

Southern York County School District

One Warrior at a time...

COURSE DESCRIPTION:

- The dynamics of earth science include the studies of forces of nature that build up and wear down the earth's surface. Dynamics include energy flow across the earth's surface and its role in weather and climate. Space science is concerned with the origin and evolution of the universe. The understanding of these concepts uses principles from physical sciences, geography and mathematics.

LONG TERM TRANSFER GOALS

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

Unit 1: The Nature of Science

Big Idea	Scientist use both direct and indirect observations to study the natural world and Universe.		
Essential Questions	<ol style="list-style-type: none"> 1. How does scientists use observations and inference to collect information and solve problems? 2. How are careers in Earth Science interacted to scientific and nonscientific jobs? 		
Time Frame Aug. - Sept.			
Common Core Language Standards	<p>PA Core Standards (Reading in Science and Technical Subjects): CC.3.5.6-8.C. Follow precisely a multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks. CC.3.5.6-8.I.^[SEP] Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</p> <p>PA Core Standards (Writing in Science and Technical Subjects): CC.3.6.6-8.A. Write arguments focused on discipline-specific content. • Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. CC.3.6.6-8.C. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p>		
Vocabulary	Standards & Assessment Anchors	Learning Objectives	Lessons and Assessments
Observation Inference Prediction Scientific Method Hypotheses Geosphere	<p>PA ASSESSMENT ANCHORS: S.7.A.1.1 Explain, interpret, and apply scientific, environmental, or technological knowledge presented in a variety of formats (visuals, scenarios, graphs). Reference: 3.1.7.A, 3.4.7.C</p>	<p>Distinguish between a scientific theory and a general opinion, explaining how a theory is supported with evidence.</p> <p>Develop questions that can be answered through scientific inquiry</p>	<p><u>Lesson 1 (4 Days)</u> <u>Box Observation Lab.</u> <u>Mystery Footsteps</u> Mystery Footsteps G.O.</p> <p><u>Lesson 2 (2 Days)</u></p>

Hydrosphere Atmosphere Geology Hydrology Astronomy Meteorology	<p>S.7.A.1.2 Identify and explain the impacts of applying scientific, environmental, or technological knowledge to address solutions to practical problems. Reference: 3.1.7.A, 3.4.7.A, 3.4.7.B, 3.4.7.D, 4.4.7.D</p> <p>S.7.A.3.2 Apply knowledge of models to make predictions, draw inferences, or explain technological concepts. Reference: 3.1.7.A, 3.4.7.B, 3.4.7.E</p>	<p>and/or technological design.</p> <p>Use evidence such as observations or experimental results to support inferences.</p> <p>Describe the positive and negative effects (both intended and unintended) of scientific results or technological developments.</p> <p>Use evidence to develop descriptions, explanations, and models.</p> <p>Make inferences based on scientific models (e.g., charts, graphs, diagrams).</p> <p>Use evidence from investigations to clearly describe relationships and communicate and support conclusions.</p>	<p><u>Inquiry Cube Lab</u></p> <p><u>Lesson 3 (2 Days)</u></p> <p><u>A Career in Earth Science</u></p> <p><u>Common Assessments</u></p> <p><u>Observation & Inference Quiz</u></p>
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Unit 2: Earth Features and Processes that Change Earth and Its Resources

Big Idea	The Earth is a complex and dynamic set of interconnected systems (e.g. geosphere, hydrosphere, atmosphere, biosphere) that interact over a wide range of temporal and spatial scales.
Essential Questions	<ol style="list-style-type: none"> How and why is Earth constantly changing? How do Earth's processes and human activities affect each other?
Time Frame Sept. - Nov.	
Common Core Language Standards	<p>PA Core Standards (Reading in Science and Technical Subjects): CC.3.5.6-8.C. Follow precisely a multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks. CC.3.5.6-8.F.^[SEP] Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text. CC.3.5.6-8.I.^[SEP] Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</p> <p>PA Core Standards (Writing in Science and Technical Subjects): CC.3.6.6-8.A. Write arguments focused on discipline-specific content. <ul style="list-style-type: none"> Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. CC.3.6.6-8.B. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. <ul style="list-style-type: none"> Use precise language and domain-specific vocabulary to inform about or explain the topic. CC.3.6.6-8.C. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p>

