Unit Title: Plant and Animal	Structures: October / November (MP 1)			
Big Idea: All organisms have	the same foundational needs: water, shelter, food, and air. Howeve	er, a wide variety of plants and anima	als inhabit our world.	
Investigation Questions	NGSS/ PA Core Standards	Objectives/ Lab Activities	Key Vocabulary	Reading Wonders Connection
LESSON 1: Structures Used for Survival Pre-Unit Assessment: How Are an Organism's' Structures Adapted for Its Environment? Will Seeds Grow Inside a Plastic Bag?	<ul> <li>NGSS standards –</li> <li>4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.</li> <li>4-LS1-2: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.</li> <li>4-PS4-2: Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.</li> <li>3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.</li> </ul>	Recognize that plants and animals have special structures and behaviors that enable them to survive in their environments. Identify adaptations of plants and animals that are essential for survival, growth, and reproduction. Design an environment for seeds to grow in and make predictions about their growth.	<ul> <li>Adaptations</li> <li>Environment</li> <li>Organism</li> <li>Survival</li> <li>Reproduce</li> <li>Structure</li> </ul>	<ul> <li>Wonders: Unit 2/week 3</li> <li>Weekly Concept: Natural Connections</li> <li>Connect to Science: Explain how living things affect the physical characteristics of their regions</li> </ul>
LESSON 2: Animal Structures	PA Standard – 3.2.4.B5: Demonstrate how light can be reflected, refracted, or absorbed by an object.	Describe structural adaptations and how they vary based on an animal's environment.	<ul><li>Dissect</li><li>Ectotherm</li><li>Endoskeleton</li></ul>	Wonders: Unit 2/week 4 • Weekly Concept: Adaptations
How Do External Structures Support Survival?	<ul><li>S4.B.1.1.1: Identify life processes of living things (e.g., growth, digestion, respiration).</li><li>S4.B.1.1.2: Compare similar functions of external</li></ul>	Use external and internal structures to explain how	<ul> <li>Endotherm</li> <li>Exoskeleton</li> <li>External Structure</li> </ul>	<ul> <li>Essential Question: What helps an animal survive?</li> <li>Connect to Science: Plants</li> </ul>
How Do Internal Structures Support Survival?	<ul> <li>characteristics of organisms (e.g., anatomical characteristics: appendages, type of covering, body segments).</li> <li>S4.B.1.1.3: Describe basic needs of plants and animals (e.g., air, water, food).</li> <li>S4.B.1.1.4: Describe how different parts of a living thing work together to provide what the organism needs (e.g., parts of plants: roots, stems, leaves).</li> <li>S4.B.2.1.2: Explain how specific adaptations can help a living organism survive (e.g., protective coloration, mimicry, leaf sizes and shapes, ability to catch or retain water).</li> </ul>	animals survive in their environments. Argue how properly functioning external and internal structures are important for the survival of animals. Investigate both internal and external adaptations using a preserved squid specimen.	<ul> <li>Internal Structure</li> <li>Invertebrate</li> <li>Reproduction</li> <li>Vertebrate</li> </ul>	and animals have structures for growth and survival.

LESSON 3: Plant	S4.A.3.1.1: Categorize systems as either natural or human	Identify and explain the	External Structure	Wonders: Unit 3/Week 5
Structures	made (e.g., ballpoint pens, simple electrical circuits, plant	purpose of internal and	Flower	Weekly Concept: Feeding
How Does a Seed Grow into	anatomy, water cycle). S4.A.3.2.2: Use models to make observations to explain how	external structures in a plant and how these structures help	<ul> <li>Fruit</li> <li>Germinate</li> </ul>	<ul> <li>the World</li> <li>Essential Question: In what</li> </ul>
a Plant?	systems work (e.g., water cycle, Sun-Earth-Moon system).	the plant survive, grow, and	Internal Structure	<ul> <li>Essential Question: In what ways can advances in</li> </ul>
	<b>S4.A.3.3.1:</b> Identify and describe observable patterns (e.g.,	reproduce.	<ul> <li>Internal Structure</li> <li>Leaves</li> </ul>	science be helpful or
Do Plants Have Structural	growth patterns in plants, weather, water cycle).		<ul> <li>Ovary</li> </ul>	harmful?
