Fourth Grade Science Curriculum

Course Description: In fourth grade, students will experience three science domains; physical science, life science, and earth and space science. During the physical science unit, students learn that energy can be transferred from place to place by sound, light, heat, and electric currents. The will describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. For life science, students experience learn that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. And in earth and space science, students learn about rock formations, effects of weathering, and describe patterns of Earth’s features.

Scope and Sequence:

<table>
<thead>
<tr>
<th>Unit</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth and Space Science, Unit 1</td>
<td>5 weeks</td>
</tr>
<tr>
<td>● Topic 1: Rock Patterns</td>
<td></td>
</tr>
<tr>
<td>● Topic 2: Changing Land</td>
<td></td>
</tr>
<tr>
<td>● Topic 3: Plants’ Effect on Regions</td>
<td></td>
</tr>
<tr>
<td>● Topic 4: Plate Tectonics</td>
<td></td>
</tr>
<tr>
<td>Physical Science, Part 1, Unit 2</td>
<td>5 weeks</td>
</tr>
<tr>
<td>● Topic 1: Energy and Speed</td>
<td></td>
</tr>
<tr>
<td>● Topic 2: Transfer of Energy in Collisions</td>
<td></td>
</tr>
<tr>
<td>● Topic 3: Chemical Processes</td>
<td></td>
</tr>
<tr>
<td>Physical Science, Part 2 Unit 3</td>
<td>5 weeks</td>
</tr>
<tr>
<td>● Topic 1: Motion of Waves</td>
<td></td>
</tr>
<tr>
<td>● Topic 2: Wavelength and Amplitude</td>
<td></td>
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<tr>
<td>● Topic 3: Light Reflection</td>
<td></td>
</tr>
<tr>
<td>Life Science, Unit 4</td>
<td>3 weeks</td>
</tr>
<tr>
<td>● Topic 1: Plant and Animal Parts</td>
<td></td>
</tr>
<tr>
<td>● Topic 2: Sense Receptors</td>
<td></td>
</tr>
</tbody>
</table>
Unit 1: Earth and Space Science

Subject: Science
Grade: 4th
Name of Unit: Earth and Space Science
Length of Unit: 5 weeks - First Quarter (29-30 Days)

Overview of Unit: Students experience the sciences that deal with the origin, composition, and physical features of the Earth through identifying evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time, making observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation, making observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation, analyzing and interpreting data from maps to describe patterns of Earth’s features.

Topic 1: Rock Patterns

Suggested Length of Time: 5 days

Essential Questions (Student Wondering):
● How can rocks give us clues to the the past?

Enduring Understanding (Learning Objectives):
● The student is expected to identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

Standards Addressed

Priority (Disciplinary Core Ideas):
● 4-ESS1.C.1 The History of Planet Earth: Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed.

Supporting (CC & SEP):
● Constructing Explanations and Designing Solutions → Identify Evidence: Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.
● Evidence → Patterns can be used as evidence to support an explanation.

Detailed Description/Instructions:

<table>
<thead>
<tr>
<th>Standard/CC</th>
<th>5E Model:</th>
<th>Suggested</th>
<th>Notes</th>
</tr>
</thead>
</table>

Board Approved: June 7, 2018
| # of Days | 4-ESS1.C.1 Engage: Accessing Prior Knowledge | ½ Day | • Watch Setup Video.  
• Prepare for the unit by purchasing orange juice, carbonated soft drink, cocoa powder, orange sprinkles, pretzels, and puffed rice cereal.  
• Preview picture vocabulary to match the vocabulary terms with the associated lessons (teach vocabulary in context).  

| 4-ESS1.C.1 Engage: Hook | ½ Day | • By the end of this lesson students should be able to think about and share what causes landscapes to change.  

| 4-ESS1.C.1 (CC Evidence) Explore: Do 1: Activity | 1 Day | • By the end of this lesson students should be able to make and share observations based on what they see in the rock formations of the Grand Canyon.  
• Consider teacher modeling rather than students in groups.  
• Multi-day preparation involved.  
• Use Master Materials List to verify which materials are present or need to be obtained.  
• By the end of this lesson students should be able to observe core layers to see what kind of events affect the layers of Earth.  
• CC: Students can use patterns as evidence to support their explanations of which layer is the most recent and what that layer tells us.  

| 4-ESS1.C.1 (CC Evidence) Explore: Do 2: Activity | 1 Day | • Use Master Materials List to verify which materials are present or need to be obtained.  
• By the end of this lesson students should be able to tell a story surrounding their rock layer model.  
• CC: Students can use patterns to provide evidence of which layer
would have formed first and which layer would have formed last.

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<thead>
<tr>
<th>Standard</th>
<th>Activity</th>
<th>Duration</th>
<th>Additional Notes</th>
</tr>
</thead>
</table>
| 4-ESS1.C.1 | Explain: STEMscopedia | 1 Day | Must Do  
By the end of this lesson students should connect the engage and explore activities to science standards. |
| 4-ESS1.C.1 | Elaborate: Teacher Choice | If Time Allows | Additional Elaborate activities are optional per teacher choice and student needs.  
Elaborate activities could be taught through a science workshop model with centers.  
By the end of these lessons students should connect the engage and explore activities to the real world.  
Consider opportunities to digitally connect with experts and community members on topics related to this standard.  
Consider opportunities to explore current local and global issues related to this standard. |
| 4-ESS1.C.1 | Evaluate: Assess | 1 Day | CER (Must Do), Multiple Choice, and Open-Ended Response  
Performance Expectation Assessment Task (PEAT) can be completed as the Engaging Scenario or other unit-culminating activity. |

### Topic 2: Changing Land

**Suggested Length of Time:** 10-12 days  
**Essential Questions (Student Wondering):**  
Why do some rock formations become smaller over time?  
**Enduring Understanding (Learning Objectives):**
The student is expected to make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

**Standards Addressed**

*Priority (Disciplinary Core Ideas):*
- 4-ESS.2.A.1 Earth Materials and Systems: Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.

