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:

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<td><strong>Life Science</strong></td>
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<td>• Topic 1: Plant and Animal Parts</td>
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<td>• Topic 2: Sense Receptors</td>
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<td><strong>Earth and Space Science</strong></td>
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<td>• Topic 1: Rock Patterns</td>
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<td>• Topic 2: Changing Land</td>
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<td>• Topic 3: Plants’ Effect on Regions</td>
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<tr>
<td>• Topic 4: Plate Tectonics</td>
<td>6 weeks</td>
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</tbody>
</table>
Unit 1: Physical Science Part 1

Subject: Science
Grade: 4th
Name of Unit: Physical Science
Time per Day: 30 Minutes (approximately)
Length of Unit: 9 weeks - First Semester (42 - 65 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: 6-14 Days

Essential Questions (Student Wondering):
- What causes things to move faster or slower?

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:
- 4-PS3.A.1 Definitions of Energy: The faster a given object is moving, the more energy it possesses.

Supporting:
- Energy: Energy can be transferred in various ways and between objects.
- 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>
<th>Standard</th>
<th>5E Model</th>
<th>Suggested # of Days</th>
<th>Notes:</th>
</tr>
</thead>
</table>
| P-PS.3.A.1    | Engage: Assess Prior Knowledge | ½ Day               | • During this lesson students should use background knowledge to predict what will happen to the speed of an object if the energy acting on the object is increased.  
• Teaching Tips: 3-Corners, Turn and Talk |
| 4-PS.3.A.1    | Engage: Hook           | ½ Day               | • By the end of this lesson students should determine in which trial they used the most and least amount of energy. |
| 4-PS.3.A.1    | Explore: Scientific Investigation | 1 Day               | • By the end of this lesson students should that the amount of energy changes depending on the amount of energy transferred into a system.  
• This will be students’ first experience with CER. Spend time facilitating conversations when completing. |
| 4-PS.3.A.1    | Explore: Problem Based Learning (PBL) | 3-6 Days            | • 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. |

- Read the Teacher Background section (located under “Home”)
- Watch Setup Video
- Read Common Misconceptions
- Consider how you will structure science labs and journals. When moving through the first Scope take time to teach these components.
- Consider how vocabulary will be recorded. One way to do this is provide a lotus with important vocabulary for students to add to throughout the Scope.
| 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  
• 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.  
• Decided if students will complete the “Try Now”.
| Explain: Picture Vocabulary | ½ Day | • May Do  
• If you chose to track vocabulary with the lotus, this day may be skipped.  
• There’s a flash card option and slideshow option.  
• By the end of the lesson students should be able to connect the engage and explore to content vocabulary.
| Explain/Elaborate: Teacher Choice | 1-2 Days | • By the end of this lesson students should connect science content to the real world.  
• May do per teacher choice and student needs.  
• Recommendation: Career Connection  
• Expand 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) | 1 Day | • Model this assessment with students to teach process.
| 4-PS.3.A.1 | Evaluate: Multiple | 1 Day | • Combine as one assessment. They
Choice and Open-Ended Response Assessment could be copied or assigned digitally.
- Performance Expectation Assessment Task (PEAT) completed after Chemical Processes scope.

### Topic 2: Transfer of Energy in Collision

#### Suggested Length of Time: 8-12 Days

#### Essential Questions (Student Wondering):
- When there is a car pile-up caused by a series of cars that rear-end one another, what happens to the energy of the car that started the accident?