Vocabulary	Assessment Anchors & Standards	Learning Objectives	Lessons and Assessments
minerals molecules density luster streak hardness fracture/cleavage rock inorganic Mohs Scale rock cycle Metamorphic Igneous Sedimentary rock cycle deposition weathering Erosion porosity Asthenosphere Lithosphere continental crust oceanic crust convection currents Era Epoch Eon Period Volcanoes Subduction zone Plates Convergent Boundary Divergent Boundary Transform Boundary Earthquakes Fault Epicenter	<p>PA ASSESSMENT ANCHORS:</p> <p>S8.D.1.1 Describe constructive and destructive natural processes that form different geologic structures and resources. Reference: 3.5.7.A, 4.4.7.B</p> <p>S.7.C.1.1 Describe the structure of matter and its chemical and physical properties. Reference: 3.2.7.A</p> <p>S.7.A.1.3 Identify and analyze evidence that certain variables may have caused measurable changes in natural or human-made systems. Reference: 3.1.7.A</p> <p>PA STANDARDS:</p> <p>3.3.7.A1. Define the basic features of the rock cycle. Describe the layers of the earth. Differentiate among the mechanisms by which heat is transferred through the earth's system.</p> <p>3.3.8.A1. Distinguish between physical and chemical weathering. Compare and contrast the types of energy that drive Earth's system.</p> <p>3.3.7.A2. Explain land use in relation to soil type and topography.</p> <p>3.3.7.A3. Explain and give examples of how physical evidence, such as fossils and surface features of glaciation support theories that the Earth has evolved over geological time. Compare geological processes over time.</p> <p>3.3.8.A3. Explain how matter on earth is conserved throughout the geological processes over time.</p> <p>3.3.7.A6. Locate significant geologic structures using various mapping representations. Describe geologic time as it relates to earth processes.</p>	<p>Explain the rock cycle as changes in the solid earth and rock types (igneous – granite, basalt, obsidian, pumice; sedimentary – limestone, sandstone, shale, coal; and metamorphic – slate, quartzite, marble, gneiss).</p> <p>Describe natural processes that change Earth's surface (e.g., landslides, volcanic eruptions, earthquakes, mountain building, new land being formed, weathering, erosion, sedimentation, soil formation).</p> <p>Identify soil types. (i.e., humus, topsoil, subsoil, loam, loess, and parent material) and their characteristics (particle size, porosity, permeability) found in different biomes and in Pennsylvania, and explain how they formed.</p> <p>Explain how fossils provide evidence about plants and animals that once lived throughout Pennsylvania's history (e.g., fossils provide evidence of different environments).</p> <p>Describe the relationship between mass and volume as density.</p> <p>Use characteristic physical or chemical properties to distinguish one substance from another (e.g., density, thermal expansion/contraction, freezing/melting points, streak test).</p> <p>Use evidence, observations, or explanations to make inferences about changes in systems over time (e.g., carrying capacity, succession, fossil evidence in the geologic time scale).</p>	<p><u>Lesson 1 (3 Days)</u> Mineral Lab Toothpaste Lab</p> <p><u>Lesson 2 (2 Days)</u> Kinesthetic Rock Cycle Rock Cycle Interactive Handout & Interactive Link</p> <p><u>Lesson 3 (2 Days)</u> Rock Identification Lab</p> <p><u>Lesson 4 (3 Days)</u> Weathering Erosion + Deposition Sand Reflection Essay</p> <p><u>Lesson 5 (3 Days)</u> Layers upon Layers Lab The Grand Canyon Color By Layer Webquest</p> <p><u>Lesson 6 (5 Days)</u> Box Module</p> <p><u>Lesson 7 (5 Days)</u> Earth's Layers Foldable Directions Journey to the Earth Story</p> <p><u>Lesson 8 (2 Days)</u> Geologic History 400-meter track walk Sequencing Time</p> <p><u>Lesson 9 (5 Days)</u> Alfred Wegener's Lab & EdPuzzle class code isiwvah Plate Tectonics & Surface Feature Graham Cracker Lab</p> <p><u>Lesson 10 (2 Days)</u> USA Earthquake Risk Assess.</p> <p><u>Common Assessments:</u> Mineral/Rock Quiz</p>

