



Washington Township School District



The mission of the Washington Township Public Schools is to provide a safe educational environment for all students to attain the skills and knowledge specified in the New Jersey Student Learning Standards at all grade levels so as to ensure their full participation in our global society as responsible, self-directed, and civic-minded citizens.

Course Title:	Science				
Grade Level(s):	4				
Duration:	<i>Full Year:</i>	X	<i>Semester:</i>	<i>Marking Period:</i>	
Course Description:	<p>The Washington Township School District fourth grade curriculum uses an integrated approach to general science that focuses on units in physical, life, and earth science. By using this approach, teachers are able to meet the needs of all students while aligning with the New Jersey Model Curriculum, the Next Generation Science Standards, and the New Jersey Student Learning Standards. Hands-on activities are stressed and include student discovery experiments, problem solving, model building, cooperative learning, technology integration, classroom discussion, teacher demonstrations, and writing opportunities for research and self-expression. Interdisciplinary subject areas are incorporated whenever possible. Students are introduced to the use of scientific tools and methods used for investigations. The course is designed to be implemented using the 5E Model of Instruction: Engage, Explore, Explain, Extend/Elaborate, and Evaluate. The major topics of study for fourth grade are taken specifically from the Next Generation Science Standards:</p> <ul style="list-style-type: none"> ● Unit 1: Physical Science-Sources of Energy ● Unit 2: Physical Science-Uses of Energy ● Unit 3: Physical Science-Waves ● Unit 4: Life Science-Structure, Function, and Information Processing ● Unit 5: Earth Science-Earth's Systems: Processes that Shape The Earth ● Unit 6: Earth Science-Natural Hazards ● Engineering Design (Integrated Throughout) 				
Grading Procedures:	<p>40%-Summative 30%-Formative 20%-Supportive 10%-Supplemental</p>				
Primary Resources:	<p>National Geographic Texts/Teacher's Manual Student Laptops Student Notebooks Additional Research Materials</p>				

Washington Township Principles for Effective Teaching and Learning

- Implementing a standards-based curriculum
- Facilitating a learner-centered environment
- Using academic target language and providing comprehensible instruction
- Adapting and using age-appropriate authentic materials
- Providing performance-based assessment experiences
- Infusing 21st century skills for College and Career Readiness in a global society

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Under the Direction of: Linda Thomas, Elementary Supervisor and Gretchen Gerber, Director

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Revised: _____

BOE Approval: _____

Unit Title: Unit 1: Physical Science-Sources of Energy

Unit Description: Students will be introduced to energy. They will learn about speed, motion, sound, light, and heat and how they are transferred into energy.

Unit Duration: 14 Days

Desired Results

Standard(s):

4-PS3-1: Use evidence to construct an explanation relating the speed of an object to the energy of that object. [Assessment Boundary: Assessment does not include quantitative measures of changes in the speed of an object or on any precise or quantitative definition of energy.]

4-PS3-2: Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. [Assessment Boundary: Assessment does not include quantitative measurements of energy.]

4-PS3-3: Ask questions to predict outcomes about the changes in energy that occur when objects collide. [Clarification Statement: Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.]

Indicators:

PS3.A: Definitions of Energy

- The faster a given object is moving, the more energy it possesses. (4-PS3-1)
- Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2, 4-PS3-3)

PS3.B: Conservation of Energy and 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. (4-PS3-2, 4-PS3-3)
- Light also transfers energy from place to place. (4-PS3-2)
- Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2, 4-PS3-4)

PS3.C: Relationship Between Energy and Forces

- When objects collide, the contact forces energy transfer so as to change the objects' motions. (4-PS3-3)

Understandings:

Students will understand...

- The faster a given object is moving, the more energy it possesses.
- Energy can be moved from place to place by moving objects or through sound, light, or electric currents.
- 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.
- Light also transfers energy from place to place.
- Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy.
- When objects collide, the contact forces energy transfer so as to change the objects' motions.

Essential Questions:

- How can energy move from place to place?
- How does the speed of a moving object relate to the amount of energy it possesses?
- How does energy transfer and/or change when objects collide?
- How does the energy of motion transform into sound?
- How is energy transferred from the sun to Earth?
- What is heat?

Assessment Evidence

Performance Tasks:

Investigate Lessons-Students will practice performance tasks in cooperative groups engaging in scientific steps of an investigation.

- Lesson 1.2: *Speed* (p. 6-7)
Observe that the speed of a ball increases with the amount of energy they give it when they roll it.
- Lesson 1.4: *Motion* (p. 10-11)
Predict that the energy of a ball will increase and the ball will move faster when it is hit harder.
- Lesson 1.6: *Sound* (p.14-15)
Observe that salt grains will vibrate with more energy when more sound energy is directed toward them.
- Lesson 1.8: *Light* (p. 18-19)
Observe that color fades on areas of paper exposed to light.
- Lesson 1.10: *Heat* (p. 22-23)
Observe that a cup with the warmest water will melt butter the fastest.