*Supporting (CC & SEP):*
- Planning and Carrying Out Investigations→Phenomenon Explanations: Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
- Cause and Effect → Cause and effect relationships are routinely identified, tested, and used to explain change

**Detailed Description/Instructions:**

<table>
<thead>
<tr>
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</table>
| 4-ESS.2.A.1 | Engage: Accessing Prior Knowledge | ½ day | • Watch Setup Video  
• During this lesson students should use background knowledge to predict why some rocks are different from others.  
• Preview picture vocabulary to match the vocabulary terms with the associated lessons (teach vocabulary in context). |
| 4-ESS.2.A.1 | Engage: Hook | ½ day | • By the end of this lesson students should be able to compare the breakdown of objects based on different methods. |
| 4-ESS2-1 (CC Cause and Effect) | Explore: Activity | 2 days | • By the end of this lesson students should be able to describe the effects of waves on the beach.  
• Internet search of Collaroy Narrabeen Beach Erosion Time Lapse  
• CC: Students can make cause/effect relationships for how the beach changed as they made waves. |
| 4-ESS2-1  | Explore: Do 2 Activity: Wind Erosion | 1 day | - By the end of this lesson students should be able to describe the effects of wind erosion.  
- Use Master Materials List to verify which materials are present or need to be obtained.  
- CC: Students can make cause/effect relationships for how the wind changed the land. |
|-----------|-------------------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------|
| 4-ESS2-1  | Explore: PBL                        | 4-6 days | - By the end of this lesson students should create and present a prototype that slows down or stops soil erosion caused by water over hilly farmland or wind over flat farmland.  
- Review Expert Roles  
- 21st Century Skill Addressed: Presentation  
- CC: Students will be able to identify cause/effect relationships as they create prototypes for solutions to prevent the erosion of soil from farmland. |
| 4-ESS.2.A.1 | Explain: STEMscopedia               | 1 Day  | - Must Do  
- By the end of this lesson students should connect the engage and explore activities to science standards. |
| 4-ESS.2.A.1 | Elaborate: Teacher Choice           | If Time Allows | - By the end of this lesson students should connect the engage and explore activities to the real world.  
- Additional Elaborate activities are optional per teacher choice and student needs.  
- Elaborate activities could be taught through a science workshop model with centers.  
- Consider opportunities to digitally connect with experts and community members on topics related to this standard.  
- Consider opportunities to explore |
current local and global issues related to this standard.

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<thead>
<tr>
<th>Standard/CC</th>
<th>Evaluate: Assess</th>
<th>1 Day</th>
<th>Notes</th>
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<tbody>
<tr>
<td>4-ESS2.A.1</td>
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- CER (Must Do), Multiple Choice, and Open-Ended Response
- Performance Expectation Assessment Task (PEAT) can be completed as the Engaging Scenario or other unit-culminating activity.

**Topic 3: Plants’ Effect on Regions**

**Suggested Length of Time:** 6 days

**Essential Questions (Student Wondering):**
- What does a beaver dam do to the plant in the area?

**Enduring Understanding (Learning Objectives):**
- The student is expected to make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

**Standards Addressed**

*Priority (Disciplinary Core Ideas):*
- 4-ESS2.E.1 Biogeology: Living things affect the physical characteristics of their regions.

*Supporting (CC & SEP):*
- Cause and Effect: Cause-and-effect relationships are routinely identified, tested, and used to explain change.
- Planning and Carrying Out Investigations → Phenomenon Explanations: Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or to test a design solution.

**Detailed Description/Instructions:**

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<tbody>
<tr>
<td>4-ESS2.E.1</td>
<td>Engage: Accessing</td>
<td>½ day</td>
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- Watch Setup Video.
- Preview picture vocabulary to match the vocabulary terms with the associated lessons (teach vocabulary in context).
- During this lesson students should use background knowledge to...
<table>
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<th>Prior Knowledge</th>
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<th>predict which plant from a given list has a greater effect on earth.</th>
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<tbody>
<tr>
<td>4-ESS2.E.1</td>
<td>Engage: Hook</td>
<td>½ day</td>
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<td>● By the end of this lesson students should be able to discuss how animals and plants affect our environment.</td>
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<tr>
<td>4-ESS2.E.1 (CC Cause and Effect)</td>
<td>Explore: Activity</td>
<td>1 day</td>
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<td>● By the end of this lesson students should be able to discuss ways humans can help repair the environment so it will be more like it was before a dam was built.</td>
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<td>● CC: Students can identify a cause/effect relationship of how building the dam affected the surrounding land.</td>
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<tr>
<td>4-ESS2.E.1 (CC Cause and Effect)</td>
<td>Explore: Engineering Solutions</td>
<td>2 Day</td>
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<td>● By the end of this lesson students should be able to explain how an invasive species can change the physical characteristic of its region.</td>
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<td>● Day 1: Create</td>
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<td>● Day 2: Present</td>
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<td>● CC: Students can identify cause/effect relationships in explaining how kudzu affects our region and how we can control the kudzu population.</td>
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<td>4-ESS2.E.1</td>
<td>Explain: STEMscopedia</td>
<td>1 Day</td>
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<td>● Must Do</td>
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<td>● By the end of this lesson students should connect the engage and explore activities to science standards.</td>
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<td>4-ESS2.E.1</td>
<td>Elaborate: Teacher Choice</td>
<td>If Time Allows</td>
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<td>● By the end of this lesson students should connect the engage and explore activities to the real world.</td>
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<td>● Additional Elaborate activities are optional per teacher choice and student needs.</td>
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<td>● Elaborate activities could be taught through a science workshop model with centers.</td>
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<td>● By the end of this lesson students</td>
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should connect the engage and explore activities to the real world.
- Consider opportunities to digitally connect with experts and community members on topics related to this standard.
- Consider opportunities to explore current local and global issues related to this standard.