			<u>Laws & Principles of Geology Quiz</u> <u>Dynamic Earth Interactive/Final & Website</u>
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Unit 3: Composition and Structure of the Universe

Big Idea	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.		
Essential Questions	1. What is the universe, and what is Earth's place in it?		
Time Frame Nov. - Jan.			
Common Core Language Standards	<p>PA Core Standards (Reading in Science and Technical Subjects): CC.3.5.6-8.C. Follow precisely a multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks. CC.3.5.6-8.F. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text. CC.3.5.6-8.I. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</p> <p>PA Core Standards (Writing in Science and Technical Subjects): CC.3.6.6-8.A. Write arguments focused on discipline-specific content. • Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. CC.3.6.6-8.B. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. • Use precise language and domain-specific vocabulary to inform about or explain the topic. CC.3.6.6-8.C. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p>		
Vocabulary	Assessment Anchors & Standards	Learning Objectives	Lessons and Assessments
Spectrum Satellite Orbit Space Probe Planet Asteroid Meteor Meteorite Meteoroid Gravity Light Year	<p>PA ASSESSMENT ANCHORS: S8.D.3.1 Explain the relationships between and among the objects of our solar system. Reference: 3.4.7.D</p> <p>S8.C.1.1 Explain concepts about the structure and properties (physical and chemical) of matter. Reference: 3.4.7.A</p>	<p>Describe patterns of Earth's movements (i.e., rotation and revolution) in relation to the moon and sun (i.e., phases, eclipses, and tides).</p> <p>Describe the role of gravity as the force that governs the movement of the solar system and universe.</p> <p>Compare and contrast characteristics</p>	<p><u>Lesson 1 (5 Days)</u> <u>Guide to Our S.S.</u> Solar System Catalog Project</p> <p><u>Lesson 2 (2 Days)</u> <u>Small/Large - Near/Far?</u> <u>Sizing up the Universe</u></p> <p><u>Lesson 3 (2 Days)</u></p>

<p>Galaxy Universe Nebula Red giant Supernova Black hole Main Sequence H-R Diagram Big Bang Theory Axis Rotation Revolution Ellipse Solstice Equinox Waning Waxing Solar Eclipse Lunar Eclipse Absolute Magnitude Apparent Magnitude Light-year Constellation</p>	<p>S.7.C.3.1 Explain the principles of force and motion. Reference: 3.2.7.B</p> <p>S.7.A.3.2 Apply knowledge of models to make predictions, draw inferences, or explain technological concepts. Reference: 3.1.7.A, 3.4.7.B, 3.4.7.E</p> <p>PA STANDARDS:</p> <p>3.3.7.B1. Explain how gravity is the major force in the formation of the planets, stars, and the solar system. Describe gravity as a major force in determining the motions of planets, stars, and the solar system. Compare and contrast properties and conditions of objects in the solar system to those on Earth.</p> <p>3.3.8.B1. Explain how light, measured remotely, can be used to classify objects in the universe.</p> <p>3.3.7.B2. Identify a variety of instruments used to gather evidence about the universe. Describe repeating patterns in the Sun-Earth-Moon system and the positions of stars. Relate planetary size and distance in our solar system using an appropriate scale model.</p> <p>3.3.8.B2. Explain measurements and evidence indicating the age of the universe.</p>	<p>of celestial bodies found in the solar system (e.g., moons, asteroids, comets, meteors, inner and outer planets).</p> <p>Describe forces acting on an object (e.g., friction, gravity, balanced versus unbalanced).</p> <p>Describe how engineers use models to develop new and improved technologies to improve scientific study and/or human life.</p>	<p><u>Rock Identification Lab</u></p> <p><u>Lesson 4 (10 Days)</u> Hubble Story Analysis Ballooniverse Lab</p> <p><u>Lesson 5 (3 Days)</u> Kinesthetic Astronomy Reasons for the Seasons Storybook</p> <p><u>Lesson 6 (5 Days)</u> Box Module</p> <p><u>Lesson 7 (5 Days)</u> Earth's Layers Foldable Directions Journey to the Earth Story</p> <p><u>Lesson 8 (2 Days)</u> Profile a Space Probe</p> <p><u>Common Assessments:</u> Solar System, Star and Galaxy Quiz.</p>
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Unit 4: Weather and Climate

Big Idea	The Earth is a complex and dynamic set of interconnected systems (e.g. geosphere, hydrosphere, atmosphere, biosphere) that interact over a wide range of temporal and spatial scales.
Essential Questions	1. How and why is Earth constantly changing?
Time Frame Jan. - March.	

