

## Curriculum Map: General Science 8 2022-23

Course: SCIENCE 8 Sub-topic: General

Grade(s): 8

**Course Description:** General Science 8 is a course designed to expose 8th grade students to a wide variety of scientific subject areas. Throughout the course, the process of scientific discovery will be emphasized while students learn about the following areas: 1) The Nature of Science; 2) Ecology; 3) Environmental Science; 4) Chemistry; 5) Astronomy; 6) Electricity and Magnetism; 7) Energy, Work and Machines; 8) Motion, Forces and Pressure. The course also includes two authentic units where students are grouped in teams to solve problems with a more "real world" approach. The coursework will prepare these students for the variety of science classes they will take during their high school years. The curriculum will focus on standards set by the PSSA tests and will help prepare the students for the 8th grade PSSA Science Test.

**Course Textbooks, Workbooks, Materials Citations:** Textbooks: Science Explorer Series from Prentice Hall  
Environmental Science  
Chemical Interactions  
Astronomy  
Electricity and Magnetism  
Motion, Force and Energy

### Unit: Nature of Science

Timeline: Week 1 to 4

**Unit Description:** The Nature of Science unit focuses on how science works as a process from observations to theories and laws. The unit stresses the ideas that scientific facts are arrived at through a specific process known as the scientific method and must include data supported conclusions. Measurements are also included in this unit.

**Unit Essential Questions:** How are scientific principles formed using the scientific method?

**Unit Big Ideas:** Science is a process that begins with observations leading to questions. These questions are answered using a process of experimentation and inferencing to form data supported conclusions.

Measurements are extremely important in scientific discovery and the metric system is the universal system of measurement used by scientists all over the world.

**Unit Materials:** Worksheets  
PHET online lab

**Unit Assignments:** Scientific Method Quiz  
Portfolio  
Measurement Quiz  
Test

**Unit Key** Inference

**Terminology & Definitions :**

Qualitative Observation  
Quantitative Observation  
Hypothesis  
Dependent Variable  
Independent Variable  
Conclusion  
Theory  
Metric System  
Mass  
Volume  
Density

**STANDARDS: STANDARDS**

STATE: PA Core Anchors and Eligible Content (2014)

[M03.D-M.1.2.1 \(Advanced\)](#)

Measure and estimate liquid volumes and masses of objects using standard units (cups [c], pints [pt], quarts [qt], gallons [gal], ounces [oz.], and pounds [lb]) and metric units (liters [l], grams [g], and kilograms [kg]).

Alternate Eligible Content Code M03DM1.2.1a: Identify and use the appropriate measurement tool based on the situation

**Topic: The process of science**

Minutes for Topic: 88

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.A.1.1.1 \(Advanced\)](#)

Distinguish between a scientific theory and an opinion, explaining how a theory is supported with evidence, or how new data/information may change existing theories and practices.

[S8.A.1.1.2 \(Advanced\)](#)

Explain how certain questions can be answered through scientific inquiry and/or technological design.

[S8.A.1.2 \(Advanced\)](#)

Describe the positive and negative, intended and unintended, effects of specific scientific results or technological developments (e.g., air/space travel, genetic engineering, nuclear fission/fusion, artificial intelligence, lasers, organ transplants).

**Topic: Branches of Science****STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.A.3 \(Advanced\)](#)

Systems, Models, and Patterns

**Topic: The Scientific Method****STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.A.1.1.3 \(Advanced\)](#)

Use evidence, such as observations or experimental results, to support inferences about a relationship.

[S8.A.1.2.1 \(Advanced\)](#)

Describe the positive and negative, intended and unintended, effects of specific scientific results or technological developments (e.g., air/space travel, genetic engineering, nuclear fission/fusion, artificial intelligence, lasers, organ transplants).

[S8.A.1.3.2 \(Advanced\)](#)

Use evidence, observations, or explanations to make inferences about change in systems over time (e.g., carrying capacity, succession, population dynamics, loss of mass in chemical reactions, indicator fossils in geologic time scale) and the variables

	affecting these changes.
<a href="#">S8.A.2 (Advanced)</a>	Processes, Procedures, and Tools of Scientific Investigations
<a href="#">S8.A.2.1.3 (Advanced)</a>	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.
<a href="#">S8.A.2.1.4 (Advanced)</a>	Interpret data/observations; develop relationships among variables based on data/observations to design models as solutions.
<a href="#">S8.A.2.1.5 (Advanced)</a>	Use evidence from investigations to clearly communicate and support conclusions.

### Topic: Analyzing Data

Minutes for Topic: 88

#### STANDARDS

STATE: Pennsylvania State Anchors (2010)

<a href="#">S8.A.1 (Advanced)</a>	Reasoning and Analysis
<a href="#">S8.A.1.3.2 (Advanced)</a>	Use evidence, observations, or explanations to make inferences about change in systems over time (e.g., carrying capacity, succession, population dynamics, loss of mass in chemical reactions, indicator fossils in geologic time scale) and the variables affecting these changes.
<a href="#">S8.A.2.1.3 (Advanced)</a>	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.
<a href="#">S8.A.2.1.4 (Advanced)</a>	Interpret data/observations; develop relationships among variables based on data/observations to design models as solutions.