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<thead>
<tr>
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<th>5E Model:</th>
<th>Suggested # of Days</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-ESS2.E.1</td>
<td>Evaluate: Assess</td>
<td>1 Day</td>
<td>CER (Must Do), Multiple Choice, and Open-Ended Response</td>
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<td>Performance Expectation Assessment Task (PEAT) can be completed as the Engaging Scenario or other unit-culminating activity.</td>
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### Topic 4: Plate Tectonics

**Suggested Length of Time:** 8 days

**Essential Questions (Student Wondering):**
Why are there more earthquakes in certain places?

**Enduring Understanding (Learning Objectives):**
- The student is expected to analyze and interpret data from maps to describe patterns of Earth’s features.

**Standards Addressed**

*Priority (Disciplinary Core Ideas):*
- 4-ESS2.B.1 Plate Tectonics and Large-Scale System Interactions: The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features in areas of Earth.

*Supporting (CC & SEP):*
- Patterns → Evidence: Patterns can be used as evidence to support an explanation.
- Analyzing and Interpreting Data → Analyze and Interpret Data: Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.

**Detailed Description/Instructions:**

- Watch Setup Video
- Preview picture vocabulary to
match the vocabulary terms with the associated lessons (teach vocabulary in context).

| 4.ESS2.B.1 | Engage: Accessing Prior Knowledge | ½ day | • By the end of this lesson students should be able to think and share about the continents and about which student statement they agree with the most. |
| 4.ESS2.B.1 | Engage: Hook | ½ day | • By the end of this lesson students should be able to observe, compare, and describe landforms shown on a map. |
| 4.ESS2.B.1 (CC Patterns/Evidence) | Explore: Do 1: Activity | 1 day | • By the end of this lesson students should be able to use maps to make connections between the edges of tectonic plates and the location of certain landforms.  
• CC: Students can use patterns as evidence to explain the relationship between plate boundaries and landforms. |
| 4.ESS2.B.1 (CC Patterns/Evidence) | Explore: Engineering Solutions | 3 days | • Claim-Evidence-Reasoning  
• By the end of this lesson students should be able to design a new form of transportation that can handle any terrain in a certain area.  
• CC: Students can present evidence to justify their designs and to explain which features of their transportation allow it to cover this terrain. |
| 4.ESS2.B.1 | Explain: STEMscopedia | 1 Day | • Must Do  
• By the end of this lesson students should connect the engage and explore activities to science standards. |
<p>| 4.ESS2.B.1 | Elaborate: Teacher Choice | If Time Allows | • Additional Elaborate activities are optional per teacher choice and student needs. |</p>
<table>
<thead>
<tr>
<th>4.ESS2.B.1</th>
<th>Evaluate: Assess</th>
<th>2 Day</th>
</tr>
</thead>
</table>
| ● Elaborate activities could be taught through a science workshop model with centers.  
● By the end of this lesson students should connect the engage and explore activities to the real world.  
● Consider opportunities to digitally connect with experts and community members on topics related to this standard.  
● Consider opportunities to explore current local and global issues related to this standard. |

### Engaging Scenario

**Engaging Scenario** (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

**Information Technologies Performance Expectations Assessment Task**

In this task, students create an emergency signaling system and show how it interacts with the eye or ear.

**Notes:**

- Significant preparation is required. Please review prior to assessment.

**Rubric for Engaging Scenario:**

Use the rubric provided in the Sense Receptors Performance Expectation Assessment Task.
Unit 2: Physical Science Part 1

Subject: Science
Grade: 4th
Name of Unit: Physical Science
Time per Day: 30 Minutes (approximately)
Length of Unit: 5 weeks - Second Quarter (about 27 days)
Overview of Unit: Students experience the science of non-living things through relating the speed of an object to the energy of that object, making observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents, asking questions and predicting outcomes about the changes in energy that occur when objects collide, applying scientific ideas to design, test, and refining a device that converts energy from one form to another.

Topic 1: Energy and Speed

Suggested Length of Time: about 8 days
Essential Questions (Student Wondering):
  • How is the speed of an object related to the distance it will travel?
• Enduring Understanding (Learning Objectives):
  • The student is expected to use evidence to construct an explanation relating the speed of
    an object to the energy of that object.

Standards Addressed

Priority (Disciplinary Core Ideas):
  • 4-PS3.A.1 Definitions of Energy: The faster a given object is moving, the more energy it possesses.

Supporting (Crosscutting Concepts (CC) and Science and Engineering Practices (SEP):
  • Energy: Energy can be transferred in various ways and between objects.
  • Constructing Explanations and Designing Solutions → Use Evidence: Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or to design a solution to a problem.

Detailed Description/Instructions:

<table>
<thead>
<tr>
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<th>5E Model</th>
<th>Suggested # of Days</th>
<th>Notes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-PS.3.A.1</td>
<td>Engage: Assess Prior Knowledge</td>
<td>½ Day</td>
<td>• During this lesson students should use background knowledge to predict what will happen to the speed of an object if the energy</td>
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<tr>
<td>4-PS.3.A.1 (CC) Evidence</td>
<td>Engage: Hook</td>
<td>½ Day</td>
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|                          | ● By the end of this lesson students should determine in which trial they used the most and least amount of energy.  
|                          | ● This lesson requires a large, open space (outside, gym, cafeteria).  
|                          | ● May be adjusted to be done as a whole group instead of multiple, smaller groups in order to save time. |