Adaptations?	<b>S4.C.1.1.1:</b> Use physical properties [e.g., mass, shape, size,	Examine and compare seeds	Petal	Connect to Science:
Adaptations:	volume, color, texture, magnetism, state (i.e., solid, liquid, and	to draw conclusions about plant		Research a problem before
How Do Internal Structures	gas), conductivity (i.e., electrical and heat)] to describe matter.	development.		beginning a design solution.
Help Support a Plant's	<b>S4.C.1.1.2:</b> Categorize/group objects using physical			beginning a design solution.
Survival, Growth, and	characteristics.	Describe the different		
Reproduction?	<b>S4.A.1.1.1:</b> Distinguish between a scientific fact and an	appearances as adaptations.		
	opinion, providing clear explanations that connect			
How Can We Use Dissection	observations and results (e.g., a scientific fact can be	Dissect and identify the internal		
to Learn About Plant	supported by making observations).	structures of a flower and		
Structures?	S4.A.1.3.1: Observe and record change by using time and	explain how they relate to		
	measurement.	reproduction.		
LESSON 4: Using the	S4.A.2.1.1: Generate questions about objects, organisms, or	Investigate and analyze the five	Brain	Wonders: Unit 2/week 1
Senses	events that can be answered through scientific investigations.	senses to determine their	Brain Stem	Weekly Concept: Literary
	S4.A.2.1.3: Observe a natural phenomenon (e.g., weather	importance in survival.	Cerebellum	Lessons
How Do We Sense the World	changes, length of daylight/night, movement of shadows,		Cerebrum	Essential Question: What
Around Us?	animal migrations, growth of plants), record observations, and	Describe how information is	Cortex	are some messages in
	then make a prediction based on those observations.	processed, and predict the	<ul> <li>Environment</li> </ul>	animal stories?
How Is Information	<b>S4.A.2.1.4:</b> State a conclusion that is consistent with the	effects on information	<ul> <li>Senses</li> </ul>	Connect to Science:
Processed?	information/data.	processing if the brain is		Describe how animals
	S4.A.2.2.1: Identify appropriate tools or instruments for	damaged.		receive information
How Are Senses Tested?	specific tasks and describe the information they can provide			through their senses
	(e.g., measuring: length - ruler, mass - balance scale, volume	Explore the brain and use		
	- beaker, temperature - thermometer; making observations:	evidence to explain its role in		
	hand lens, binoculars, telescope).	sensing the world.		
	<b>3.4.4.C2:</b> Describe the engineering design process: Define a problem. Generate ideas. Select a solution and test it. Make	Internation the importance of		
	the item. Evaluate the item.	Identify the importance of		
		memory when processing		
		information in order to stay safe.		
		Sale.		
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LESSON 5: Exploring the	Identify the structures of the	•	Cornea	Wonders	: Unit 2/week 1
Eye	eye and their individual	•	Iris	•	Weekly Concept: Literary
	functions.	•	Lens		Lessons
How Does the Eye Work?		• (	Optic Nerve	•	Essential Question: What
	Explain how light waves and	•	Pupil		are some messages in
How Do We See Images?	their frequencies affect our	•	Retina		animal stories?
	experience of vision.			•	Connect to Science:
How Do Human Eyes					Describe how animals
Compared to Other Animals'	Describe the role of the brain in				receive information
Eyes?	processing information and its				through their senses
	importance in recognizing				
	color, shape, and motion.				
	Examine the cause-and-effect				
	relationship between light and				
	pupil size.				
	Use a cow eye to draw				
	comparisons between human				
	and animal eyes.				

LESSON 6: Structure and	Develop a model that	٠	Review	
Function	demonstrates an		vocabulary from	
	understanding of the human		lessons 1-5	
How Can the Eye Be	eye and how it could be more			
Improved?	powerful.			
