SCIENCE
Fourth Grade

Unit 1
Plant and Animal Structures

Essential Question
This question guides the student experience throughout the unit and is open-ended and enduring.
How do the structures of plants and animals help them grow, survive, reproduce, and respond to their environment?

Unit Summary
This summary provides high-level information about the main learning outcomes within this unit.
Students are introduced to the unit's anchoring phenomenon of that while most animals have eyes, the location of the eyes will vary depending on the animal and its needs. In this unit, students explore plant structures that are used for support and growth, protection, reproduction, and responding to the environment. Students examine animal structures that are used for digestion, circulation, support, movement, protection, reproduction, and sensing and responding to the environment. Can students use what they know about the structures of both plants and animals to give a comic book artist ideas for creating new creatures for his latest work?

Guiding Questions
At the end of this unit, students should be able to respond to these questions as they demonstrate understanding of key concepts, skills and relevance to their own lives.

Content

- What structures do plants and animals use to grow and survive?
- How do animals use their eyes to respond to their environment?
- What are some ways animal structures help with reproduction?

Process

- How can you tell if a plant or animal structure is used for protection, movement, or sensing?
- What patterns do you notice in where animal eyes are located and how they are used?

- How can you investigate whether a structure helps an organism survive in its environment?

Reflective

- What did you find interesting about how different animals use their eyes?
- If you were an animal, what structure would be most important for you to survive, and why?
- How does learning about plant and animal structures help you understand how living things are connected to their environment?

Power Standards

These state standards have been identified as critical to students' long-term learning progression in this discipline. They are assessed within the scope of this unit.

- 4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
- 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.
- 4-PS4-2 Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
- 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.

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Unit 2
Energy

Essential Question
This question guides the student experience throughout the unit and is open-ended and enduring.
How is energy transferred and used to help people stay safe and make choices about the resources they use?

Unit Summary
This summary provides high-level information about the main learning outcomes within this unit.
Students are introduced to the unit's anchoring phenomenon of how bike helmets protect you. In this unit, students explore how energy and motion are related, how energy is transferred between colliding objects, and how energy is transferred by sound, light, heat, and electric currents. Students examine the ways energy is stored and used, and how people choose energy resources. Students design a safety device for bike riding that uses energy. How can students use what they know to help teach others about how energy transfers from one place to another by creating a safety pamphlet about bike helmets?

Guiding Questions
At the end of this unit, students should be able to respond to these questions as they demonstrate understanding of key concepts, skills and relevance to their own lives.

Content

- What is the relationship between energy and motion?
- How does energy move during a collision or impact?
- What are some ways energy can be transferred and stored for safety devices like bike helmets?

Process

- How can you tell that energy has been transferred in a collision or when light or sound is produced?
- What steps would you take to test how well a bike helmet light works using different energy sources?
- How can you compare different energy resources to decide which is best for a device?

Reflective

- When have you experienced energy transfer in your own life, like during a fall or while using a light?
- Why do you think it's important to understand how energy works when designing things like bike helmets or safety gear?
- What new ideas do you have for using energy in safe and efficient ways?

Power Standards

These state standards have been identified as critical to students' long-term learning progression in this discipline. They are assessed within the scope of this unit.

- 4-ESS3-1 Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
- 4-PS3-1 Use evidence to construct an explanation relating the speed of an object to the energy of that object.
- 4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
- 4-PS3-3 Ask questions and predict outcomes about the changes in energy that occur when objects collide.
- 4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
- 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials,time, or cost.
- 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.

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Unit 3
Earth's Changing Surface

Essential Question
This question guides the student experience throughout the unit and is open-ended and enduring.
How does Earth's surface change over time, and what clues help us understand the forces and living things that shape it?

Unit Summary
This summary provides high-level information about the main learning outcomes within this unit.
Students are introduced to the anchoring phenomenon of how the once tall and pointy Appalachian Mountains have become low and rounded over time. In this unit, students investigate Earth's changing surface as they explore clues that show Earth's surface changes. Students examine how water, wind, and living things also make changes to Earth's surface. Students find out about fossils and how the location of fossils can indicate past changes to Earth's surface. Students locate where earthquakes, volcanoes, and mountains are found, and discover what people can do about natural hazards. Using what they know about how Earth's surface changes and the resulting natural hazards, can students develop a hazard plan for their community?

Guiding Questions
At the end of this unit, students should be able to respond to these questions as they demonstrate understanding of key concepts, skills and relevance to their own lives.

Content

- What are some clues that show Earth's surface has changed over time?
- How do water and wind shape mountains like the Appalachians?
- What can fossils tell us about the history of the Appalachian Mountains?

Process

- How can you tell whether Earth's surface was changed by water, wind, or living things?
- What steps would you take to investigate how a mountain has changed over time?

- How do scientists use maps or data to identify where earthquakes, volcanoes, and mountains are found?

Reflective

- What surprised you about how mountains like the Appalachians can change shape over time?
- Why is it important to understand natural hazards and how they affect land and people?
- How has your thinking changed about how Earth's surface looks and why it changes?

Power Standards

These state standards have been identified as critical to students' long-term learning progression in this discipline. They are assessed within the scope of this unit.

- 4-ESS1-1 Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.
- 4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
- 4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features.
- 4-ESS3-2 Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.
- 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials,time, or cost.
- 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.

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Unit 4
Waves and Information

Essential Question
This question guides the student experience throughout the unit and is open-ended and enduring.
How do waves help us understand the world around us and allow people to send and receive information?

Unit Summary
This summary provides high-level information about the main learning outcomes within this unit.
Students are introduced to the anchoring phenomenon of how, by using sound waves, people can communicate. In this unit, students explore waves and their properties, how waves affect objects, and which waves travel through Earth causing seismic activity. Students understand how sound waves and patterns are used to send messages. Using their knowledge, can students demonstrate different ways information can be transferred by creating a new communication method?

Guiding Questions
At the end of this unit, students should be able to respond to these questions as they demonstrate understanding of key concepts, skills and relevance to their own lives.

Content
- What are some examples of waves, and how do they move?
- What do amplitude and wavelength tell us about a wave?
- How are sound waves used to communicate messages?

Process
- How can you observe or measure the effects of waves on objects?
- What patterns can you find in how waves send messages, like sound or light signals?
- What steps would you take to model how a wave travels through Earth or air?

Reflective
- Where do you notice sound or light waves being used to send messages in your life?
- Why do you think understanding waves is important for safety or communication?

- What did you learn about waves that changed how you think about sound or communication?

Power Standards

These state standards have been identified as critical to students' long-term learning progression in this discipline. They are assessed within the scope of this unit.

- 4-PS4-1 Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
- 4-PS4-3 Generate and compare multiple solutions that use patterns to transfer information.
- 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.