<table>
<thead>
<tr>
<th>4-PS.3.A.1 (CC Energy)</th>
<th>Explore: Scientific Investigation</th>
<th>1 Day</th>
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</thead>
</table>
|                        | ● By the end of this lesson students should that the amount of energy changes depending on the amount of energy transferred into a system.  
|                        | ● Consider mid-lesson teaching point to support students’ with measurement and data collection procedures.  
|                        | ● This will be students’ first experience with CER. Spend time facilitating conversations when completing.  
|                        | ● CC: Students can explain how potential energy is being transferred to kinetic energy as the car rolls down the ramp. |

<table>
<thead>
<tr>
<th>4-PS.3.A.1 (CC Energy)</th>
<th>Explore: Problem Based Learning (PBL)</th>
<th>3-6 Days</th>
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</thead>
</table>
|                        | ● By the end of this lesson students should be able to collaborate to solve a scientific problem.  
|                        | ● This is the first time students experience the Engineering Design Process. Consider how you will launch this.  
|                        | ● Reference the Disciplinary Core Ideas, Crosscutting Concepts, and Science and Engineering Practices to clarify their connection to this lesson.  
|                        | ● CC: Students can understand how |
the strength of the structure must withstand the energy being transferred from the fan to the walls/ceiling.

| 4-PS.3.A.1 | Explain: STEMscopedia | 1 Day | ● By the end of this lesson students should connect the engage and explore experiences to the standard.
● Must Do
● Could be done whole group, individually, or small groups.
● Consider what reading strategies you want students to practice during this reading. This is a longer text, so consider the jigsaw method within the group.
● Could be printed in packets, booklets, or assigned digitally.
● Decided if students will complete the “Try Now”.

| Explain/Elaborate: Teacher Choice |  If time allows. | ● By the end of this lesson students should connect science content to the real world.
● Recommendation: Career Connection, Science Today-Watch it, and Concept Review Game
● Elaborate activities could be taught through a science workshop model with centers.
● Consider opportunities to digitally connect with experts and community members on topics related to this standard.
● Consider opportunities to explore current local and global issues related to this standard.

| 4-PS.3.A.1 | Evaluate: Argue: Claim-Evidence-Reasoning (CER); Multiple Choice and/or Open-Ended Response Assessment | 1 Day | ● Model this CER assessment (Must Do) with students to teach process. These assessments could be copied or assigned.
● Performance Expectation Assessment Task (PEAT) can be completed as the Engaging Scenario
Topic 2: Transfer of Energy in Collision

Suggested Length of Time: about 8 days

Essential Questions (Student Wondering):
Why do we hear a sound when something drops on the ground?

Enduring Understanding (Learning Objectives):
- The student is expected to make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
- The student is expected to ask questions and predict outcomes about the changes in energy that occur when objects collide.

Standards Addressed
  Priority (Disciplinary Core Ideas):
  - 4-PS3.A.2 Definitions of Energy: Energy can be moved from place to place by moving objects or through sound, light, or electric currents.
  - 4-PS3.B.1 Conservation of Energy & Energy Transfer: Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced.

  Supporting (CC & SEP):
  - Asking Questions and Defining Problems → Investigate and Predict: Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause-and-effect relationships (4-PS3-3).
  - Planning and Carrying Out Investigations → Phenomenon Explanations: Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or to test a design solution (4-PS3-2).
  - Energy: Energy can be transferred in various ways between objects (4-PS3-1; 4-PS3-2; 4-PS3-3; 4-PS3-4).

Detailed Description/Instructions:

<table>
<thead>
<tr>
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<th>5E Model</th>
<th>Suggested # of Days</th>
<th>Notes:</th>
</tr>
</thead>
<tbody>
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- Watch Setup Video.
- Read the Teacher Background section (located under “Home”).
- Read Common Misconceptions.
- Preview picture vocabulary to match the vocabulary terms with the
<table>
<thead>
<tr>
<th>Standards</th>
<th>Activity</th>
<th>Duration</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-PS3.A.2</td>
<td>Engage: Accessing Prior Knowledge (APK)</td>
<td>½ Day</td>
<td>During this lesson students should use their background knowledge to predict what happens to the energy of an object when it collides with another object. Teaching Tips: 3 Corners, Act it Out. Model Claim-Evidence-Response thinking out loud for students.</td>
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<tr>
<td>4-PS3.A.2; 4-PS3.B.1</td>
<td>Engage: Hook</td>
<td>½ Day</td>
<td>By the end of this lesson students should demonstrate how sound energy can be transferred from one place to another using cups and a string. Conclude with think, pair, share to reflect on new learning. Correct any new misconceptions during share. To shorten to ½ day, poke holes and tie knots prior to lesson.</td>
</tr>
<tr>
<td>4-PS3.A.2; 4-PS3.B.1 (CC Energy)</td>
<td>Explore: Scientific Investigation</td>
<td>1-2 Days</td>
<td>By the end of this lesson students should demonstrate how energy works by using batteries to make a light bulb light up and a buzzer sound. See STEMcoach within lesson guide for tips. Use Master Materials List to verify which materials are present or need to be obtained. Options for taking 2 days (based on time): Part 1 = Day 1 and Part 2 = Day 2. Save just the discuss step for Day 2. * CC: Students should be able to explain how energy was transferred that caused the buzzer and light bulb to work.</td>
</tr>
<tr>
<td>4-PS3.A.2; 4-PS3.B.1 (CC Energy)</td>
<td>Explore: Science Investigation</td>
<td>2-3 Days</td>
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<td></td>
<td>● See STEMcoach within lesson guide for tips.</td>
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<td></td>
<td>● Use Master Materials List to verify which materials are present or need to be obtained.</td>
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<td></td>
<td>● Options for multiple days (based on time):</td>
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<tr>
<td></td>
<td>○ Part 1 = Day 1 and Part 2 = Day 2</td>
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<tr>
<td></td>
<td>○ Day 1 = Design; Day 2 = Experiment; Day 3 = Reflect and Discuss</td>
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<td>● To shorten activity, reduce to two collision designs.</td>
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<td>● Discuss/model proper measurement and data collection with data table.</td>
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<td></td>
<td>● Additional support found in lesson guide under ELL Strategy and Intervention Strategies.</td>
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<td></td>
<td>● CC: Students should be able to explain how energy was transferred when the cars collided.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>4-PS3.A.2; 4-PS3.B.1</th>
<th>Explain: STEMscopedia</th>
<th>1 Day</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>● Must Do</td>
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<td></td>
<td>● By the end of this lesson students should be able to connect the engage and explore to the content vocabulary.</td>
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<td></td>
<td>● Could be done whole group, individually, or small groups.</td>
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<td>● Could be printed in packets, booklets, or assigned digitally.</td>
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<td></td>
<td>● Optional homework in lesson guide to connect with energy transfers observed at home.</td>
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<tr>
<th>Elaborate: Teacher Choice</th>
<th>If time allows.</th>
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<tbody>
<tr>
<td></td>
<td>● Optional per teacher choice and student needs.</td>
</tr>
<tr>
<td></td>
<td>● By the end of these lessons students should connect science content to the real world.</td>
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<tr>
<td></td>
<td>● Elaborate activities could be taught through a science workshop model with centers.</td>
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<tr>
<td></td>
<td>● Consider opportunities to digitally connect with experts and</td>
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</tbody>
</table>
community members on topics related to this standard.
- Consider opportunities to explore current local and global issues related to this standard.