#### 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:**
- 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:**
- 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).
- 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>
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</table>
| 4-PS3.A.2   | **Engage:** Accessing Prior Knowledge (APK) | ½ Day               | • 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. |
| 4-PS3.B.1   |                                   |                     |                                                                      |
| 4-PS3.A.2;  | **Engage:** Hook                  | ½ Day               | • 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. |
| 4-PS3.B.1   |                                   |                     |                                                                      |
| 4-PS3.A.2;  | **Explore:** Scientific Investigation | 1-2 Days         | • 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 = |
<table>
<thead>
<tr>
<th>Activity</th>
<th>Duration</th>
<th>Notes</th>
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</table>
| **4-PS3.A.2; 4-PS3.B.1** Explore: Science Investigation | 2-3 Days  | - See STEMcoach within lesson guide for tips.  
- Use Master Materials List to verify which materials are present or need to be obtained.  
- Options for multiple days (based on time):  
  - Part 1 = Day 1 and Part 2 = Day 2  
  - Day 1 = Design; Day 2 = Experiment; Day 3 = Reflect and Discuss  
- To shorten activity, reduce to two collision designs.  
- Discuss/model proper measurement and data collection with data table.  
- Additional support found in lesson guide under ELL Strategy and Intervention Strategies. |
| **4-PS3.A.2; 4-PS3.B.1** Explain: STEMscopedia | 1 Day     | - Must Do  
- By the end of this lesson students should be able to connect the engage and explore to the content vocabulary.  
- Could be done whole group, individually, or small groups.  
- Could be printed or assigned digitally.  
- Optional homework in lesson guide to connect with energy transfers observed at home. |
| Explain: Picture Vocabulary                   | ½ Day     | - May Do  
- By the end of this lesson students should be able to connect the engage and explore vocabulary to content vocabulary.  
- There’s a flash card option and slideshow option. |
<p>| Elaborate: Teacher                            | 1-2 Days  | - May Do optional per teacher choice |</p>
<table>
<thead>
<tr>
<th>Choice and student needs.</th>
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</thead>
<tbody>
<tr>
<td>By the end of these lessons students should connect science content to the real world.</td>
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<tr>
<td>Expand activities could be taught through a science workshop model with centers.</td>
</tr>
<tr>
<td>Consider opportunities to digitally connect with experts and community members on topics related to this standard.</td>
</tr>
<tr>
<td>Consider opportunities to explore current local and global issues related to this standard.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>4-PS3.A.2; 4-PS3.B.1</th>
<th>Evaluate: Argue: Claim-Evidence-Reasoning (CER)</th>
<th>1 Day</th>
<th>● Model this assessment with students to teach process.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-PS3.A.2; 4-PS3.B.1</td>
<td>Evaluate: Multiple Choice and Open-Ended Response Assessment</td>
<td>1 Day</td>
<td>● Combine as one assessment. They could be copied or assigned digitally.</td>
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<td>● Performance Expectation Assessment Task (PEAT) completed after Chemical Processes Module.</td>
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</tbody>
</table>

### Topic 3: Chemical Processes

**Suggested Length of Time:** 8-10 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:**  
- 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:**  
- 4. PS3.D.3-5 Energy can be transferred in various ways and between objects.
### Detailed Description/Instructions:

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<tr>
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</table>
| 4-PS3.D.1 | Engage: Accessing Prior Knowledge | ½ day | • Notes: Watch Setup Video  
• Read the Teacher Background section  
• Recommend projecting the page onto your screen. Could use “Corners” activity here.  
• 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 | Explore: Do 1: Activity | 1 Day | • Use master materials list to verify which materials are present or need to be obtained.  
• 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. |
• Consider how you will structure the present opportunity (just kids? parents invited?)  
• By the end of this lesson students should be able to design a booth that has many examples of electrical energy being converted to other forms of energy. |
| 4-PS3.D.1 | 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. |
<table>
<thead>
<tr>
<th>Standard</th>
<th>Activity</th>
<th>Duration</th>
<th>Details</th>
</tr>
</thead>
</table>
| 4-PS3.D.1  | Explain: Picture Vocabulary     | ½ Day    | • May Do  
• By the end of this lesson students should be able to connect the engage and explore activities to the vocabulary.                  |
| 4-PS3.D.1  | Elaborate: Teacher Choice       | 1- 2 Days| • May Do  
• Additional Expand activities are optional per teacher choice and student needs.  
• Expand activities could be taught through a science workshop model with centers.  
• Recommendations: Career Connections, eScopedia, Interactive Practice  
• 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. |
| 4-PS3.D.1  | Evaluate: Assess                | 2 Day    | • CRE, Multiple Choice, and Open-Ended Response  
• Performance Expectation Assessment Task (PEAT) completed as the Engaging Scenario. |

Board Approved 3/30/17
**Engaging Scenario**

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

**Chemical Process Performance Expectation Assessment Task**

In this task, students model an asteroid hitting a rocket in space. Students design and build a warning system for their rockets.

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

**Rubric for Engaging Scenario:**

Use the rubric provided in the Chemical Process Performance Expectation Assessment Task.
Unit 2: Physical Science Part 2

Subject: Science
Grade: 4th
Name of Unit: Physical Science
Time per Day: 30 Minutes Minimum
Length of Unit: 6 weeks - First Semester (26 - 31 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: 7-9 days
Essential Questions (Student Wondering):
- How can you make waves, like the ocean waves, in a bathtub of 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:
- 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:
- 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 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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<th>Suggested # of Days</th>
<th>Notes:</th>
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</thead>
</table>
| 4.PS4.A.1 | Engage: Accessing Prior Knowledge | ½ day | Notes: Watch Setup Video  
Read the Teacher Background section |
|          |          |                     | Note the Intervention strategy at end of the lesson. |
| 4.PS4.A.1 | Engage: Hook | ½ day | • 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.  
  