Other Evidence:

- Science Notebook Entries
- Quizzes
 - After Lesson 4 -- “Motion”
 - After Lesson 10 -- “Heat”
- Unit Test

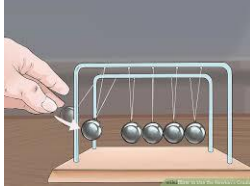
Benchmarks: Physical Science Benchmark will be given after Unit 3.

Learning Plan

Resources: National Geographic Learning: Exploring Science Teacher’s Guide, Student Text Books, Interactive eBook and Website, Laptops, Student Science Notebooks

Learning Activities:

Lesson	Activities	Notebook Evidence	Materials/Suggested Resources
<p>1.1: Batter Up! (p. 4-5)</p> <p>Standards: 4-PS3-1, 4-PS3-2, 4-PS3-3 PS3.A: Definition of Energy</p> <p>Objective(s):</p> <ul style="list-style-type: none"> • Explain how energy can be moved from place to place. • Connect the speed of a moving object to the amount of energy it possesses. <p>Duration: 1 Day</p>	<p>Engage: Share knowledge about baseball.</p> <p>Explore: Preview & Read p. 4-5</p> <p>Explain:</p> <ul style="list-style-type: none"> • Define energy • Explain how energy can move • Connect speed to energy <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Identify three examples of objects moving energy from place to place <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • List of objects that move energy from place to place • Energy based solution to posed scenario • “Wrap it Up!” [2] 	
<p>1.2: Speed *INVESTIGATE (p. 6-7)</p> <p>Standards: 4-PS3-1</p> <p>Objective(s):</p> <ul style="list-style-type: none"> • Use evidence to explain how the speed of an 	<p>Engage: Discuss ways to move energy from hands to wall.</p> <p>Explore: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Preview, Read, & Conduct Investigation on p. 6-7 <p>Explain: Share observations & conclusions</p>	<ul style="list-style-type: none"> • “Speed of Ball” table (TR p.1) • “Wrap it Up!” [2] 	<p><u>Each Group of 2:</u></p> <ul style="list-style-type: none"> • Whiffle ball • Stop watch <p><u>Teacher:</u></p> <ul style="list-style-type: none"> • Masking tape

<p>object relates to its energy.</p> <p>Duration: 1 Day</p>	<p>Elaborate: Present & discuss guiding questions Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>		
<p>1.3: Hit the Ball (p. 8-9)</p> <p>Standards: 4-PS3-2, 4-PS3-3 PS3.B: Conservation of Energy and Energy Transfer, PS3.C: Relationship between Energy and Forces</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Recall that moving objects possess energy. Describe the transfer of energy that occurs when moving objects collide. <p>Duration: 1 Day</p>	<p>Engage: Discuss what impact of collision feels like Explore: Preview & Read p. 8-9 Explain:</p> <ul style="list-style-type: none"> Review motion Define transfer Describe an energy transfer during a collision <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research the physics of baseball collisions Extend thinking about energy and collisions <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> Report on physics of baseball bat-ball collision “Wrap it Up!” [3] 	<p>Baseball Physics Website needed</p> <p>Newton’s Cradle</p> 
<p>1.4: Motion *INVESTIGATE (p. 10-11)</p> <p>Standards: 4-PS3-3</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Ask questions about the changes in energy that occur when objects collide. Predict outcomes about the changes in energy that occur when objects collide. <p>Duration: 1 Day</p>	<p>Engage: Discuss what happens to the energy of a ball after it collides with a bat Explore: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Preview, Read, & Conduct Investigation on p. 10-11 <p>Explain: Share observations & conclusions Elaborate:</p> <ul style="list-style-type: none"> Repeat step 3 of investigation using different amounts of force Present & discuss guiding questions <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> “Energy Changes During Collisions” table (TR p. 2) Additional collision table “Wrap it Up!” [2] 	<p><u>Each group of 2:</u></p> <ul style="list-style-type: none"> Whiffle ball Stop watch <p><u>Teacher:</u></p> <ul style="list-style-type: none"> Masking tape
<p>QUIZ 1</p>			
<p>1.5: Sounds of the Game (p. 12-13)</p> <p>Standards: 4-PS3-2, 4-PS3-3 4-PS3.A: Definitions of Energy, 4-PS3.B: Conservation of Energy and Energy Transfer</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Recognize that sound possesses energy 	<p>Engage: Discuss what students hear with their eyes closed Explore: Preview & Read p. 12-13 Explain:</p> <ul style="list-style-type: none"> Connect sound to energy Describe how energy is conserved <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research how musical instruments transfers 	<ul style="list-style-type: none"> Notes about how musical instruments transfer sound energy Notes about how sound energy bounces off some surfaces and is absorbed by others “Wrap it Up!” [3] 	<p>Musical Instruments/Sound Website</p> <p>Sound absorption</p>