Common Core Language Standards	PA Core Standards (Reading in Science and Technical Subjects): CC.3.5.6-8.C. Follow precisely a multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks. CC.3.5.6-8.F. Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text. CC.3.5.6-8.I. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.		
Vocabulary	Assessment Anchors & Standards	Learning Objectives	Lessons and Assessments
Atmosphere Troposphere Ozone Layer Ultraviolet Radiation Chlorofluorocarbon Radiation Conduction Convection Condensation Coriolis Effect Jet Stream Sea Breeze Land Breeze Weather Climate Humidity Relative Humidity Dew Point Precipitation Barometer Anemometer Psychrometer Air Mass Front Meteorologist Isotherm Isobar	PA ASSESSMENT ANCHORS: S8.D.2.1 Explain how pressure, temperature, moisture, and wind are used to describe atmospheric conditions that affect regional weather or climate. Reference: 3.5.7.C S.7.C.1.1 Describe the structure of matter and its chemical and physical properties. Reference: 3.2.7.A S.7.C.1.2 Compare chemical and physical changes of matter. Reference: 3.2.7.A S.7.C.2.1 Describe how energy flows through the living world. Reference: 3.1.7.A, 3.2.7.B, 4.1.7.C PA STANDARDS: 3.3.6.A5. Describe the composition and layers of the atmosphere. Explain the effects of oceans on climate. Describe how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation. 3.3.7.A5. Describe the basic elements of meteorology. Explain the relationship between the energy provided by the sun and the temperature differences among water, land and atmosphere. 3.3.8.A5. Explain how the curvature of the earth contributes to climate. Compare and contrast water vapor, clouds, and humidity. 3.3.7.A6. Describe changes in atmospheric conditions associated with various weather patterns.	Explain the impact of water systems on the local weather or the climate of a region (e.g., lake effect snow, land/ocean breezes). Identify how global patterns of atmospheric movement influence regional weather and climate. Identify how cloud types, wind directions and barometric pressure changes are associated with weather patterns in different regions of the country. Compare the behavior of particle motion in solids, liquids, and gases. Describe the relationship between mass and volume as density. Describe how energy is transferred and conserved in a closed system.	<u>Lesson 1 (4 Days)</u> <u>Atmosphere Virtual Lab</u> <u>Lesson 2 (1 Days)</u> <u>Restoring the Ozone & Video</u> <u>Lesson 3 (2 Days)</u> <u>Density Lab</u> <u>Lesson 4 (4 Days)</u> <u>Density Simulation</u> <u>Lesson 5 (2 Days)</u> <u>Insolation Lab</u> <u>Lesson 6 (3 Days)</u> <u>Global Winds Foldable</u> <u>Lesson 7 (3 Days)</u> <u>Relative Humidity Lab</u> <u>Lesson 8 (2 Days)</u> <u>Dewing Science Lab</u> <u>Lesson 9 (4 Days)</u> <u>Graphing Weather Data</u> <u>Lesson 10 (4 Days)</u> <u>Forecasting Weather</u> <u>Common Assessments:</u> <u>Atmosphere Quiz</u> <u>Weather Exam</u>