### Topic: Metric Units and Conversions

Minutes for Topic: 88

#### STANDARDS

STATE: Pennsylvania State Anchors (2010)

<a href="#">S8.A.2.1.1 (Advanced)</a>	Use evidence, observations, or a variety of scales (e.g., mass, distance, volume, temperature) to describe relationships.
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### Topic: Converting Metric and English Units - Dimensional Analysis

#### STANDARDS

STATE: Pennsylvania State Anchors (2010)

<a href="#">S8.A.1.3.1 (Advanced)</a>	Use ratio to describe change (e.g., percents, parts per million, grams per cubic centimeter, mechanical advantage).
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### Topic: Measuring Density

Minutes for Topic: 132

#### STANDARDS

STATE: Pennsylvania State Anchors (2010)

<a href="#">S8.A.1.3.2 (Advanced)</a>	Use evidence, observations, or explanations to make inferences about change in systems over time (e.g., carrying capacity, succession, population dynamics, loss of mass in chemical reactions, indicator fossils in geologic time scale) and the variables affecting these changes.
<a href="#">S8.A.2.1.5 (Advanced)</a>	Use evidence from investigations to clearly communicate and support conclusions.
<a href="#">S8.A.2.2 (Advanced)</a>	Apply appropriate instruments for a specific purpose and describe the information the instrument can provide.
<a href="#">S8.A.2.2.1 (Advanced)</a>	Describe the appropriate use of instruments and scales to accurately and safely measure time, mass, distance, volume, or temperature under a variety of conditions.
<a href="#">S8.A.2.2.2 (Advanced)</a>	Apply appropriate measurement systems (e.g., time, mass, distance, volume, temperature) to record and interpret observations under varying conditions.

### Unit: Ecology

Timeline: Week 5 to 8

**Unit Description:** The Ecology Unit focuses on how living things interact with their environment. It uses the levels of ecology to explain how populations, communities and ecosystems are interconnected

in these environments.

**Unit Essential Questions:** How and why do organisms interact with their environment and what are the effects of these interactions?

**Unit Big Ideas:** Organisms grow, reproduce, and perpetuate their species by obtaining necessary resources through interdependent relationships with other organisms and the physical environment.

**Unit Materials:** Environmental Science Text Book

Worksheets

Pocket Folder

**Unit Assignments:** Populations Quiz  
Food Webs Quiz

Portfolio

Ecology Test

Ecology Test Corrections

**Unit Key Terminology & Definitions :** Abiotic Biotic Consumer Ecosystem Energy pyramid Food chain Food web Niche Predator Prey  
Producer Symbiosis

Capacity Carrying Dynamics Limiting factor Population

Carrying capacity Community Competition Limiting factors Population

Commensalism Mutualism Parasitism Predator Prey

Autotroph Carnivore Competition Consumer Decomposer Energy pyramid Food chain Food web Herbivore Heterotroph Omnivore Photosynthesis Predation Primary Producer Secondary Tertiary

Conservation of matter Consumer Decomposer Flow of energy Producer Carbon Cycle Nitrogen Cycle Water Cycle

Ecosystem

**STANDARDS: STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.A.1.3.2 \(Advanced\)](#) Use evidence, observations, or explanations to make inferences about change in systems over time (e.g., carrying capacity, succession, population dynamics, loss of mass in chemical reactions, indicator fossils in geologic time scale) and the variables affecting these changes.

[S8.A.3.1.4 \(Advanced\)](#) Distinguish between open loop (e.g., energy flow, food web) and closed loop (e.g., materials in the nitrogen and carbon cycles, closed-switch) systems.

[S8.B.1.1.4 \(Advanced\)](#) Identify the levels of organization from cell to organism and describe how specific structures (parts), which underlie larger systems, enable the system to function as a whole.

[S8.B.2.1.5 \(Advanced\)](#) Explain that adaptations are developed over long periods of time and are passed from one generation to another.

[S8.B.3.1.1 \(Advanced\)](#) Explain the flow of energy through an ecosystem (e.g., food chains, food webs).

[S8.B.3.1.2 \(Advanced\)](#) Identify major biomes and describe abiotic and biotic components (e.g., abiotic: different soil types, air, water sunlight; biotic: soil microbes, decomposers).

[S8.B.3.1.3 \(Advanced\)](#) Explain relationships among organisms (e.g., producers/consumers, predator/prey) in an ecosystem.

- [S8.B.3.2 \(Advanced\)](#) Identify evidence of change to infer and explain the ways different variables may affect change in natural or human-made systems.
- [S8.B.3.2.1 \(Advanced\)](#) Use evidence to explain factors that affect changes in populations (e.g., deforestation, disease, land use, natural disaster, invasive species).
- [S8.B.3.2.3 \(Advanced\)](#) Describe the response of organisms to environmental changes (e.g., changes in climate, hibernation, migration, coloration) and how those changes affect survival.