| 4-PS3.A.2; 4-PS3.B.1 | Evaluate: Argue: Claim-Evidence-Reasoning (CER); Multiple Choice and Open-Ended Response Assessment | 1 Day | • Model CER assessment (Must Do) with students to teach process. They could be copied or assigned digitally.  
• Performance Expectation Assessment Task (PEAT) can be completed as the Engaging Scenario or other unit-culminating activity. |

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**Topic 3: Chemical Processes**

**Suggested Length of Time:** about 8 days  
**Essential Questions (Student Wondering):**
- What happens to dry wood as it burns?  

**Enduring Understanding (Learning Objectives):**
- The student is expected to apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

**Standards Addressed**
- **Priority (Disciplinary Core Ideas):**
  - 4-PS3.D.1 Energy in Chemical Processes and Everyday Life: The expression “produce energy” typically refers to the conversion of stored energy into a desired form for practical use.
- **Supporting (CC & SEP):**
  - 4. PS3.D.3-5 Energy can be transferred in various ways and between objects.
  - Constructing Explanations and Designing Solutions → Apply Scientific Ideas: apply scientific ideas to solve design problems.

**Detailed Description/Instructions:**

<table>
<thead>
<tr>
<th>Standard/CC</th>
<th>5E Model</th>
<th>Suggested # of Days</th>
<th>Notes:</th>
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</thead>
</table>
|             |          |                     | • Watch Setup Video.  
|             |          |                     | • Read the Teacher Background |

Board Approved: June 7, 2018
• By the end of this lesson the students should be able to use their background knowledge to record in their journal which student correctly defined chemical processes. |
| 4-PS3.D.1  | Engage: Hook | ½ day | • By the end of this lesson students should be able to discuss different similarities between food and gasoline. |
| 4-PS3.D.1 (CC Energy) | Explore: Do 1: Activity | 1 Day | • Use master materials list to verify which materials are present or need to be obtained.  
• If students need more support, model one of the transportation cards as a class. You may also ask which fuels are renewable (food for horses, electricity for electric car)  
• Note ELL and Intervention Strategies at end of lesson  
• By the end of this lesson students should be able to analyze how energy is being converted in various forms of transportation.  
• CC: Students can give examples of sources of energy and how that energy converts into a form of transportation. |
• Consider how you will structure the
<table>
<thead>
<tr>
<th>Standard</th>
<th>Activity</th>
<th>Duration</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-PS3.D.1</td>
<td>Explain: STEMscopedia</td>
<td>1 Day</td>
<td>Must Do&lt;br&gt;By the end of this lesson students should be able to connect the engage and explore activities to the scope standard.</td>
</tr>
<tr>
<td>4-PS3.D.1</td>
<td>Elaborate: Teacher Choice</td>
<td>If time allows.</td>
<td>Additional Elaborate activities are optional per teacher choice and student needs.&lt;br&gt;Elaborate activities could be taught through a science workshop model with centers.&lt;br&gt;Recommendations: Career Connections, eScopedia, Interactive Practice&lt;br&gt;By the end of this lesson students should be able to connect the science content to the real world.&lt;br&gt;Consider opportunities to digitally connect with experts and community members on topics related to this standard.&lt;br&gt;Consider opportunities to explore current local and global issues related to this standard.</td>
</tr>
<tr>
<td>4-PS3.D.1</td>
<td>Evaluate: Assess</td>
<td>2 Day</td>
<td>CER (Must Do), Multiple Choice, and/or Open-Ended Response&lt;br&gt;Performance Expectation Assessment Task (PEAT) can be</td>
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<td>completed as the Engaging Scenario or other unit-culminating activity.</td>
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</table>
**Engaging Scenario**

An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.

**Information Technologies Performance Expectations Assessment Task**

In this task, students create an emergency signaling system and show how it interacts with the eye or ear.

Notes:
- Significant preparation is required. Please review prior to assessment.

**Rubric for Engaging Scenario:**
- Preview picture vocabulary to match the vocabulary terms with the associated lessons (teach vocabulary in context).
Unit 3: Physical Science Part 2

Subject: Science
Grade: 4th
Name of Unit: Physical Science
Time per Day: 30 Minutes Minimum
Length of Unit: 5 weeks - Fourth Quarter (22-23 days)
Overview of Unit: Students experience the science of non-living things through developing a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move, developing a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move and developing a model to describe that light reflecting from objects and entering the eye allows objects to be seen.