  - 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 | 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.  
  
4.PS4.A.1 | 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 movement of waves in the deep ocean and near the beach.  
  
4.PS4.A.1 | Explain: STEMs Scoped  
  
  STEMs  
  
  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.  
  
4.PS4.A.1 | Explain: Picture Vocabulary | ½ Day | • May Do  
  - By the end of this lesson students should be able to connect the engage and explore activities to the vocabulary.  
  
4.PS4.A.1 | Elaborate: Teacher | 1-2 Days | • May Do |
| Choice |  | • Additional Expand activities are optional per teacher choice and student needs.  
• Expand 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. |
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<tbody>
<tr>
<td>4.PS4.A.1</td>
<td>Evaluate: Assess</td>
<td>1 Day</td>
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</tbody>
</table>
|  | • CRE, Multiple Choice, and Open-Ended Response  
• Performance Expectation Assessment Task (PEAT) completed after Light Reflection Scope. |

**Topic 2: Wavelength and Amplitude**

**Suggested Length of Time:** 8-9 days

**Essential Questions (Student Wondering):**
- How can you tell the difference between red and green lights by only looking at its wavelength?

**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:**
- 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:**
- 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.
- 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 | Explore: Activity           | 1 day               | ● During this lesson students should explore the movement of waves.  
● See STEMcoach (multiple) within lesson guide for tips. |
| 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. |
| 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 | Explain: Picture Vocabulary | ½ Day               | ● By the end of this lesson students should be able to connect the engage    |
and explore to convert vocabulary.
  ● May Do

| 4.PS4.A.2 | Elaborate: Teacher Choice | 1-2 Days | ● By the end of this lesson students should be able to connect science content to the real world.  
  ● May Do  
  ● Additional Expand activities are optional per teacher choice and student needs.  
  ● Expand 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 | ● CRE, Multiple Choice, and Open-Ended Response  
  ● Performance Expectation Assessment Task (PEAT) completed after Light Reflection Scope. |
Topic 3: Light Reflection

Suggested Length of Time: 11-13 days

Essential Questions (Student Wondering):
- What causes light 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:
- 4-PS4.B.1 Electromagnetic Radiation: An object can be seen when light reflected from its surface enters the eyes.

Supporting:
- Cause and Effect: Cause-and-effect relationships are routinely identified, tested, and used to explain change
- Predict Phenomena: Develop and/or use models to describe and/or predict phenomena.

Detailed Description/Instructions:

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</thead>
<tbody>
<tr>
<td>4-PS4.B.1</td>
<td>Engage: Accessing Prior Knowledge</td>
<td>½ day</td>
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<td>Prepare for the unit by requesting empty toilet paper rolls, empty paper towel rolls, and empty water bottles.</td>
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<tr>
<td>4-PS4.B.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 decide what recycled material would be better to prevent light from entering a window.</td>
</tr>
<tr>
<td>4-PS4.B.1</td>
<td>Explore: Do 1: Engineering Solutions</td>
<td>2 days</td>
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<td>See STEMcoach (multiple) within lesson guide for tips.</td>
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<td>Consider how you will review Expert Roles.</td>
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<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</td>
</tr>
</tbody>
</table>
hiding behind a wall.

| 4-PS4.B.1 | Explore: Do 2: Activity | 2 days | Pre-cut the squares of wax paper, foil, and plastic wrap so that you have one of each type for each group.  
See STEMcoach (multiple) within lesson guide for tips.  
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. |
| 4-PS4.B.1 | Explore: Do 3: Engineering Solutions | 3 days | See STEMcoach (multiple) within lesson guide for tips.  
Consider how you will review Expert Roles.  
Consider Criteria and Constraints  
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. |
| 4-PS4.B.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. |
| 4-PS4.B.1 | Explain: Picture Vocabulary | ½ Day | May Do  
By the end of this lesson students should be able to connect the engage and explore to vocabulary. |
| 4-PS4.B.1 | Elaborate: Teacher Choice | 1-2 Days | May Do  
Additional Expand activities are optional per teacher choice and student needs.  
Expand activities could be taught through a science workshop model with centers.  
By the end of this lesson students should be able to connect the engage and explore to the real }
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.