(\* standards consolidated from Topic level)

**Topic: Levels of Ecology**

Minutes for Topic: 44

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

- [S8.B.1.1.4 \(Advanced\)](#) Identify the levels of organization from cell to organism and describe how specific structures (parts), which underlie larger systems, enable the system to function as a whole.
- [S8.B.3.1.2 \(Advanced\)](#) Identify major biomes and describe abiotic and biotic components (e.g., abiotic: different soil types, air, water sunlight; biotic: soil microbes, decomposers).

**Topic: Measuring Populations**

Minutes for Topic: 88

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

- [S8.B.3.2.1 \(Advanced\)](#) Use evidence to explain factors that affect changes in populations (e.g., deforestation, disease, land use, natural disaster, invasive species).

**Topic: Factors that affect population size - carrying capacity**

Minutes for Topic: 88

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

- [S8.B.3.2 \(Advanced\)](#) Identify evidence of change to infer and explain the ways different variables may affect change in natural or human-made systems.

**Topic: Symbiotic Relationships in Communities**

Minutes for Topic: 44

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

- [S8.B.2.1.5 \(Advanced\)](#) Explain that adaptations are developed over long periods of time and are passed from one generation to another.
- [S8.B.3.1.3 \(Advanced\)](#) Explain relationships among organisms (e.g., producers/consumers, predator/prey) in an ecosystem.
- [S8.B.3.2.3 \(Advanced\)](#) Describe the response of organisms to environmental changes (e.g., changes in climate, hibernation, migration, coloration) and how those changes affect survival.

**Topic: Analyzing Food Chains and Food Webs**

Minutes for Topic: 132

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

- [S8.B.3.1.1 \(Advanced\)](#) Explain the flow of energy through an ecosystem (e.g., food chains, food webs).

**Topic: Matter Cycles**

Minutes for Topic: 44

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.A.3.1.4 \(Advanced\)](#)

Distinguish between open loop (e.g., energy flow, food web) and closed loop (e.g., materials in the nitrogen and carbon cycles, closed-switch) systems.

**Topic: Succession**

Minutes for Topic: 44

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.A.1.3.2 \(Advanced\)](#)

Use evidence, observations, or explanations to make inferences about change in systems over time (e.g., carrying capacity, succession, population dynamics, loss of mass in chemical reactions, indicator fossils in geologic time scale) and the variables affecting these changes.

**Unit: Environmental Science**

Timeline: Week 9 to 12

**Unit**

**Description:** The Environmental Science Unit focuses on how humans impact the environment. The unit uses an environmental science decision making process as a template to examine 5 major areas of human impact: Human Population Growth; Resource Conservation; Biodiversity; Air Pollution and Energy Demands.

**Unit Essential Questions:**

How do Earth's processes and human activities affect each other?

**Unit Big Ideas:** The Earth's processes affect and are affected by human activities.

**Unit Materials:** Environmental Science Textbook

Pocket Folder

Worksheets

Online Human Population Website

**Unit**

**Assignments:**

Environmental Decisions Writing Assignment

Analyzing Environmental Decisions Quiz

Biodiversity Quiz

Air Pollution Quiz

Portfolio

Environmental Decisions Test

Environmental Decisions Test Corrections

**Unit Key**

**Terminology & Definitions :**

Environmental Science

Erosion

Nutrient Depletion

Leachate

Incineration

Renewable Resource

Nonrenewable Resource

Sustainable Yield

Biodiversity

Invasive Species

Acid Rain

Global Warming

## **STANDARDS: STANDARDS**

STATE: Pennsylvania State Anchors (2010)

- [S8.A.1.2 \(Advanced\)](#) Describe the positive and negative, intended and unintended, effects of specific scientific results or technological developments (e.g., air/space travel, genetic engineering, nuclear fission/fusion, artificial intelligence, lasers, organ transplants).
- [S8.A.1.2.1 \(Advanced\)](#) Describe the positive and negative, intended and unintended, effects of specific scientific results or technological developments (e.g., air/space travel, genetic engineering, nuclear fission/fusion, artificial intelligence, lasers, organ transplants).
- [S8.A.1.2.2 \(Advanced\)](#) Identify environmental issues and explain their potential long-term health effects (e.g., pollution, pest controls, vaccinations).
- [S8.B.3.2.1 \(Advanced\)](#) Use evidence to explain factors that affect changes in populations (e.g., deforestation, disease, land use, natural disaster, invasive species).
- [S8.B.3.2.2 \(Advanced\)](#) Use evidence to explain how diversity affects the ecological integrity of natural systems.
- [S8.B.3.3 \(Advanced\)](#) Explain how renewable and nonrenewable resources provide for human needs or how these needs impact the environment.
- [S8.B.3.3.1 \(Advanced\)](#) Explain how human activities may affect local, regional, and global environments.
- [S8.B.3.3.2 \(Advanced\)](#) Explain how renewable and nonrenewable resources provide for human needs (i.e., energy, food, water, clothing, and shelter).
- [S8.B.3.3.3 \(Advanced\)](#) Describe how waste management affects the environment (e.g., recycling, composting, landfills, incineration, sewage treatment).
- [S8.C.2.1 \(Advanced\)](#) Describe energy sources, transfer of energy, or conversion of energy.
- [S8.C.2.2 \(Advanced\)](#) Compare the environmental impact of different energy sources chosen to support human endeavors.
- [S8.C.2.2.2 \(Advanced\)](#) Compare the time span of renewability for fossil fuels and the time span of renewability for alternative fuels.
- [S8.C.2.2.3 \(Advanced\)](#) Describe the waste (i.e., kind and quantity) derived from the use of renewable and nonrenewable resources and their potential impact on the environment.