Topic 1: Motion of Waves

Suggested Length of Time: 5 days
Essential Questions (Student Wondering):
  ● What occurs when rocks are thrown into still water?
Enduring Understanding (Learning Objectives):
  ● The student is expected to develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
Standards Addressed
  Priority (Disciplinary Core Ideas):
    ● 4. PS4.A.1 Wave Properties: Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach.
  Supporting (CC & SEP):
    ● 4. PS4.A.3-5 Similarities and differences in patterns can be used to sort, classify, communicate, and analyze simple rates of change for natural phenomena and designed products.
    ● 4. PS4.A.3-5 Developing and Using Models → Develop a model: Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution.

Detailed Description/Instructions:
<table>
<thead>
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<th>Suggested # of Days</th>
<th>Notes:</th>
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</thead>
</table>
| 4.PS4.A.1 | Engage: Accessing Prior Knowledge | ½ day | • Note the Intervention strategy at end of the lesson.  
• By the end of this lesson students should be able to find the wrong sentences in the chart and make any changes needed to make them correct. |
| 4.PS4.A.1 | Engage: Hook | ½ day | • Note the ELL strategy at end of lesson; using the dowel may not be necessary for students to observe waves  
• By the end of this lesson students should be able to observe and discuss motion by working with a metal spring. |
| 4.PS4.A.1 (CC Similarities and Differences) | Explore: Do 1: Activity | 1 day | • Use Master Materials List to verify which materials are present or need to be obtained.  
• See STEMcoach (multiple) within lesson guide for tips.  
• By the end of this lesson students should be able to observe the movement of waves and water by dropping objects and causing waves.  
• CC: Similarities and differences are observed when dropping a penny, marble, and tennis ball into still water. |
| 4.PS4.A.1 (CC Similarities and Differences; Design a) | Explore: Do 2: Activity | 1 day | • See STEMcoach (multiple) within lesson guide for tips.  
• ELL strategy at end of lesson  
• By the end of this lesson students should be able to observe the |
## 4.PS4.A.1

<table>
<thead>
<tr>
<th>Activity</th>
<th>Duration</th>
<th>Additional Information</th>
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</table>
| **Explain:** STEMscopedia | 1 Day | Must Do  
By the end of this lesson students should be able to connect the engage and explore activities to the scope standard. |
| **Elaborate:** Teacher Choice | If Time Allows | Additional Elaborate activities are optional per teacher choice and student needs.  
Elaborate activities could be taught through a science workshop model with centers.  
By the end of this lesson students should be able to connect the science content to the real world.  
Consider opportunities to digitally connect with experts and community members on topics related to this standard.  
Consider opportunities to explore current local and global issues related to this standard. |
| **Evaluate:** Assess | 1 Day | CER (Must Do), Multiple Choice, and Open-Ended Response  
Performance Expectation Assessment Task (PEAT) can be completed as the Engaging Scenario or other unit-culminating activity. |

### Topic 2: Wavelength and Amplitude

**Suggested Length of Time:** 6-7 days  
**Essential Questions (Student Wondering):**  
- How can we predict where an earthquake will cause the most damage?
Enduring Understanding (Learning Objectives):
- The student is expected to develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.

Standards Addressed

Priority (Disciplinary Core Ideas):
- 4-PS4.A.2 Wave Properties: Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks).

Supporting (CC & SEP):
- Patterns → Similarities and Differences: Similarities and differences in patterns can be used to sort, classify, communicate, and analyze simple rates of change for natural phenomena and designed products.
- Developing and Using Models → Develop a Model: Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution.

Detailed Description/Instructions:

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</table>
| 4-PS4.A.2   | Engage: Accessing Prior Knowledge | ½ day | ● During this lesson students should use background knowledge to predict which wave provided the longest wavelength.  
● Note the ELL strategy at end of lesson. |
| 4-PS4.A.2   | Engage: Hook | ½ day | ● During this lesson students should explore the movement of waves.  
● Recommend to not use the rubber bands; have students “pop” with light taps of their hand.  
● Note the ELL strategy at end of the lesson. |
| 4-PS4.A.2   (CC Similarities and Differences) | Explore: Activity | 1 day | ● During this lesson students should explore the movement of waves.  
● See STEMcoach (multiple) within lesson guide for tips.  
● CC: There are similarities and differences in the motion and pattern of waves. |
<table>
<thead>
<tr>
<th>Standard</th>
<th>Lesson Title</th>
<th>Duration</th>
<th>Objectives</th>
</tr>
</thead>
</table>
| 4.PS4.A.2 | Explore: Engineering Solutions | 2-3 days | - By the end of this lesson students should collaborate with a team to solve a science problem.  
- By the end of this lesson students should measure waves from a simulated earthquake and then design a solution for buildings that are in areas prone to earthquakes.  
- Consider how you will review Expert Roles.  
- Consider Criteria and Constraints  
- Note the ELL strategy at end of the lesson.  
- CC: All seismic waves cause Earth’s crust to move, but the strength and effects may be different. |
| 4.PS4.A.2 | Explain: STEMscopedia | 1 Day | - By the end of this lesson students should be able to connect the engage and explore to content standards.  
- Must Do |
| 4.PS4.A.2 | Elaborate: Teacher Choice | If Time Allows | - By the end of this lesson students should be able to connect science content to the real world.  
- Additional Elaborate activities are optional per teacher choice and student needs.  
- Elaborate activities could be taught through a science workshop model with centers.  
- Consider opportunities to digitally connect with experts and community members on topics related to this standard.  
- Consider opportunities to explore current local and global issues related to this standard. |
| 4.PS4.A.2 | Evaluate: Assess | 1 Day | - CER (Must Do), Multiple Choice, and Open-Ended Response  
- Performance Expectation Assessment Task (PEAT) can be completed as the Engaging Scenario or other unit-culminating activity. |
**Topic 3: Light Reflection**

**Suggested Length of Time:** 11 days

**Essential Questions (Student Wondering):**
- What is needed for a vision chart to be seen?

**Enduring Understanding (Learning Objectives):**
- The student is expected to develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.