What Have Eye Learned?	Compare the eyes of other			
	organisms to determine the			
	weaknesses of the human eye.			
	Present models to			
	communicate knowledge about			
	the eye's structures and			
	functions.			
	Evaluate models to argue			
	which model is most			
	successful.			

Big idea: There are two main	types of energy (potential and kinetic) involving circuits, transfers a	and transformations. Renewable and	nonrenewable forms of energy	are used differently around the world.	
Investigation Questions	NGSS/ PA Core Standards	Objectives/ Lab Activities	Key Vocabulary	Reading Wonders Connection	
LESSON 1: Energy Sources Are Everywhere Pre-Unit Assessment: Where Do You Get Your Energy? What Are Some Types of Energy We Use?	<ul> <li>NGSS standards –</li> <li>4-PS3-1: Use evidence to construct an explanation relating the speed of an object to the energy of that object.</li> <li>4-PS3-2: Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.</li> <li>4-PS3-3: Ask questions and predict outcomes about the changes in energy that occur when objects collide.</li> <li>4-PS3-4: Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.</li> <li>4-PS4-1: Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause</li> </ul>	Create a working definition of the term "energy." Identify the Sun as the source of most energy on Earth. Understand that energy can change type. Recognize different types of energy in the classroom.	<ul> <li>Energy</li> <li>Photosynthesis</li> <li>System</li> </ul>	<ul> <li>Wonders: Unit 6/Week 3</li> <li>Weekly Concept: Resources</li> <li>Essential Question: How have our energy resources changed over the years?</li> <li>Connect to Science: Develop possible solutions through engineering design</li> </ul>	
LESSON 2: Stored and Motion Energy What Are Stored and Motion Energy? How Can I Change the Energy in a Ping-Pong Ball? What Happens When Objects Collide?	<ul> <li>objects to move.</li> <li>4-PS4-3: Generate and compare multiple solutions that use patterns to transfer information.</li> <li>4-ESS3-1: Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.</li> <li>3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.</li> <li>3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.</li> </ul>	Recognize that energy has many types. Participate in activities that demonstrate the difference between stored energy and motion energy. Demonstrate an understanding of stored energy and motion energy.	<ul> <li>Motion (kinetic) Energy</li> <li>Stored (potential) Energy</li> </ul>	<ul> <li>Wonders: Unit 1/week 4</li> <li>Weekly Concept: Ideas in Motion</li> <li>Essential Question: How can science help you understand how things work?</li> <li>Connect to Science: Relate speed to energy of an object.</li> </ul>	
	<ul> <li>PA Standard – see correlation document</li> <li>3.1.5.A2: Describe how life on earth depends on energy from the sun.</li> <li>S3.D.1.2.1: Describe why certain resources are renewable and other resources are nonrenewable.</li> </ul>	Recognize that when objects collide, energy is transferred between them.			

LESSON 3: Energy	S3.D.1.2.2: Identify and describe examples of renewable and	Describe some basic types of	Chemical Energy	Wonders:Unit 5/Week 3
Transfers and	nonrenewable resources.	energy, including light, radiant,	<ul> <li>Electrical Energy</li> </ul>	Weekly Concept: Inventions
Transformations	<b>S4.C.2.1.1:</b> Identify energy forms, energy transfer, and energy examples (e.g., light, heat, electrical).	thermal, sound, electrical, chemical, and mechanical.	<ul><li>Light Energy</li><li>Mechanical</li></ul>	• Essential Question: How can inventions solve problems?
How is the Sun's Energy	<b>S5.C.2.1.1:</b> Describe how energy exists in many forms (e.g.,		Energy	Connect to Science:
Transferred?	electrical, mechanical, chemical, heat, light, sound) and can	Use scientific equipment to	<ul> <li>Radiant Energy</li> </ul>	Understand that energy can
	be transformed within a system.	investigate energy and how it is	<ul> <li>Sound Energy</li> </ul>	be transferred by sound,
How Do You Build an	<b>S4.C.2.1.2:</b> Describe the flow of energy through an object or	transformed into other types	<ul> <li>Thermal Energy</li> </ul>	light, heat and electric
Electric Circuit?	system (e.g., feeling radiant heat from a light bulb, eating food	and transferred within a		currents.
	to get energy, using a battery to light a bulb or run a fan).	system.		