(\* standards consolidated from Topic level)

## **Topic: Environmental Decision Making**

Minutes for Topic: 132

### **STANDARDS**

STATE: Pennsylvania State Anchors (2010)

- [S8.A.1.2 \(Advanced\)](#) Describe the positive and negative, intended and unintended, effects of specific scientific results or technological developments (e.g., air/space travel, genetic engineering, nuclear fission/fusion, artificial intelligence, lasers, organ transplants).
- [S8.A.1.2.1 \(Advanced\)](#) Describe the positive and negative, intended and unintended, effects of specific scientific results or technological developments (e.g., air/space travel, genetic engineering, nuclear fission/fusion, artificial intelligence, lasers, organ transplants).
- [S8.A.1.2.2 \(Advanced\)](#) Identify environmental issues and explain their potential long-term health effects (e.g., pollution, pest controls, vaccinations).

## **Topic: World Population Growth**

Minutes for Topic: 44

## STANDARDS

STATE: [Pennsylvania State Anchors \(2010\)](#)

[S8.B.3.3.1 \(Advanced\)](#)

Explain how human activities may affect local, regional, and global environments.

[S8.B.3.3.3 \(Advanced\)](#)

Describe how waste management affects the environment (e.g., recycling, composting, landfills, incineration, sewage treatment).

### Topic: Conservation of Natural Resources

Minutes for Topic: 132

#### STANDARDS

STATE: [Pennsylvania State Anchors \(2010\)](#)

[S8.B.3.3 \(Advanced\)](#)

Explain how renewable and nonrenewable resources provide for human needs or how these needs impact the environment.

[S8.B.3.3.2 \(Advanced\)](#)

Explain how renewable and nonrenewable resources provide for human needs (i.e., energy, food, water, clothing, and shelter).

### Topic: Biodiversity

Minutes for Topic: 132

#### STANDARDS

STATE: [Pennsylvania State Anchors \(2010\)](#)

[S8.B.3.2.1 \(Advanced\)](#)

Use evidence to explain factors that affect changes in populations (e.g., deforestation, disease, land use, natural disaster, invasive species).

[S8.B.3.2.2 \(Advanced\)](#)

Use evidence to explain how diversity affects the ecological integrity of natural systems.

### Topic: Air Pollution

Minutes for Topic: 132

#### STANDARDS

STATE: [Pennsylvania State Anchors \(2010\)](#)

[S8.A.1.2 \(Advanced\)](#)

Describe the positive and negative, intended and unintended, effects of specific scientific results or technological developments (e.g., air/space travel, genetic engineering, nuclear fission/fusion, artificial intelligence, lasers, organ transplants).

[S8.A.1.2.2 \(Advanced\)](#)

Identify environmental issues and explain their potential long-term health effects (e.g., pollution, pest controls, vaccinations).

### Topic: Energy Resources

Minutes for Topic: 132

#### STANDARDS

STATE: [Pennsylvania State Anchors \(2010\)](#)

[S8.C.2.1 \(Advanced\)](#)

Describe energy sources, transfer of energy, or conversion of energy.

[S8.C.2.2 \(Advanced\)](#)

Compare the environmental impact of different energy sources chosen to support human endeavors.

[S8.C.2.2.2 \(Advanced\)](#)

Compare the time span of renewability for fossil fuels and the time span of renewability for alternative fuels.

[S8.C.2.2.3 \(Advanced\)](#)

Describe the waste (i.e., kind and quantity) derived from the use of renewable and nonrenewable resources and their potential impact on the environment.

### Unit: Chemistry

Timeline: Week 13 to 16

#### Unit

The Chemistry Unit focuses on the interactions of the basic building blocks of matter. It

#### Description:

explains the structure of atoms and how they are arranged on the periodic table. The unit then looks at how these atoms are bonded together to form compounds and finishes with chemical reactions.

#### Unit Essential

#### Questions:

How can one explain the structure, properties, and interactions of matter?

**Unit Big Ideas:** Matter can be understood in terms of the types of atoms present and the interactions both



between and within atoms.

**Unit Materials:** Chemical Interactions Text Book

Periodic Table

Pocket Folder

**Unit** Atomic Structure Quiz

**Assignments:**

Chemical Bonds and Formula Quiz

Chemistry Test

Chemistry Portfolio

Chemistry Test Corrections

**Unit Key** Protons

**Terminology &**

**Definitions :** Neutrons

Electrons

Chemical Bond

Group/Family

Valence Electrons

Compound

Molecular Formula

Coefficient

Subscript

Reactants

Products

Enzyme

**STANDARDS: STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.C.1 \(Advanced\)](#) Structure, Properties, and Interaction of Matter and Energy  
[S8.C.1.1 \(Advanced\)](#) Explain concepts about the structure and properties (physical and chemical) of matter.