**Standards Addressed**

*Priority (Disciplinary Core Ideas):*
- 4-PS4.B.1 Electromagnetic Radiation: An object can be seen when light reflected from its surface enters the eyes.

*Supporting (CC & SEP):*
- Cause and Effect: Cause-and-effect relationships are routinely identified, tested, and used to explain change
- Developing and Using Models → Predict Phenomena: Develop and/or use models to describe and/or predict phenomena.

**Detailed Description/Instructions:**

<table>
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<tr>
<th>Standard/CC</th>
<th>5E Model:</th>
<th>Suggested # of Days</th>
<th>Notes</th>
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<tbody>
<tr>
<td>4-PS4.B.1</td>
<td>Engage: Accessing Prior Knowledge</td>
<td>½ day</td>
<td>By the end of this lesson students should be able to decide what recycled material would be better to prevent light from entering a window.</td>
</tr>
<tr>
<td>4-PS4.B.1</td>
<td>Engage: Hook</td>
<td>½ day</td>
<td>By the end of this lesson students should be able to observe and discuss how the placement of mirrors can change the appearance of objects.</td>
</tr>
<tr>
<td>4-PS4.B.1 (CC Cause &amp; Effect)</td>
<td>Explore: Do 1: Engineering Solutions</td>
<td>2 days</td>
<td>See STEMcoach (multiple) within lesson guide for tips. Consider how you will review</td>
</tr>
<tr>
<td>4-PS4.B.1 (CC Cause &amp; Effect)</td>
<td>Explore: Do 2: Activity</td>
<td>2 days</td>
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<tr>
<td>Expert Roles.</td>
<td>● Consider Criteria and Constraints</td>
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<td>● By the end of this lesson students should be able to use mirrors and their knowledge that light travels in a straight line to see an object hiding behind a wall.</td>
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<td>● CC: Light reflecting off of objects into the eye is what causes us to see the object.</td>
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<td>● Pre-cut the squares of wax paper, foil, and plastic wrap so that you have one of each type for each group.</td>
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<td>● See STEMcoach (multiple) within lesson guide for tips.</td>
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<td>● By the end of this lesson students should be able to observe and discuss how light transmitted through different mediums affects what they are able to see.</td>
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<td>● CC: The amount of light that travels through materials effects the visibility of an object on the other side.</td>
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<thead>
<tr>
<th>4-PS4.B.1 (CC Cause &amp; Effect)</th>
<th>Explore: Do 3: Engineering Solutions</th>
<th>3 days</th>
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<tbody>
<tr>
<td></td>
<td>● See STEMcoach (multiple) within lesson guide for tips.</td>
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<tr>
<td></td>
<td>● Consider how you will review Expert Roles.</td>
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<td></td>
<td>● Consider Criteria and Constraints</td>
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<td>● By the end of this lesson students should be able to create a model of the Earth, Moon, and Sun that shows how the reflecting of light on the Moon creates the phases we see on Earth.</td>
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<td></td>
<td>● CC: The sun’s light reflected off the moon causes us to see the phases of the moon.</td>
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<thead>
<tr>
<th>4-PS4.B.1</th>
<th>Explain: STEMscopedia</th>
<th>1 Day</th>
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<tbody>
<tr>
<td></td>
<td>● Must Do</td>
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<tr>
<td></td>
<td>● By the end of this lesson students should be able to connect the engage and explore to content</td>
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</table>
Elaborate: Teacher Choice

If Time Allows

1. Additional Elaborate activities are optional per teacher choice and student needs.
2. Elaborate activities could be taught through a science workshop model with centers.
3. By the end of this lesson students should be able to connect the engage and explore to the real world.
4. Consider opportunities to digitally connect with experts and community members on topics related to this standard.
5. Consider opportunities to explore current local and global issues related to this standard.

Evaluate: Assess 2 Day

1. CER (Must Do), Multiple Choice, and Open-Ended Response
2. Performance Expectation Assessment Task (PEAT) can be completed as the Engaging Scenario or other unit-culminating activity.

Engaging Scenario

Engaging Scenario (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

Information Technologies Performance Expectations Assessment Task
In this task, students create an emergency signaling system and show how it interacts with the eye or ear.

Notes:
- Significant preparation is required. Please review prior to assessment.
Rubric for Engaging Scenario:

Use the rubric provided in the Information Technologies Performance Expectation Assessment Task.
Unit 4: Life Sciences

Subject: Science  
Grade: 4th  
Name of Unit: Life Sciences  
Length of Unit: 2-3 weeks - Fourth Quarter (12 days)  

Overview of Unit: Students experience the sciences that deal with living organisms and life processes through constructing an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction, using 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.

Topic 1: Plant and Animal Parts

Suggested Length of Time: 6 days  
Essential Questions (Student Wondering):
  ● How do gills help a fish to survive?  

Enduring Understanding (Learning Objectives):
  ● The student is expected to construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Standards Addressed
  Priority (Disciplinary Core Ideas):
    ● 4-LS1.A.1 Structure and Function: Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.  
    ● 5-LS1.A.1 Compare and contrast the major organs/organ systems that perform similar functions for animals belonging to different vertebrates classes.

Supporting (CC & SEP):
  ● Systems and System Models → System Description: A system can be described in terms of its components and their interactions.  
  ● Engaging in Argument from Evidence → Construct and/or support an argument with evidence, data, and/or a model.

