SUBJECT: Science	GRADE: 8
Unit Title: Astronomy	Time Frame: 7 weeks
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## **UNIT OVERVIEW**

The Astronomy unit is a survey of the primary forces that govern the universe and how the Earth fits within the structure and function of space as a whole. Topics studied include the age and structure of the universe, physical and chemical structure of celestial bodies (including planets, stars and smaller objects), and an overview of and uses for the electromagnetic spectrum.

LRG SKILLS AND DISPOSITIONS	PA STEELS
Collaboration and Teamwork Critical Thinking and Problem Solving Creativity & Innovation	PA STEELS: <u>3.3.6-8.A</u> , <u>3.3.6-8.B</u> , <u>3.3.6-8.C</u>
COMPETENCIES	LEARNING TARGETS
<ul> <li>I can infer information about stars based on observations I make from Earth.(3.3.A, 3.3.B)</li> <li>I can use observations of the sky to explain the predictable patterns of the movement of Earth, moon, sun and planets. (3.3.C)</li> </ul>	<ul> <li>I can develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. (3.3.A)</li> <li>I can develop and use a model to describe the role of gravity in the motion within galaxies and the solar system. (3.3.B)</li> <li>I can analyze and interpret data to determine scale properties of objects in the solar system. (3.3.C)</li> </ul>

SUBJECT: Science	GRADE: 8
Unit Title: Ecology	Time Frame: 7 weeks
UNIT OVERVIEW	

The Ecology unit is taught through the lens that within ecosystems, all components, both living and nonliving, are connected and interdependent. Ecological interactions and levels of organization are covered as well as the way that energy flows through ecosystems of all types. Cycles of matter are introduced as well as a brief overview of adaptations. The environmental impact of humans is a focus throughout the unit.

LRG SKILLS AND DISPOSITIONS	PA STEELS
Collaboration and Teamwork Critical Thinking and Problem Solving Creativity & Innovation Digital Literacy & Tech Proficiency	PA STEELS: <u>3.1.6-8.F</u> , <u>3.1.6-8.I</u> , <u>3.1.6-8.J</u> , <u>3.1.6-8.K</u> , <u>3.1.6-8.L</u> , <u>3.1.6-8.U</u> , <u>3.4.6-8.D</u> , <u>3.4.6-8.E</u> , <u>3.4.6-8.G</u> , <u>3.4.6-8.H</u> , <u>3.4.6-8.I</u> , <u>3.3.6-8.M</u> , <u>3.3.6-8.N</u> , <u>3.5.6-8.LL</u> , <u>3.5.6-8.E</u> , <u>3.5.6-8.H</u>
COMPETENCIES	LEARNING TARGETS
<ul> <li>I can explain how the structures, functions and behaviors of organisms allow them to use, transport, and remove the matter and energy needed to live. (3.1.F)</li> <li>I can explain that ecosystems are complex systems comprising living (biotic) and non-living (abiotic) parts, which interact with each other. (3.1.I) (3.1.J)</li> <li>I can explain how matter cycles and energy flows within ecosystems, driven by interactions among various organisms and between organisms and their physical surroundings. (3.1.K)</li> <li>I can comprehend that when the environment changes and species populations shift, it causes changes in ecosystems. (3.1.L)</li> </ul>	<ul> <li>I can construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. (3.1.F)</li> <li>I can analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. (3.1.I)</li> <li>I can construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. (3.1.J)</li> <li>I can develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. (3.1.K)</li> <li>I can construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. (3.1.L)</li> </ul>

- I can recognize that humans depend on biodiversity, which includes a variety species and ecosystems, for resources.
- I understand that human activities can affect the diversity of species. (3.1.U)
- I can recognize how human actions in agriculture, industry, and daily life affect the land, rivers, ocean, and air. (3.3.M)(3.3.N)
- I can recognize that the environment provides multi-faceted opportunities to develop and apply interdisciplinary literacy skills to investigate complex issues at various scales. (3.4.D)
- I can conduct scientific investigations using place-based inquiry and authentic, outdoor field experience(s) is essential to understanding local environmental issues. (3.4.E)
- I can explain how best management practices and data driven resource management, as well as environmental laws and policies, encourage environmental sustainability. (3.4.G)
- I can explain how environmental stewardship practices are essential to improving environmental quality, sustainability, and community well-being. (3.4.H)
- I can explain how environmental justice plays an important role in providing equitable protection from environmental hazards or concerns for all people. (3.4.I)
- I can explain how the responsible creation and use of technology requires the sustainable use of renewable and nonrenewable resources and the handling of waste. (3.5.E)
- I can explain how the values and beliefs of societies shape attitudes towards technology. (3.5.H)
- I can explain how the study of technology and engineering as a human activity is interdisciplinary. (3.5.LL)