[S8.C.1.1.1 \(Advanced\)](#) Explain the differences among elements, compounds, and mixtures.

[S8.C.1.1.2 \(Advanced\)](#) Use characteristic physical or chemical properties to distinguish one substance from another (e.g., density, thermal expansion/contraction, freezing/melting points, streak test).

[S8.C.1.1.3 \(Advanced\)](#) Identify and describe reactants and products of simple chemical reactions.

(\* standards consolidated from Topic level)

**Topic: Introduction - physical vs chemical changes**

Minutes for Topic: 44

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.C.1.1 \(Advanced\)](#)

Explain concepts about the structure and properties (physical and chemical) of matter.

**Topic: atomic structure**

Minutes for Topic: 132

**STANDARDS**

STATE: [Pennsylvania State Anchors \(2010\)](#)

[S8.C.1.1.1 \(Advanced\)](#)

Explain the differences among elements, compounds, and mixtures.

**Topic: trends of the periodic table**

Minutes for Topic: 132

**STANDARDS**

STATE: [Pennsylvania State Anchors \(2010\)](#)

[S8.C.1.1.2 \(Advanced\)](#)

Use characteristic physical or chemical properties to distinguish one substance from another (e.g., density, thermal expansion/contraction, freezing/melting points, streak test).

**Topic: bonding**

Minutes for Topic: 88

**STANDARDS**

STATE: [Pennsylvania State Anchors \(2010\)](#)

[S8.C.1 \(Advanced\)](#)

Structure, Properties, and Interaction of Matter and Energy

**Topic: Reading Molecular Formulas**

Minutes for Topic: 44

**STANDARDS**

STATE: [Pennsylvania State Anchors \(2010\)](#)

[S8.C.1.1.3 \(Advanced\)](#)

Identify and describe reactants and products of simple chemical reactions.

**Topic: Reading and Balancing Chemical Equations**

Minutes for Topic: 132

**STANDARDS**

STATE: [Pennsylvania State Anchors \(2010\)](#)

[S8.C.1.1.3 \(Advanced\)](#)

Identify and describe reactants and products of simple chemical reactions.

**Topic: Factors affecting rates of reactions**

Minutes for Topic: 44

**STANDARDS**

STATE: [Pennsylvania State Anchors \(2010\)](#)

[S8.C.1.1.3 \(Advanced\)](#)

Identify and describe reactants and products of simple chemical reactions.

**Unit: Fruitvale**

Timeline: Week 17 to 18

**Unit**

The Fruitvale Unit uses authentic assessment and a hands-on approach to solving a real life problem of groundwater contamination. Students are divided into teams that all must use principles of science to determine the source of a ground water contamination scenario. Topics include water pollution, concentration, isometric maps and contamination plumes. This unit also reinforces the process of the scientific method in a much more realistic situation.

**Description:**

**Unit Essential**

**Questions:**

What are the sources of groundwater contamination and how can the scientific method be used to find the source?

**Unit Big Ideas:** There are different sources of groundwater pollution that have different methods of remediation.

**Unit Materials:** Maps and Background Information

Chemplates

Concentration Demo

Well Samples

**Unit Assignments:** Fruitvale Well Permit  
Isomap Coloring Diagram  
Fruitvale Conclusion  
Final Product

**Unit Key Terminology & Definitions :** Watershed  
Aquifer  
Point Source Pollution  
Non-Point Source Pollution  
Concentration  
Solubility  
Solvent  
Solute  
Plume

**STANDARDS: STANDARDS**

STATE: Pennsylvania State Anchors (2010)

- [S8.A.1.1 \(Advanced\)](#) Explain, interpret, and apply scientific, environmental, or technological knowledge presented in a variety of formats (e.g., visuals, scenarios, graphs).
- [S8.A.1.1.2 \(Advanced\)](#) Explain how certain questions can be answered through scientific inquiry and/or technological design.
- [S8.A.1.1.4 \(Advanced\)](#) Develop descriptions, explanations, predictions, and models using evidence.
- [S8.A.1.2.2 \(Advanced\)](#) Identify environmental issues and explain their potential long-term health effects (e.g., pollution, pest controls, vaccinations).
- [S8.A.1.3.1 \(Advanced\)](#) Use ratio to describe change (e.g., percents, parts per million, grams per cubic centimeter, mechanical advantage).
- [S8.A.1.3.3 \(Advanced\)](#) Examine systems changing over time, identifying the possible variables causing this change, and drawing inferences about how these variables affect this change.
- [S8.A.2.1 \(Advanced\)](#) Apply knowledge of scientific investigation or technological design in different contexts to make inferences to solve problems.
- [S8.A.3.1.1 \(Advanced\)](#) Describe a system (e.g., watershed, circulatory system, heating system, agricultural system) as a group of related parts with specific roles that work together to achieve an observed result.
- [S8.A.3.2.1 \(Advanced\)](#) Describe how scientists use models to explore relationships in natural systems (e.g., an ecosystem, river system, the solar system).
- [S8.A.3.2.3 \(Advanced\)](#) 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).