<table>
<thead>
<tr>
<th>4-PS4.B.1</th>
<th>Evaluate: Assess</th>
<th>2 Day</th>
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</table>

- CRE, Multiple Choice, and Open-Ended Response
- Performance Expectation Assessment Task (PEAT) completed as engaging scenario.

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 3: Life Sciences

Subject: Science  
Grade: 4th  
Name of Unit: Life Sciences  
Length of Unit: 3 weeks - Second Semester (14 - 16 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: 7-8 days  
Essential Questions (Student Wondering):
  - What are the similarities and differences between the parts of plants and animals?  
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:
  - 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:
  - A system can be described in terms of its components and their interactions.  
  - Construct and/or support an argument with evidence, data, and/or a model.

Detailed Description/Instructions:

<table>
<thead>
<tr>
<th>Standard</th>
<th>5E Model:</th>
<th>Suggested # of Days</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-LS1.A.1</td>
<td>Engage: Accessing Prior Knowledge</td>
<td>½ day</td>
<td>• Prepare for the unit by purchasing plants, celery stalk and fruit</td>
</tr>
<tr>
<td>4-LS1.A.1</td>
<td>Engage: Hook</td>
<td>½ day</td>
<td>• During this lesson students should use background knowledge to predict how adaptations help plants and animals meet their basic needs.</td>
</tr>
<tr>
<td>4-LS1.A.1</td>
<td>Engage: Hook</td>
<td>½ day</td>
<td>• By the end of this lesson students</td>
</tr>
<tr>
<td>Standard</td>
<td>Activity Type</td>
<td>Time</td>
<td>Description</td>
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</tbody>
</table>
| 4-LS1.A.1 5-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/Rainberrie/chart-vertebrates](http://www.slideshare.net/Rainberrie/chart-vertebrates) |
| 4-LS1.A.1 | Explore: Activity | 1 day | - Materials to collect prior to lesson, plant in dirt, celery with leaves, fruit with internal seeds |
| 4-LS1.A.1 5-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.  
- In the section, What Do You Think? Under the category “Which item does not belong?” add categories concerning vertebrate structures |
| 4-LS1.A.1 | Explain: Picture Vocabulary | ½ Day | - May Do  
- By the end of this lesson students should be able to connect the engage and explore to vocabulary. |
| 4-LS1.A.1 | Elaborate: Teacher Choice | 1- 2 Days | - May Do  
- By the end of this lesson students should be able to connect the engage and explore to the real world.  
- Additional Expand activities are optional per teacher choice and student needs.  
- Expand 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.

<table>
<thead>
<tr>
<th></th>
<th>Evaluate: Assess</th>
<th>1 Day</th>
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</thead>
</table>
| 4-LS1.A.1 | CRE, Multiple Choice, and Open-Ended Response | Performance Expectation Assessment Task (PEAT) will be completed after Sense Receptors Scope.

## Topic 2: Sense Receptors

**Suggested Length of Time:** 7-8 days

**Essential Questions (Student Wondering):**
  ● How are a porcupine’s quills related to its five senses?

**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:**
  ● 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:**
  ● A system can be described in terms of its components and their interactions.
  ● Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system.
### Detailed Description/Instructions:

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<thead>
<tr>
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<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>4.LS1.D.1</td>
<td>Engage: Accessing Prior Knowledge</td>
<td>½ day</td>
<td>● Prepare for the unit by requesting empty toilet paper rolls and water bottles. ● 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</td>
</tr>
<tr>
<td>4.LS1.D.1</td>
<td>Engage: Hook</td>
<td>½ day</td>
<td>● During this lesson student will explore how people react to smell differently. ● Prepare film canisters prior to lesson</td>
</tr>
<tr>
<td>4.LS1.D.1</td>
<td>Explore: Scientific Investigation</td>
<td>1 day</td>
<td>● 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.</td>
</tr>
<tr>
<td>4.LS1.D.1</td>
<td>Explore: Engineering Solutions</td>
<td>1 day</td>
<td>● 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.</td>
</tr>
<tr>
<td>4.LS1.D.1</td>
<td>Explain: STEMscopedia</td>
<td>1 Day</td>
<td>● 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</td>
</tr>
<tr>
<td>4.LS1.D.1</td>
<td>Explain: Picture Vocabulary</td>
<td>½ Day</td>
<td>● By the end of this lesson students should connect the engage and explore activities to content vocabulary.</td>
</tr>
<tr>
<td>4.LS1.D.1</td>
<td>Elaborate: Teacher Choice</td>
<td>1-2 Days</td>
<td>May Do</td>
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<td>● By the end of the lesson students should be able to connect science standards to the real world.</td>
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<td>● May Do</td>
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<td>● Additional Expand activities are optional per teacher choice and student needs.</td>
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<td>● Expand 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></td>
<td>● Consider opportunities to explore current local and global issues related to this standard.</td>
</tr>
<tr>
<td>4.LS1.D.1</td>
<td>Evaluate: Assess</td>
<td>2 Day</td>
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<td></td>
<td></td>
<td></td>
<td>● CRE, Multiple Choice, and Open-Ended Response</td>
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<td></td>
<td>● Performance Expectation Assessment Task (PEAT) will be completed as the Engaging Scenario.</td>
</tr>
</tbody>
</table>