How Can We Use Circuits to	<b>S5.C.2.1.2:</b> Describe how heat energy is usually a byproduct			
Investigate Energy?	of an energy transformation.	Model energy using pie charts		
	<b>S5.C.2.1.3:</b> Distinguish between kinetic and potential energy.	and provide evidence for		
What Have You Learned	S4.C.3.1.2: Compare the relative movement of objects or	energy changes.		
About Energy?	describe types of motion that are evident (e.g., bouncing ball,			
	moving in a straight line, back and forth, merry-go-round).			
LESSON 4: Energy Moves	<b>3.2.4.B2:</b> Identify types of energy and their ability to be stored	Identify and define waves as	<ul> <li>Amplitude</li> </ul>	Wonders: Unit 4/Week 3
in Waves	and changed from one form to another.	regular patterns of motion.	<ul> <li>Frequency</li> </ul>	Weekly Concept:
	3.2.4.B3: Understand that objects that emit light often emit		<ul> <li>Wave</li> </ul>	Breakthroughs
How Can You Use Waves to	heat.	Identify the parts of a wave.	<ul> <li>Wavelength</li> </ul>	Essential Question: How
Send Messages?	3.2.4.B6: Give examples of how energy can be transformed			do inventions and
	from one form to another.	Collect evidence to prove that		technology affect your
What Do You Know About	3.2.P.B5: Explain how waves transfer energy without	waves have energy.		life?
Waves?	transferring matter.			Connect to Science:
	S5.B.3.2.1: Identify fossil fuels and alternative fuels used by	Use patterns to identify waves		Develop solutions to
How Can You Create	humans.	with different sizes and		problems.
Waves?	S4.A.3.1.1: Categorize systems as either natural or	frequencies.		
	human-made (e.g., ballpoint pens, simple electrical circuits,			
How Does Energy Move in	plant anatomy, water cycle).	Use evidence to prove that		Wonders: Unit 5/Week 4
Waves?	S4.A.3.2.1: Identify what different models represent (e.g.,	waves can transfer energy.		Weekly Concept: Zoom In
	maps show physical features, directions, distances; globes			<ul> <li>Essential Question: What</li> </ul>
	represent Earth; drawings of watersheds depict terrain;			can you discover when you
	dioramas show ecosystems; concept maps show relationships			look closely at something?
	of ideas).			Connect to Science: Learn
	S4.A.3.2.2: Use models to make observations to explain how			that waves can be made in
	systems work (e.g., water cycle, Sun Earth-Moon system).			water when the surface is
				disturbed.

LESSON 5: Recycling	S4.A.3.2.3: Use appropriate, simple modeling tools and	Learn about alternatives to	•	Alternative	Wonders	: Unit 6/Week 3
Energy	techniques to describe or illustrate a system (e.g., two cans	fossil fuels: solar energy,		Energy	•	Weekly Concept: Resources
	and string to model a communications system, terrarium to	geothermal energy, wind	•	Biomass Energy	•	Essential Question: How
What Are Types of	model an ecosystem).	energy, water energy, and	•	Fossil Fuel		have our energy resources
Alternative Energy?	S4.A.3.3.1: Identify and describe observable patterns (e.g.,	biomass energy.	•	Geothermal		changed over the years?
	growth patterns in plants, weather, water cycle).			Energy	•	Connect to Science: Develop
How Does a Wind Turbine	S4.A.1.1.2: Identify and describe examples of common	Construct models to	•	Hydroelectric		possible solutions through
Generate Energy?	technological changes past to present in the community (e.g.,	demonstrate water and wind		Energy		engineering design
	energy production, transportation, communications,	energy.	•	Solar Energy		
What Can I Build to	agriculture, packaging materials) that have either positive or		•	Turbine		
Demonstrate Water Energy?	negative impacts on society or the environment.	Work cooperatively and follow	•	Water Energy		
	S4.A.1.3.2: Describe relative size, distance, or motion.	directions. Suggest innovations	•	Wind Energy		
	S4.A.1.3.3: Observe and describe the change to objects	in design. Record questions for				
	caused by temperature change or light.	further exploration.				