- I can evaluate competing design solutions for maintaining biodiversity and ecosystem services. (3.1.U)
- I can apply scientific principles to design a method for monitoring and minimizing human impact on the environment. (3.3.M)
- I can construct an argument supported by evidence for how increases in human population and per capita consumption of natural resources impact Earth's systems. (3.3.N)
- I can gather, read, and synthesize information from multiple sources to investigate how Pennsylvania environmental issues affect Pennsylvania's human and natural systems. (3.4.D)
- I can collect, analyze, and interpret environmental data to describe a local environment. (3.4.E)
- I can obtain and communicate information to describe how best resource management practices and environmental laws are designed to achieve environmental sustainability. (3.4.G)
- I can design a solution to an environmental issue in which individuals and societies can engage as stewards of the environment. (3.4.H)
- I can construct an explanation that describes regional environmental conditions and their implications on environmental justice and social equity. (3.4.I)
- I can consider the impacts of a proposed or existing technology and devise strategies for reducing, reusing, and recycling waste caused by its creation. (3.5.E)
- I can evaluate trade-offs based on various perspectives as part of a decision process that recognizes the need for careful compromises among competing factors. (3.5.H)
- I can compare how different technologies involve different sets of processes. (3.5.LL)

SUBJECT: Science GRADE: 8	
Unit Title: Meteorology	Time Frame: 7 weeks
UNIT OVERVIEW	

The Meteorology unit focuses on a general overview of atmospheric structure/function as well as the primary components of all weather forecasting (temperature, moisture, and air pressure). Climographs, weather maps and movement of weather are also analyzed. Weather related natural disasters such as tornadoes, hurricanes, and blizzards are studied as they relate to the main components of weather.

LRG SKILLS AND DISPOSITIONS	PA STEELS
Collaboration and Teamwork Critical Thinking and Problem Solving Creativity & Innovation Digital Literacy & Tech Proficiency Communication & Empathy	PA STEELS: 3.2.6-8.M, 3.3.6-8.I, 3.3.6-8.J, 3.3.6-8.L, 3.3.6-8.M, 3.3.6-8.O
COMPETENCIES	LEARNING TARGETS
<ul> <li>I can understand that the total change of energy in any system equals the total energy transferred into or out of the system. (3.2.M)</li> <li>I can explain how water's presence and properties affect Earth's ecosystems and surface features. (3.3.I)</li> <li>I can understand how weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, &amp; living things. (3.3.J) (3.3.O)</li> <li>I can recognize that natural processes can lead to sudden or gradual changes in Earth's systems, and some of these changes may have negative effects on humans. (3.3.L)</li> </ul>	<ul> <li>I can apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. (3.2.M)</li> <li>I can develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. (3.3.I)</li> <li>I can collect data to provide evidence for how the motion and complex interactions of air masses result in changes in weather conditions. (3.3.J)</li> <li>I can analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. (3.3.L)</li> </ul>

- I can recognize how human actions in agriculture, industry, and daily life affect the land, rivers, ocean, and air. (3.3.M)
- I can apply scientific principles to design a method for monitoring and minimizing human impact on the environment. (3.3.M)
- I can ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. (3.3.0)

SUBJECT: Science	GRADE: 8
Unit Title: Hydrology	Time Frame: 7 weeks
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## UNIT OVERVIEW

The Hydrology unit is taught through the lens of human impact, particularly on the Chesapeake Bay Watershed. The structure and composition of water is covered, and is connected to the importance of water for the existence of life on Earth. Primary reservoirs and basins of fresh and salt water are overviewed, as well as the local, regional, and global availability and uses of water.

LRG SKILLS AND DISPOSITIONS	PA STEELS
Collaboration and Teamwork Critical Thinking and Problem Solving Creativity & Innovation	PA STEELS: 3.3.6-8.E, 3.3.6-8.H, 3.3.6-8.I, 3.3.6-8.K, 3.3.6-8.M, 3.3.6-8.N, 3.4.6-8.B, 3.4.6-8.C, 3.4.6-8.D, 3.4.6-8.E, 3.4.6-8.G, 3.4.6-8.H, 3.5.6-8.X, 3.5.6-8.I, 3.5.6-8.Z

## COMPETENCIES LEARNING TARGETS

- I can understand that the changes we see on Earth happen because energy moves and matter cycles between interconnected systems, including the geosphere, hydrosphere, atmosphere, and biosphere. (3.3.E)
- I can explain how water affects Earth's ecosystems and surface features because of its presence and properties. (3.3.H) (3.3.I)
- I can understand that everything humans use, including materials, energy, and fuels, comes from natural sources. Some of these sources can renew over time, while others cannot. (3.3.K)
- I can explain how human actions in agriculture, industry, and daily life affect the land, rivers, oceans, and air. (3.3.M) (3.3.N)
- I can explain how human cultures and societies experience and interact with the environment in various ways. (3.4.B)
- I can explain how watersheds and wetlands function as interconnected systems that support, impact, and are influenced by living things. (3.4.C)
- I can explain how the environment provides multi-faceted opportunities to develop and apply interdisciplinary literacy skills to investigate complex issues at various scales. (3.4.D)
- I can conduct scientific investigations using place-based inquiry and authentic, outdoor field experience(s) is essential to understanding local environmental issues. (3.4.E)
- I can explain how best management practices and data driven resource management, as well as environmental laws and policies, encourage environmental sustainability. (3.4.G)
- I can explain how environmental stewardship practices are essential to improving environmental quality, sustainability, and community well-being. (3.4.H)

