth's water systems.
 - 3.5.7.D.a. • Explain the water cycle using the processes of evaporation and condensation.
 - 3.5.7.D.b. • Describe factors that affect evaporation and condensation.
 - 3.5.7.D.c. • Distinguish salt from fresh water (e.g., density, electrical conduction).
 - 3.5.7.D.d. • Compare the effect of water type (e.g., polluted, fresh, salt water) and the life contained in them.
 - 3.5.7.D.e. • Identify ocean and shoreline features, (e.g., bays, inlets, spit, tidal marshes).
- Refer to Environment and Ecology Standards Categories 4.1, 4.3, 4.8 for standards that deal with environmental impact of Earth structures and forces.

3.6.7 Technology Education

Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:

- 3.6.7.A. Explain biotechnologies that relate to related technologies of propagating, growing, maintaining, adapting, treating and converting.
 - 3.6.7.A.a. • Identify the environmental, societal and economic impacts that waste has in the environment.
 - 3.6.7.A.b. • Identify and explain the impact that a specific medical advancement has had on society.
 - 3.6.7.A.c. • Explain the factors that were taken into consideration when a specific object was designed.
 - 3.6.7.A.d. • Define and describe how fuels and energy can be generated through the process of biomass conversion.
 - 3.6.7.A.e. • Identify and group basic plant and animal production processes.
 - 3.6.7.A.f. • explain the impact that agricultural science has had on biotechnology.
- 3.6.7.B. Explain information technologies of encoding, transmitting, receiving, storing, retrieving and decoding.
 - 3.6.7.B.a. • Demonstrate the effectiveness of image generating technique to communicate a story (e.g., photography, video).
 - 3.6.7.B.b. • Analyze and evaluate the effectiveness of a graphic object designed and produced to communicate a thought or concept.
 - 3.6.7.B.c. • Apply basic technical drawing techniques to communicate an idea or solution to a problem.
 - 3.6.7.B.d. • Apply the appropriate method of communications technology to communicate a thought.

- 3.6.7.C. Explain physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, marketing, research and design.
- 3.6.7.C.a. • Use knowledge of material effectiveness to solve specific construction problems (e.g., steel vs. wood bridges).
- 3.6.7.C.b. • Differentiate among the different types of construction applications (e.g., microwave tower, power plants, aircrafts).
- 3.6.7.C.c. • Explain basic material processes that manufactured objects undergo during production. (e.g., separating, forming, combining).
- 3.6.7.C.d. • Evaluate a construction activity by specifying task analyses and necessary resources.
- 3.6.7.C.e. • Explain the relationships among the basic resources needed in the production process for a specific manufactured object.
- 3.6.7.C.f. • Explain the difference between design engineering and production engineering processes.
- 3.6.7.C.g. • Analyze manufacturing steps that affect waste and pollutants.
- 3.6.7.C.h. • Explain transportation technologies of propelling, structuring, suspending, guiding, controlling and supporting.
- 3.6.7.C.i. • Identify and explain the workings of several mechanical power systems.
- 3.6.7.C.j. • Model and explain examples of vehicular propulsion, control, guidance, structure and suspension systems.
- 3.6.7.C.k. • Explain the limitations of land, marine, air and space transportation systems.

3.7.7 Technological Devices

Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:

- 3.7.7.A. Describe the safe and appropriate use of tools, materials and techniques to answer questions and solve problems.
- 3.7.7.A.a. • Identify uses of tools, machines, materials, information, people, money, energy and time that meet specific design criteria.
- 3.7.7.A.b. • Describe safe procedures for using tools and materials.
- 3.7.7.A.c. • Assess materials for appropriateness of use.
- 3.7.7.B. Use appropriate instruments and apparatus to study materials.
- 3.7.7.B.a. • Select appropriate instruments to measure the size, weight, shape and temperature of living and non-living objects.
- 3.7.7.B.b. • Apply knowledge of different measurement systems to measure and record objects' properties.
- Computer literacy, including the use of hardware and software in standard statements C, D, and E, should be integrated across all content areas.
- 3.7.7.C. Apply basic computer operations and concepts.
- 3.7.7.C.a. • Identify solutions to basic hardware and software problems.
- 3.7.7.C.b. • Apply knowledge of advanced input devices.
- 3.7.7.C.c. • Apply knowledge of hardware setup.
- 3.7.7.C.d. • Describe the process for basic software installation and demonstrate it.
- 3.7.7.C.e. • Analyze and solve basic operating systems problems.
- 3.7.7.C.f. • Apply touch keyboarding skills and techniques at expectable speed and accuracy.
- 3.7.7.C.g. • Demonstrate the ability to perform basic software installation.
- 3.7.7.D. Utilize computer software to solve specific problems.
- 3.7.7.D.a. • Identify legal restrictions in the use of software and the output of data.

- 3.7.7.D.b. • Apply advanced graphic manipulation and desktop publishing techniques.
- 3.7.7.D.c. • Apply basic multimedia applications.
- 3.7.7.D.d. • Apply advanced word processing, database and spreadsheet skills.
- 3.7.7.D.e. • Describe and demonstrate how two or more software applications can be used to produce an output.
- 3.7.7.D.f. • Select and apply software designed to meet specific needs.
- 3.7.7.E. Apply basic computer communications systems.
- 3.7.7.E.a. • Identify and explain various types of on-line services.
- 3.7.7.E.b. • Identify and explain the function of the parts of a basic network.
- 3.7.7.E.c. • Describe and apply the components of a web page and their function.
- 3.7.7.E.d. • Explain and demonstrate file transfer within and out side of a computer network.
- 3.7.7.E.e. • Identify, describe and complete advanced on-line research.

3.8.7 Science, Technology and Human Endeavors

Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:

- 3.8.7.A. Explain how sciences and technologies are limited in their effects and influences on society.
- 3.8.7.A.a. • Identify and describe the unavoidable constraints of technological design.
- 3.8.7.A.b. • Identify changes in society as a result of a technological development.
- 3.8.7.A.c. • Identify and explain improvements in transportation, health, sanitation and communications as a result of advancements in science and technology and how they effect our lives.
- 3.8.7.B. Explain how human ingenuity and technological resources satisfy specific human needs and improve the quality of life.
- 3.8.7.B.a. • Identify interrelationships between systems and resources.
- 3.8.7.B.b. • Identify and describe the resources necessary to solve a selected problem in a community and improve the quality of life.
- 3.8.7.B.c. • identify and explain specific examples of how agricultural science has met human needs and has improved the quality of life.
- 3.8.7.C. Identify the pros and cons of applying technological and scientific solutions to address problems and the effect upon society.
- 3.8.7.C.a. • Describe the positive and negative expected and unexpected effects of specific technological developments.
- 3.8.7.C.b. • Describe ways technology extends and enhances human abilities.