LESSON 6: My Energy	S4.A.1.3.5: Provide examples, predict, or describe how	Design and plan an experiment	•	Review		
Experiment	everyday human activities (e.g., solid waste production, food	or demonstration to answer a		vocabulary from		
	production and consumption, transportation, water	student-generated question		previous lessons		
How Can I Design an	consumption, energy production and use) may change the	about energy.		1-6.		
Experiment About Energy?	environment.					
	S4.A.2.1.1: Generate questions about objects, organisms, or	Execute a plan to construct				
Does My Experiment	events that can be answered through scientific investigations.	apparatus, collect data, and				
Support My Prediction?		draw conclusions.				
How Can I Communicate		Present findings of				
What I Have Learned About		investigations and share results				
Energy?		with classmates.				
		Complete self-assessments to evaluate progress.				

Unit Title	Changing Earth: February / March (MP 3)						
Big Idea:	Earth is made up of mountain ranges, lakes, volcanoes, rivers, canyons, and many other landforms and waterways, all of which are continually changing.						
Investigation Questions	NGSS/ PA Core Standards	Objectives	Key Vocabulary	Reading Wonders Connection			
LESSON 1: Earth's Layers and Plates What are the Earth's Layers? Why does the Earth have Plates? What is the Ring of Fire? LESSON 2: Rock Formations and Patterns What's Your Type? What Is the Rock Cycle? How Do We Use Different Types of Rocks?	<ul> <li>4-ESS2-2: Analyze and interpret data from maps to describe patterns of Earth's features.</li> <li>3.3.4.A1: Describe basic landforms. Identify the layers of the earth. Recognize that the surface of the earth changes due to slow processes and rapid processes.</li> <li>S4.D.1.1.1: Describe how prominent Earth features in Pennsylvania (e.g., mountains, valleys, caves, sinkholes, lakes, rivers) were formed.</li> <li>3.3.5.A1: Describe how landforms are the result of a combination of destructive forces such as erosion and constructive erosion, deposition of sediment, etc.</li> <li>S4.D.1.1.2: Identify various Earth structures (e.g., mountains, watersheds, peninsulas, lakes, rivers, valleys) through the use of models.</li> <li>S5.D.1.1.1: Differentiate between abrupt changes in Earth's surface (e.g., earthquakes, volcanoes, meteor impacts, landslides) and gradual changes in Earth's surface (e.g., lifting up of mountains, waring away by erosion).</li> <li>S5.D.1.1.2: Explain how geological processes observed today (e.g., erosion, changes in the composition of the atmosphere, volcanic eruptions, earthquakes) are similar to those in the past.</li> <li>S4.A.3.2.1: Identify what different models represent (e.g., mountains, earth and sides and particular directions, distance of the atmosphere, volcanic eruptions, earthquakes, and the past.</li> </ul>	Construct a model of three layers of Earth. Assemble a map of Earth's tectonic plates and make predictions about the effects of their movement. Recognize patterns within the Ring of Fire to draw conclusions about volcanic activity and earthquakes. Compare the characteristics different types of rocks. Use a model to simulate the rock cycle. Classify rocks by the way they are formed. Research different types of rocks and make connections between their characteristics	<ul> <li>Boundary</li> <li>Core</li> <li>Convention</li> <li>Crust</li> <li>Magama</li> <li>Mantle</li> <li>Tectonic Plate</li> <li>Volcano</li> </ul> Igneous Rock <ul> <li>Lava</li> <li>Metamorphic Rock</li> <li>Sediment</li> <li>Sedimentary Rock</li> </ul>	Wonders: Unit 5/Week 4 • Weekly Concept: Zoom In • Essential Question: What can you discover when you look closely at something? • Connect to Science: Learn that waves can be made in water when the surface is disturbed.			