Unit 5: Earth's Water and Human Impacts

Big Idea	The Earth's processes affect and are affected by human activities.		
Essential Questions	1. How do Earth's processes and human activities affect each other?		
Time Frame April. - May			
Common Core Language Standards	<p>PA Core Standards (Reading in Science and Technical Subjects): CC.3.5.6-8.C. Follow precisely a multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks. CC.3.5.6-8.F. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text. CC.3.5.6-8.I. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</p> <p>PA Core Standards (Writing in Science and Technical Subjects): CC.3.6.6-8.A. Write arguments focused on discipline-specific content. • Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. CC.3.6.6-8.B. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. • Use precise language and domain-specific vocabulary to inform about or explain the topic. CC.3.6.6-8.C. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p>		
Vocabulary	Assessment Anchors & Standards	Learning Objectives	Lessons and Assessments
Point Source Estuary Habitat Succession Transpiration Infiltration Run off Salinity Basin Upwelling Current Wave Crest Trough Tide Tidal Range Continental Shelf Continental Slope Mid-ocean Ridge	<p>PA ASSESSMENT ANCHORS: S.7.D.1.2 Describe characteristic features and significance of Earth's water systems. Reference: 3.3.7.A, 4.1.7.A, 4.2.7.A, 4.2.7.B</p> <p>S.7.B.3.1 Compare the biotic and abiotic factors of different ecosystems and explain relationships between and these factors. Reference: 4.1.7.A</p> <p>S8.D.1.2 Describe the potential impact of human made processes on changes to Earth's resources and how they affect everyday life. Reference: 3.5.7.B, 3.6.7.A, 4.2.7.C</p> <p>S.7.C.2.1 Describe how energy flows through the living world. Reference: 3.1.7.A, 3.2.7.B, 4.1.7.C</p>	<p>Compare the different water systems on Earth (e.g., wetland, watershed, ocean, river).</p> <p>Compare biotic and abiotic features of freshwater and saltwater systems.</p> <p>Describe the importance of water systems on the diversity and distribution of life on Earth.</p> <p>Describe the water cycle and the physical processes on which it depends (i.e., evaporation, condensation, precipitation, transpiration, runoff, infiltration, energy inputs, and phase changes).</p> <p>Distinguish among different water systems (e.g., wetland systems, ocean</p>	<p><u>Lesson 1 (5 Days)</u> <u>Freshwater Poster Project</u></p> <p><u>Lesson 2 (4 Days)</u> <u>Freshwater Packet</u></p> <p><u>Lesson 3 (2 Days)</u> <u>River Puzzle</u></p> <p><u>Lesson 4 (5 Days)</u> Big River Watershed</p> <p><u>Lesson 5 (4 Days)</u> Chesapeake Bay WebQuest</p> <p><u>Lesson 6 (4 Days)</u> Ocean Motion</p>

<p>Trench Reef Pollution</p>	<p>S.7.B.3.2 Explain ways different variables may cause and/or influence changes in natural or human-made systems. <i>Reference: 4.5.7.D, 4.1.7.E</i></p> <p>PA STANDARDS:</p> <p>3.3.7.A4. Differentiate among Earth’s water systems. Describe the motions of tides and identify their causes and similarities</p> <p>3.3.8.A4. Explain how the oceans form one interconnected circulation system powered by wind, tides, the Earth’s rotation, and water density differences.</p> <p>3.3.8.A6. Explain how satellite images, models, and maps are used to identify Earth’s resources.</p> <p>PA Standards Addressed (Environment and Ecology):</p> <p>4.2.7.A. Explain how water enters, moves through, and leaves a watershed. Explain the concept of stream order. Describe factors that affect the flow and water quality within a watershed.</p> <p>4.2.8.A. Describe factors that affect the quality of ground and surface waters.</p> <p>4.2.7.B. Explain the primary functions of a wetland within a watershed. Providing habitat, flood control, water purification. Serving as buffer zones, wildlife propagation areas, and food and fiber systems.</p> <p>4.2.8.B. Explain the value of wetlands to other living things.</p> <p>4.2.7.C. Use appropriate tools and techniques to analyze a freshwater environment. Interpret physical, chemical, and biological data as a means of assessing the environmental quality of a freshwater environment.</p> <p>4.2.8.C. Describe how a diversity index is used to assess water quality.</p>	<p>systems, river systems, watersheds) and describe their relationships to each other as well as to landforms.</p> <p>Identify the physical characteristics of a stream and how these characteristics determine the types of organisms found within the stream environment (e.g., biological diversity, water quality, flow rate, tributaries, surrounding watershed).</p> <p>Describe how human interactions with the environment impact an ecosystem (e.g., road construction, pollution, urban development, dam building/removal).</p> <p>Explain how changes in environmental conditions can affect the survival of a population and entire species (e.g., climate, hibernation, migration, coloration).</p>	<p><u><i>Lesson 7 (5 Days)</i></u> <u><i>Ocean Passion Project</i></u></p> <p><u><i>Common Assessments:</i></u> <u><i>Water Cycle Quiz</i></u> <u><i>Freshwater Quiz</i></u></p>
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