**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.
**Unit 4: Earth and Space Science**

**Subject:** Science  
**Grade:** 4th  
**Name of Unit:** Earth and Space Science  
**Length of Unit:** 6 weeks - Second Semester (36 - 43 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:** 7-8 days  
**Essential Questions (Student Wondering):**  
- How can geologists discover and understand changes in the Earth’s surface over time?  
**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:**  
- 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:**  
- Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.  
- Patterns can be used as evidence to support an explanation.

**Detailed Description/Instructions:**

<table>
<thead>
<tr>
<th>Standard</th>
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</tr>
</thead>
<tbody>
<tr>
<td>4-ESS1.C.1</td>
<td>Engage: Accessing Prior Knowledge</td>
<td>½ Day</td>
<td>Prepare for the unit by purchasing orange juice, carbonated soft drink, cocoa powder, orange sprinkles, pretzels, and puffed rice cereal. By the end of this lesson students should be able to think about and share what causes landscapes to change.</td>
</tr>
<tr>
<td>4-ESS1.C.1</td>
<td>Engage: Hook</td>
<td>½ Day</td>
<td>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.</td>
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</tr>
<tr>
<td>4-ESS1.C.1</td>
<td>Explore: Do 1: Activity</td>
<td>1 Day</td>
<td>Consider teacher modeling rather than students in groups. 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.</td>
</tr>
<tr>
<td>4-ESS1.C.1</td>
<td>Explore: Do 2: Activity</td>
<td>1 Day</td>
<td>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.</td>
</tr>
<tr>
<td>4-ESS1.C.1</td>
<td>Explain: STEMscopedia</td>
<td>1 Day</td>
<td>Must Do By the end of this lesson students should connect the engage and explore activities to science standards.</td>
</tr>
<tr>
<td>4-ESS1.C.1</td>
<td>Explain: Picture Vocabulary</td>
<td>½ Day</td>
<td>May Do By the end of this lesson students should connect the engage and explore activities to vocabulary.</td>
</tr>
<tr>
<td>4-ESS1.C.1</td>
<td>Elaborate: Teacher Choice</td>
<td>1-2 Days</td>
<td>May Do Additional Expand activities are optional per teacher choice and student needs. Expand 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...</td>
</tr>
</tbody>
</table>
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 | CRE, Multiple Choice, and Open-Ended Response
|            |                |       | Performance Expectation Assessment Task (PEAT) will be completed after Plate Tectonics. |

**Topic 2: Changing Land**

**Suggested Length of Time:** 14-16 days

**Essential Questions (Student Wondering):**
- How can rain change the shape of a mountain?

**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:*
- 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:*
- 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.
- Cause and effect relationships are routinely identified, tested, and used to explain change

**Detailed Description/Instructions:**

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<tbody>
<tr>
<td>4-ESS.2.A.1</td>
<td>Engage: Accessing Prior Knowledge</td>
<td>½ day</td>
<td>During this lesson students should use background knowledge to predict why some rocks are different from others.</td>
</tr>
<tr>
<td>4-ESS.2.A.1</td>
<td>Engage: Hook</td>
<td>½ day</td>
<td>By the end of this lesson students should be able to compare the breakdown of objects based on</td>
</tr>
</tbody>
</table>
| 4-ESS2-1 | 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* |
|----------|------------------|--------|---------------------------------------------------------------|
| 4-ESS2-1 | Explore: Activity | 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. |
| 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 |
| 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 | Explain: Picture Vocabulary | ½ Day | • May Do  
• By the end of this lesson students should connect the engage and explore activities to vocabulary. |
| 4-ESS.2.A.1 | Elaborate: Teacher Choice | 1-2 Days | • May Do  
• By the end of this lesson students should connect the engage and explore activities to the real world.  
• Additional Expand activities are optional per teacher choice and student needs.  
• Expand 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.