(\* standards consolidated from Topic level)

**Topic: Watersheds and Aquifers**

Minutes for Topic: 88

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.A.3.1.1 \(Advanced\)](#)

Describe a system (e.g., watershed, circulatory system, heating system, agricultural system) as a group of related parts with specific roles that work together to achieve an observed result.

[S8.A.3.2.1 \(Advanced\)](#)

Describe how scientists use models to explore relationships in natural systems (e.g., an ecosystem, river system, the solar system).

[S8.A.3.2.3 \(Advanced\)](#)

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).

**Topic: Sources of Pollution - Point vs. Non-point**

Minutes for Topic: 44

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.A.1.2.2 \(Advanced\)](#)

Identify environmental issues and explain their potential long-term health effects (e.g., pollution, pest controls, vaccinations).

**Topic: Concentrations of Solutions**

Minutes for Topic: 88

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.A.1.3.1 \(Advanced\)](#)

Use ratio to describe change (e.g., percents, parts per million, grams per cubic centimeter, mechanical advantage).

**Topic: Well Testing**

Minutes for Topic: 88

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.A.1.1.2 \(Advanced\)](#)

Explain how certain questions can be answered through scientific inquiry and/or technological design.

**Topic: Analyzing Results**

Minutes for Topic: 44

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.A.1.3.3 \(Advanced\)](#)

Examine systems changing over time, identifying the possible variables causing this change, and drawing inferences about how these variables affect this change.

**Topic: Forming a Conclusion**

Minutes for Topic: 88

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.A.1.1 \(Advanced\)](#)

Explain, interpret, and apply scientific, environmental, or technological knowledge presented in a variety of formats (e.g., visuals, scenarios, graphs).

[S8.A.1.1.4 \(Advanced\)](#)

Develop descriptions, explanations, predictions, and models using evidence.

[S8.A.2.1 \(Advanced\)](#)

Apply knowledge of scientific investigation or technological design in different contexts to make inferences to solve problems.

**Unit: Astronomy**

Timeline: Week 19 to 22

**Unit Description:** The Astronomy Unit focuses on how Earth is part of a much larger solar system, galaxy and universe. Motions of the Earth, moon and sun explain things like calendar years, moon phases, tides and eclipses.

**Unit Essential Questions:** What is the universe, and what is Earth's place in it?

**Unit Big Ideas:** The universe is composed of a variety of different objects, which are organized into systems, each of which develops according to accepted physical processes and laws.

**Unit Materials:** Astronomy Text Book  
 Pocket Folder  
 Moon Phase Online Website  
 Scale Model of the Solar System Website

**Unit Assignments:** Earth, Moon and Sun Quiz  
 Planets Quiz  
 Astronomy Portfolio  
 Astronomy Test  
 Astronomy Test Corrections

**Unit Key Terminology & Definitions :** Rotation  
 Revolution  
 Waxing  
 Waning  
 Neap Tide  
 Spring Tide  
 Equinox  
 Solstice

**STANDARDS: STANDARDS**STATE: Pennsylvania State Anchors (2010)

- [S8.A.1.1.2 \(Advanced\)](#) Explain how certain questions can be answered through scientific inquiry and/or technological design.
- [S8.A.3.2.1 \(Advanced\)](#) Describe how scientists use models to explore relationships in natural systems (e.g., an ecosystem, river system, the solar system).
- [S8.D.3 \(Advanced\)](#) Composition and Structure of the Universe
- [S8.D.3.1 \(Advanced\)](#) Explain the relationships between and among the objects of our solar system.
- [S8.D.3.1.1 \(Advanced\)](#) Describe patterns of earth's movements (i.e., rotation and revolution) in relation to the moon and sun (i.e., phases, eclipses, and tides)
- [S8.D.3.1.2 \(Advanced\)](#) Describe the role of gravity as the force that governs the movement of the solar system and universe.
- [S8.D.3.1.3 \(Advanced\)](#) Compare and contrast characteristics of celestial bodies found in the solar system (e.g., moons, asteroids, comets, meteors, inner and outer planets).

(\* standards consolidated from Topic level)

**Topic: Brief History of Space Exploration**

Minutes for Topic: 44

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.D.3.1 \(Advanced\)](#) Explain the relationships between and among the objects of our solar system.

**Topic: Moon Phases, Eclipses and Tides**

Minutes for Topic: 88

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.D.3.1.1 \(Advanced\)](#) Describe patterns of earth's movements (i.e., rotation and revolution) in relation to the moon and sun (i.e., phases, eclipses, and tides)

[S8.D.3.1.2 \(Advanced\)](#) Describe the role of gravity as the force that governs the movement of the solar system and universe.