- I can construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. (3.3.E)
- I can develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. (3.3.H)
- I can develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. (3.3.I)
- I can construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes. (3.3.K)
- I can apply scientific principles to design a method for monitoring and minimizing human impact on the environment. (3.3.M)
- I can construct an argument supported by evidence for how increases in human population and per capita consumption of natural resources impact Earth's systems. (3.3.N)
- I can analyze and interpret data about how different societies (economic and social systems) and cultures use and manage natural resources differently. (3.4.B)
- I can develop a model to describe how watersheds and wetlands function as systems, including the roles and functions they serve. (3.4.C)
- I can gather, read, and synthesize information from multiple sources to investigate how Pennsylvania environmental issues affect Pennsylvania's human and natural systems. (3.4.D)
- I can collect, analyze, and interpret environmental data to describe a local environment. (3.4.E)
- I can obtain and communicate information to describe how best resource management practices and environmental laws are designed to achieve environmental sustainability. (3.4.G)
- I can design a solution to an environmental issue in which individuals and societies can engage as stewards of the environment. (3.4.H)
- I can examine the ways that technology can have both positive and negative effects at the same time. (3.5.I)

- I can explain how technology and engineering have both positive and negative impacts on both society and the environment. (3.5.I)
- I can explain that there is no single, best solution as designs can always be improved and refined. (3.5.X)
- I can explain how technology and engineering are interdisciplinary, relating to more than one content area. (3.5.Z)

- I can defend decisions related to a design problem. (3.5.X)
- I can analyze how different technological systems often interact with economic, environmental, and social systems. (3.5.Z)

SUBJECT: Science	GRADE: 8
Unit Title: Geology	Time Frame: 7 weeks
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## UNIT OVERVIEW

The Geology unit is focused on providing students with an introduction to the structure and function of the Earth as well as the geologic processes involved in the creation of geologic structures (mountains, volcanoes, islands, etc.) as well as geologic hazards. The main concepts of the rock cycle are covered as well as the primary rock types and their formation.

LRG SKILLS AND DISPOSITIONS	PA STEELS
Collaboration and Teamwork Critical Thinking and Problem Solving	PA STEELS: 3.3.6-8.E, 3.3.6-8.F, 3.3.6-8.G, 3.3.6-8.K, 3.3.6-8.L, 3.5.6-8.II, 3.5.6-8.JJ, 3.5.6-8.CC, 3.5.6-8.D, 3.5.6-8.X, 3.5.6-8.T, 3.5.6-8.U
COMPETENCIES	LEARNING TARGETS

- I can understand that the changes we see on Earth happen because energy moves and matter cycles between interconnected systems, including the geosphere, hydrosphere, atmosphere, and biosphere. (3.3.E) (3.3.F)
- I can understand how plate tectonics explains the movements and features of rocks on Earth's surface, both in the past and present. (3.3.G)
- I can explain that all materials, energy, and fuels that humans use are derived from natural sources, some of which are renewable over time and others are not. (3.3.K)
- I can explain that natural processes can cause sudden or gradual changes to Earth's systems, some of which may adversely affect humans. (3.3.L)
- I can explain how the responsible creation and use of technology requires the sustainable use of renewable and nonrenewable resources and the handling of waste. (3.5.D)
- I can explain that there are requisite skills used in technology and engineering design. (3.5.T)
- I can explain how design optimization is driven by criteria and constraints. (3.5.U)
- I can explain that there is no single, best solution as designs can always be improved and refined. (3.5.X)
- I can explain how historical eras are defined by technological advancements. (3.5.CC)
- I can explain how the study of technology and engineering as a human activity is interdisciplinary. (3.5.II)
- I can explain how the study of technology and engineering involves the ability to understand, use, assess, create technological products, systems, and ways of thinking. (3.5.JJ)

- I can construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. (3.3.E)
- I can develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. (3.3.F)
- I can analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of past plate motions. (3.3.G)
- I can construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes. (3.3.K)
- I can analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. (3.3.L)
- I can analyze how the creation and use of technologies consumes renewable, nonrenewable, and inexhaustible resources; creates waste; and may contribute to environmental challenges. (3.5.D)
- I can create solutions to problems by identifying and applying human factors in design. (3.5.T)
- I can evaluate and assess the strengths and weaknesses of various design solutions given established principles and elements of design. (3.5.U)
- I can defend decisions related to a design problem. (3.5.X)
- I can consider historical factors that have contributed to the development of technologies and human progress. (3.5.CC)
- I can explain the iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately an optimal solution. (3.5.II)
- I can apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches. (3.5.JJ)