<table>
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<tbody>
<tr>
<td>4-ESS.2.A.1</td>
<td>Evaluate: Assess</td>
<td>1 Day</td>
<td>- CRE, Multiple Choice, and Open-Ended Response</td>
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<td>- Performance Expectation Assessment Task (PEAT) will be completed after Plate Tectonics.</td>
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</tbody>
</table>

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

**Suggested Length of Time:** 6-9 days

**Essential Questions (Student Wondering):**
- Why do different regions of the U.S. look different?

**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:*
- 4-ESS2.E.1 Biogeology: Living things affect the physical characteristics of their regions.

*Supporting:*
- Cause and Effect: Cause-and-effect relationships are routinely identified, tested, and used to explain change.
- 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:**

<table>
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</thead>
<tbody>
<tr>
<td>4-ESS2.E.1</td>
<td>Engage: Accessing Prior Knowledge</td>
<td>½ day</td>
<td>- During this lesson students should use background knowledge to predict which plant from a given list has a greater effect on earth.</td>
</tr>
<tr>
<td>4-ESS2.E.1</td>
<td>Engage: Hook</td>
<td>½ day</td>
<td>- By the end of this lesson students should be able to discuss how...</td>
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<tr>
<td>Standard</td>
<td>Activity Type</td>
<td>Duration</td>
<td>Description</td>
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<tr>
<td>4-ESS2.E.1</td>
<td>Explore: Activity</td>
<td>1 day</td>
<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>
</tr>
</tbody>
</table>
| 4-ESS2.E.1       | Explore: Engineering Solutions | 2 Day    | By the end of this lesson students should be able to explain how an invasive species can change the physical characteristic of its region.  
Day 1: Create  
Day 2: Present |
| 4-ESS2.E.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-ESS2.E.1       | Explain: Picture Vocabulary | ½ Day    | May Do  
By the end of this lesson students should connect the engage and explore activities to vocabulary. |
| 4-ESS2.E.1       | Elaborate: Teacher Choice  | 1- 2 Days| May Do  
By the end of this lesson students should connect the engage and explore activities to the real world.  
Additional Expand activities are optional per teacher choice and student needs.  
Expand 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. |
EVALUATE: Assess 1 Day

- CRE, Multiple Choice, and Open-Ended Response
- Performance Expectation Assessment Task (PEAT) will be completed after Plate Tectonics.

### Topic 4: Plate Tectonics

**Suggested Length of Time:** 9-10 days

**Essential Questions (Student Wondering):**
- How can we as scientists predict where an earthquake might occur?

**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:*
- 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:*
- Evidence: Patterns can be used as evidence to support an explanation.
- Analyze and Interpret Data: Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.

**Detailed Description/Instructions:**

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<tbody>
<tr>
<td>4.ESS2.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 think about and share the continents and about which student statement they agree with the most.</td>
</tr>
<tr>
<td>4.ESS2.B.1</td>
<td>Engage: Hook</td>
<td>½ day</td>
<td>By the end of this lesson students should be able to observe, compare, and describe landforms shown on a map.</td>
</tr>
<tr>
<td>4.ESS2.B.1</td>
<td>Explore: Do 1: Activity</td>
<td>1 day</td>
<td>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.</td>
</tr>
</tbody>
</table>
| 4.ESS2.B.1 | Explore: Engineering Solutions | 3 days | • Claim-Explain-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. |
| 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. |
| 4.ESS2.B.1 | Explain: Picture Vocabulary | ½ Day | • May Do  
• By the end of this lesson students should connect the engage and explore activities to vocabulary. |
| 4.ESS2.B.1 | Elaborate: Teacher Choice | 1-2 Days | • May Do  
• Additional Expand activities are optional per teacher choice and student needs.  
• Expand 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. |
| 4.ESS2.B.1 | Evaluate: Assess | 2 Days | • CRE, Multiple Choice, and Open-Ended Response  
• Performance Expectation Assessment Task (PEAT) will be completed as the Engaging Scenario. |
Engaging Scenario

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

Plate Tectonics Expectation Assessment Task
Changes Over Time to Earth’s Surface

In this task, students analyze Paleozoic earth to locate geographical features, analyze changes to a mountain, and interpret a fossil core sample.

Rubric for Engaging Scenario:
Use the rubric provided in the Plate Tectonics Expectation Assessment Task.