**Topic: Motions of the Earth, Moon and Sun**

Minutes for Topic: 44

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.D.3.1 \(Advanced\)](#) Explain the relationships between and among the objects of our solar system.

[S8.D.3.1.1 \(Advanced\)](#) Describe patterns of earth's movements (i.e., rotation and revolution) in relation to the moon and sun (i.e., phases, eclipses, and tides)

**Topic: Scale Model of the Solar System**

Minutes for Topic: 88

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.D.3 \(Advanced\)](#) Composition and Structure of the Universe

**Topic: Characteristics of the Planets**

Minutes for Topic: 88

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.D.3.1 \(Advanced\)](#) Explain the relationships between and among the objects of our solar system.

[S8.D.3.1.3 \(Advanced\)](#) Compare and contrast characteristics of celestial bodies found in the solar system (e.g., moons, asteroids, comets, meteors, inner and outer planets).

**Topic: Comets, Asteroids and Meteoroids**

Minutes for Topic: 44

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.D.3.1.3 \(Advanced\)](#) Compare and contrast characteristics of celestial bodies found in the solar system (e.g., moons, asteroids, comets, meteors, inner and outer planets).

**Topic: Overview of the Universe**

Minutes for Topic: 44

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.D.3 \(Advanced\)](#) Composition and Structure of the Universe

**Topic: Life Cycle of Stars and H-R diagrams**

Minutes for Topic: 132

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.A.3.2.1 \(Advanced\)](#)

Describe how scientists use models to explore relationships in natural systems (e.g., an ecosystem, river system, the solar system).

**Topic: Extraterrestrial Life?**

Minutes for Topic: 44

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.A.1.1.2 \(Advanced\)](#)

Explain how certain questions can be answered through scientific inquiry and/or technological design.

**Unit: Electricity and Magnetism**

Timeline: Week 23 to 25

**Unit Description:** The Electricity and Magnetism Unit focuses on the physical properties explaining magnetism, static electricity and current electricity. Students will examine interaction of magnetic fields, ways to develop static charges and measuring series and parallel circuits.

**Unit Essential Questions:** How can one explain and predict interactions between objects within systems?

**Unit Big Ideas:** Interactions between any two objects can cause changes in one or both of them.

**Unit Materials:** Electricity and Magnetism Textbook

Worksheets

Pocket Folder

PHET online Circuit Lab

Magnets &amp; Iron Filings

**Unit Assignments:** Magnetic Field Lab  
Magnetism Quiz  
Static Electricity Quiz  
Online Circuit Lab  
Current Electricity Quiz  
Electricity & Magnetism Test  
Electricity & Magnetism Portfolio  
Electricity and Magnetism Test Corrections

**Unit Key Terminology & Definitions :** Magnetic Field  
Magnetic Poles

Conduction

Induction

Static Discharge

Current

Voltage  
Resistance  
Series Circuit  
Parallel Circuit  
Power  
Energy

**STANDARDS: STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.C.2.1.2](#)  
(Advanced)

Explain how energy is transferred from one place to another through convection, conduction, or radiation.

(\* standards consolidated from Topic level)

**Topic: 3 Methods of Developing a Static Charge**

Minutes for Topic: 88

**STANDARDS**

STATE: Pennsylvania State Anchors (2010)

[S8.C.2.1.2](#) (Advanced)

Explain how energy is transferred from one place to another through convection, conduction, or radiation.

**Topic: Basics of Magnetism**

Minutes for Topic: 88

**Topic: Magnetic Field Interactions**

Minutes for Topic: 44

**Topic: Earth as a Magnet**

Minutes for Topic: 44

**Topic: Electromagnetism**

Minutes for Topic: 88

**Topic: Basics of Electric Circuits**

Minutes for Topic: 44

**Topic: Measuring Electric Circuits**

Minutes for Topic: 44

**Topic: Difference between Parallel and Series Circuits**

Minutes for Topic: 44

**Topic: Building Circuits**

Minutes for Topic: 88

**Topic: Overview of Static Electricity**

Minutes for Topic: 44

**Unit: Work, Machines and Energy**

Timeline: Week 26 to 30

**Unit**

**Description:**

The Work, Machines and Energy Unit focuses on how energy is needed for machines to make work easier. It looks at how all machines are combinations of six simple machines and machines make work easier by changing the force and distance needed to do the work. It also looks at how energy can be described and that when energy is "used," it really is simply being converted from one form to a different form.

**Unit Essential**

**Questions:**

How can one explain and predict interactions between objects within systems?

**Unit Big Ideas:**

Interactions between any two objects can cause changes in one or both of them.