LESSON 3: Weathering and Erosion How are Canyons Formed?	<ul> <li>maps show physical features, directions, distances; globes</li> <li>represent Earth; drawings of watersheds depict terrain;</li> <li>dioramas show ecosystems; concept maps show relationships of ideas).</li> <li>S4.A.3.3.1: Identify and describe observable patterns (e.g., growth patterns in plants, weather, water cycle).</li> <li>S4.A.3.3.2: Predict future conditions/events based on observable patterns (e.g., day/night, seasons, sunrise/sunset, lunar phases).</li> <li>S4.C.1.1.1: Use physical properties [e.g., mass, shape, size, volume, color, texture, magnetism, state (i.e., solid, liquid, and gas), conductivity (i.e., electrical and heat)] to describe matter.</li> <li>S4.C.1.1.2: Categorize/group objects using physical characteristics.</li> </ul>	and where they are found Differentiate between weathering and erosion. Make a connection between water erosion and the rock cycle. Use a water table to simulate how water erosion creates landforms.	<ul> <li>Delta</li> <li>Deposit</li> <li>Erosion</li> <li>Plateau</li> <li>Weathering</li> </ul>	<ul> <li>Wonders: Unit 1/week 3</li> <li>Weekly Concept: Take Action</li> <li>Essential Question: How do people respond to natural disasters?</li> <li>Connect to Science: Make observations on effects of weathering</li> </ul>			

LESSON 4: Mapping Earth How Have Rivers Changed the Shape of the United States? How Can We Use Maps to Learn About Earth?	<ul> <li>S4.A.3.2.2 :Use models to make observations to explain how systems work (e.g., water cycle, Sun-Earth-Moon system).</li> <li>S4.A.1.1: Distinguish between a scientific fact and an opinion, providing clear explanations that connect observations and results (e.g., a scientific fact can be supported by making observations).</li> <li>S4.A.1.3.1: Observe and record change by using time and measurement.</li> <li>S4.A.2.1.1: Generate questions about objects, organisms, or events that can be answered through scientific investigations.</li> <li>S4.A.2.1.2: Design and describe an investigation (a fair test) to test one variable.</li> </ul>	Make predictions about the structures of Earth based on the locations of rivers and streams. Use different maps to draw conclusions about the impact of water erosion on landforms. Determine the importance of maps in exploring the history of Earth. Develop maps of river systems to identify patterns of movement.	<ul> <li>Geologist</li> <li>Relief Map</li> </ul>	
LESSON 5: Changing Earth Why Do Rocks Form Layers? How Are Fossils Formed?		Model deposition using a stream table to explain how sedimentary rock forms. Simulate fossil formation by creating layers of sediment in the stream table. Estimate the relative ages of rock layers based on the fossils found within them.	<ul> <li>Deposition</li> <li>Fossil</li> <li>Relative Age</li> </ul>	<ul> <li>Wonders: Unit 5/Week 5</li> <li>Weekly Concept: Digging Up the Past</li> <li>Essential Question: How can learning about the past help you understand the future?</li> <li>Connect to Social Studies: Describe the Spanish exploration and colonization of what is now the United States</li> </ul>
LESSON 6: Life on a Changing Earth Why is Soil Erosion a Problem? Can Soil Erosion Be Prevented? Which Model Prevents Soil Erosion?		Describe soil erosion and predict its impact on humans. Develop a solution for soil erosion and use the stream table to test the model. Analyze results to determine the effectiveness of models to prevent soil erosion and make connections to real-life solutions to scientific problems.	<ul> <li>Review vocabulary from lessons 1-5.</li> </ul>	<ul> <li>Wonders: Unit 3/Week 3</li> <li>Weekly Concept: Liberty and Justice</li> <li>Essential Question: How can one person make a difference?</li> <li>Connect to Science: Understand where resources come from and how they affect the environment</li> </ul>