Detailed Description/Instructions:
<table>
<thead>
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<th>Suggested # of Days</th>
<th>Notes</th>
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</thead>
</table>
| 4-LS1.A.1  | Engage: Accessing Prior Knowledge | ½ day | • Watch Setup Video.  
• Prepare for the unit by purchasing plants, celery stalk and fruit.  
• Preview picture vocabulary to match the vocabulary terms with the associated lessons (teach vocabulary in context).  
• During this lesson students should use background knowledge to predict how adaptations help plants and animals meet their basic needs. |
| 4-LS1.A.1  | Engage: Hook | ½ day | • By the end of this lesson students should describe characteristics of an organism and how it gets food.  
• Be sure to have the organism names written on class prior to lesson. |
| 4-LS1.A.1  | Explore: Activity | 1 day | • By the end of this lesson students should design a bird that would live near a large body of water, like a bay, lake, or ocean.  
• Adjust the description of the Water Birds Activity to, “Design a vertebrate.”  
• Provide students with a flow chart or information with the characteristics of each vertebrate class.  
[http://www.slideshare.net/Rainberry/chart-vertebrates](http://www.slideshare.net/Rainberry/chart-vertebrates)  
• CC: The parts of a bird make it able to live near water. |
| 4-LS1.A.1  | Explore: Activity | 1 day | • Materials to collect prior to lesson, plant in dirt, celery with leaves, fruit with internal seeds  
• CC: Describe or diagram how components of plants work together. |
| 4-LS1.A.1  | Explain: STEMscopedia | 1 Day | • Must Do  
• By the end of this lesson students should be able to connect the engage and explore to content.
Standards Addressed
- In the section, What Do You Think? Under the category “Which item does not belong?” add categories concerning vertebrate structures

<table>
<thead>
<tr>
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<th>Elaborate: Teacher Choice</th>
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</tr>
</thead>
<tbody>
<tr>
<td>● Elaborate: Teacher Choice</td>
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</tr>
<tr>
<td>● By the end of this lesson students should be able to connect the engage and explore to the real world.</td>
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<tr>
<td>● Additional Elaborate activities are optional per teacher choice and student needs.</td>
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<td>● Elaborate activities could be taught through a science workshop model with centers.</td>
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<td>● Consider opportunities to digitally connect with experts and community members on topics related to this standard.</td>
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<td>● Consider opportunities to explore current local and global issues related to this standard.</td>
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<th>Evaluate: Assess</th>
<th>1 Day</th>
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</thead>
<tbody>
<tr>
<td>● CER (Must Do), Multiple Choice, and Open-Ended Response</td>
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<tr>
<td>● Performance Expectation Assessment Task (PEAT) can be completed as the Engaging Scenario or other unit-culminating activity.</td>
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**Topic 2: Sense Receptors**

**Suggested Length of Time:** 6 days

**Essential Questions (Student Wondering):**
- How can animals use their senses for hunting?

**Enduring Understanding (Learning Objectives):**
- The student is expected to 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.

**Standards Addressed**

*Priority (Disciplinary Core Ideas):*
- 4. LS1.D.1 Information Processing: Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal’s
brain. Animals are able to use their perceptions and memories to guide their actions.

Supporting (CC & SEP):
- Systems and System Models → System Description: A system can be described in terms of its components and their interactions.
- Developing and Using Models → Use of Models: Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system.

Detailed Description/Instructions:

<table>
<thead>
<tr>
<th>Standard/ CC</th>
<th>5E Model:</th>
<th>Suggested # of Days</th>
<th>Notes</th>
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</table>
Prepare for the unit by requesting empty toilet paper rolls and water bottles.  
Preview picture vocabulary to match the vocabulary terms with the associated lessons (teach vocabulary in context).  
During this lesson students should use background knowledge to predict which sense would be the most important if they were a bat.  
By the end of this lesson students should be able to |
| 4.LS1.D.1    | Engage: Hook | ½ day | During this lesson student will explore how people react to smell differently.  
Prepare film canisters prior to lesson |
| 4.LS1.D.1    | Explore: Scientific Investigation | 1 day | By the end of this lesson students should be able to describe how different forms of communication help animals survive.  
See STEMcoach within lesson guide for tips.  
Read Procedures and Facilitation Points.  
CC: A decrease in the number of meerkats would have an effect on the ecosystem. |
| 4.LS1.D.1    | Explore: Engineering Solutions | 1 day | By the end of this lesson students should be able to describe different ways animals can sense and respond to |
danger.

- Providing the Sensing Danger rubric to highlight enduring understandings of this Engineering Solution.
- CC: An animal’s sense receptors, perceptions, and memories cause it to respond to dangers in a particular way.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Activity</th>
<th>Duration</th>
<th>Details</th>
</tr>
</thead>
</table>
| 4.LS1.D.1  | Explain: STEMscopedia             | 1 Day    | By the end of this lesson students should connect the engage and explore activities to science standards.  
- Must Do  
- In the section, What Do You Think? Under the category “Which item does not belong?” add categories concerning vertebrate structures. |
| 4.LS1.D.1  | Elaborate: Teacher Choice         | If time allows | By the end of the lesson students should be able to connect science standards to the real world.  
- Additional Elaborate activities are optional per teacher choice and student needs.  
- Elaborate activities could be taught through a science workshop model with centers.  
- Consider opportunities to digitally connect with experts and community members on topics related to this standard.  
- Consider opportunities to explore current local and global issues related to this standard. |
| 4.LS1.D.1  | Evaluate: Assess                  | 2 Day    | CER (Must Do), Multiple Choice, and Open-Ended Response  
- Performance Expectation Assessment Task (PEAT) can be completed as the Engaging Scenario or other unit-culminating activity. |
Engaging Scenario

**Engaging Scenario** (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

**Sense Receptors Performance Expectation Assessment Task**
Students pick an animal, choose one structure that helps it sense (whiskers on a cat, nose on a dog, ears on a bear, etc.), and construct an argument about how that structure supports the animal’s survival and growth. Using that sense, students create a flowchart showing how the animal responds when that sense is triggered.

**Rubric for Engaging Scenario:**
Use the rubric provided in the Sense Receptors Performance Expectation Assessment Task.