**Unit Materials:** Motion, Forces and Energy Textbook

Worksheets

Pocket Folder

**Unit Assignments:** Aspire Machines Lab  
Blue Print Assignment  
Machines Quiz  
Energy Quiz  
Test  
Portfolio  
Test Corrections

**Unit Key Terminology & Definitions :** Mechanical Advantage  
Efficiency  
Kinetic Energy  
Potential Energy  
Conservation of Energy  
Energy Conversion  
conduction  
convection  
radiation  
vaporization  
condensation  
sublimation

**STANDARDS: STANDARDS**

STATE: Pennsylvania State Anchors (2010)

- [S8.C.2 \(Advanced\)](#) Forms, Sources, Conversion, and Transfer of Energy
- [S8.C.2.1.1 \(Advanced\)](#) 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 \(Advanced\)](#) Explain how energy is transferred from one place to another through convection, conduction, or radiation.
- [S8.C.2.1.3 \(Advanced\)](#) Describe how one form of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) can be converted into a different form of energy.
- [S8.C.3.1.2 \(Advanced\)](#) Distinguish between kinetic and potential energy.
- [S8.C.3.1.3 \(Advanced\)](#) Explain that mechanical advantage helps to do work (physics) by either changing a force or changing the direction of the applied force (e.g., simple machines, hydraulic systems).

(\* standards consolidated from Topic level)

**Topic: Introduction to Work**

Minutes for Topic: 44

**Topic: How Machines Make Work Easier**

Minutes for Topic: 44

**STANDARDS**STATE: [Pennsylvania State Anchors \(2010\)](#)[S8.C.3.1.3 \(Advanced\)](#)

Explain that mechanical advantage helps to do work (physics) by either changing a force or changing the direction of the applied force (e.g., simple machines, hydraulic systems).

**Topic: Mechanical Advantage and Efficiency**

Minutes for Topic: 132

**STANDARDS**STATE: [Pennsylvania State Anchors \(2010\)](#)[S8.C.3.1.3 \(Advanced\)](#)

Explain that mechanical advantage helps to do work (physics) by either changing a force or changing the direction of the applied force (e.g., simple machines, hydraulic systems).

**Topic: Blueprints**

Minutes for Topic: 132

**Topic: Basics of Energy - Potential vs Kinetic**

Minutes for Topic: 44

**STANDARDS**STATE: [Pennsylvania State Anchors \(2010\)](#)[S8.C.3.1.2 \(Advanced\)](#)

Distinguish between kinetic and potential energy.

**Topic: 3 Methods of Heat Transfer**

Minutes for Topic: 44

**STANDARDS**STATE: [Pennsylvania State Anchors \(2010\)](#)[S8.C.2 \(Advanced\)](#)

Forms, Sources, Conversion, and Transfer of Energy

[S8.C.2.1.2 \(Advanced\)](#)

Explain how energy is transferred from one place to another through convection, conduction, or radiation.

**Topic: Thermal Energy and Phase Changes**

Minutes for Topic: 88

**Topic: Energy Conversions**

Minutes for Topic: 132

**STANDARDS**STATE: [Pennsylvania State Anchors \(2010\)](#)[S8.C.2.1.1 \(Advanced\)](#)

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 \(Advanced\)](#)

Describe how one form of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) can be converted into a different form of energy.

**Unit: Motion, Forces and Pressure**

Timeline: Week 31 to 34

**Unit**

The Motion, Forces and Pressure Unit focuses on how motion and force are directly related.

**Description:**

First, the unit examines how motion can be measured at different levels and how that motion can be displayed using graphs and charts. Then, it links forces and pressure to changes in motion and explains these changes using Newton's 3 Laws of Motion.

**Unit Essential Questions:**

How can one explain and predict interactions between objects within systems?

**Unit Big Ideas:** Interactions between any two objects can cause changes in one or both of them.

**Unit Materials:** Motion, Forces and Energy Textbook

Worksheets

Pocket Folder

**Unit** Motion Lab

**Assignments:**

Motion Quiz

Forces Quiz

Test

Portfolio

Test Corrections

**Unit Key** velocity

**Terminology & Definitions :** acceleration

force

gravity

friction

terminal velocity

balanced force

unbalanced force

inertia

momentum

pressure

**Topic: Overview of Motion & Frames of Reference**

Minutes for Topic: 44

**Topic: Methods of Measuring Motion**

Minutes for Topic: 44

**Topic: Graphing Speed and Acceleration**

Minutes for Topic: 132

**Topic: Balanced and Unbalanced Forces**

Minutes for Topic: 44

**Topic: Friction & Gravity**

Minutes for Topic: 88

**Topic: Newton's 3 Laws of Motion**

Minutes for Topic: 88

**Unit: Coaster Quest**

Timeline: Week 34 to 36

**Unit**

**Description:**

The Coaster Quest Unit uses a hands-on team approach to examine different areas of physics. Students learn about forces, motions and review the scientific method before visiting an amusement park to make measurements. Students then return to school and calculate and analyze those measurements.

**Unit Materials:** Coaster Quest Packet

Stop watch

**Unit** Coaster Quest Packet  
**Assignments:** Test

**Unit Key** G Force  
**Terminology & Definitions :** Instantaneous Speed  
Slope  
Acceleration

**Topic: G Forces**  
Minutes for Topic: 44

**Topic: Instantaneous vs. Average Speed**  
Minutes for Topic: 88

**Topic: Calculating Acceleration**  
Minutes for Topic: 132

**Topic: Swings VS Passengers**  
Minutes for Topic: 44