<ul style="list-style-type: none"> • Make an inference about energy conservation during a collision <p>Duration: 1 Day</p>	<p>sound energy and record findings in notebook</p> <ul style="list-style-type: none"> • Research how sound energy bounces off some objects and is absorbed by others <p>Evaluate: <u>Science Notebook</u> - Complete "Wrap it Up!" questions</p>		
<p>1.6: Sound *INVESTIGATE (p. 14-15)</p> <p>Standards: 4-PS3-2</p> <p>Objective(s):</p> <ul style="list-style-type: none"> • Observe evidence that sound transfers energy <p>Duration: 1 Day</p>	<p>Engage: Share experiences when noises produced vibrations</p> <p>Explore: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Preview, Read, & Conduct Investigation on p. 14-15 <p>Explain: Share observations & conclusions</p> <p>Elaborate: Present & discuss guiding questions</p> <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> • "Sound and Salt Grain Vibrations" table (TR p. 3) • "Wrap it Up!" [3] 	<p><u>Each group of 4:</u></p> <ul style="list-style-type: none"> • Clear, plastic 9oz cup • Paper towel tube • Pinch of salt • Rubber band • 6x6 in. piece of plastic wrap <p><u>Teacher:</u></p> <ul style="list-style-type: none"> • Extra paper towel tube • scissors
<p>1.7: The Sun's Light (p. 16-17)</p> <p>Standards: 4-PS3-2, 4-PS3-3</p> <p>4-PS3.A: Definitions of Energy, 4-PS3.B: Conservation of Energy and Energy Transfer</p> <p>Objective:</p> <ul style="list-style-type: none"> • Describe light energy • Recognize that light transfers energy from place to place <p>Duration: 1 Day</p>	<p>Engage: Share evidence that the sun give energy</p> <p>Explore: Preview & Read p. 16-17</p> <p>Explain:</p> <ul style="list-style-type: none"> • Describe light • Recognize that light transfers energy <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Describe what happens to transformed light energy • Research ways in which light is produced (transformed) <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> • Description of what happens to light energy after it transforms into something else • Notes on ways in which light is produced • "Wrap it Up!" [2] 	<p>Research Ways in which light is produced</p>
<p>1.8: Light *INVESTIGATE (p. 18-19)</p> <p>Standards: 4-PS3-2</p> <p>Objective:</p> <ul style="list-style-type: none"> • Make observations to provide evidence that energy can be transferred from place to place by light <p>Duration: 1 Day</p>	<p>Engage: Review how light transfers energy and discuss how someone can demonstrate light energy transfer</p> <p>Explore: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Preview, Read, & Conduct Investigation on p. 18-19 <p>Explain: Share observations & conclusions</p> <p>Elaborate: Present & discuss guiding questions</p> <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> • "How Sunlight Affects Paper" table (TR p. 4) • "Wrap it Up!" [3] 	<p><u>Each group of 2:</u></p> <ul style="list-style-type: none"> • 8 1/2 x 11 in. piece of construction paper • Assortment of small classroom objects

<p>1.9: Heat it Up! (p. 20-21)</p> <p>Standards: 4-PS3-1, 4-PS3-2, 4-PS3-3 4-PS3.A: Definitions of Energy, 4-PS3.B: Conservation of Energy and Energy Transfer</p> <p>Objective:</p> <ul style="list-style-type: none"> Recognize that heat is the transfer of thermal energy Define heat as the transfer of thermal energy <p>Duration: 1 Day</p>	<p>Engage: Discuss evidence that light is transformed into thermal energy</p> <p>Explore: Preview & Read p. 20-21.</p> <p>Explain:</p> <ul style="list-style-type: none"> Recognize that heat is the transfer of thermal energy Define heat & thermal energy <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research convection, conduction, and radiation: identify examples from photo on p. 20-21 Extend thinking to identify what is happening to the snow in photos on p. 20-21 <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> Description of evidence in photograph of convection, conduction, and radiation Observations about snow in photograph "Wrap it Up!" [3] 	<p>Research convection, conduction, radiation</p>
<p>1.10: Heat *INVESTIGATE (p. 22-23)</p> <p>Standards: 4-PS3-2</p> <p>Objective:</p> <ul style="list-style-type: none"> Make observations to provide evidence that energy can be transferred from place to place by heat <p>Duration: 1 Day</p>	<p>Engage: Share examples of thermal energy transfers to their bodies</p> <p>Explore: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Preview, Read, & Conduct Investigation on p. 22-23 <p>Explain: Compare observations</p> <p>Elaborate: Design experiment by modifying Investigation</p> <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> "Transfer of Energy to Butter" table (TR p. 5) "Wrap it Up!" [3] 	<p><u>Each group of 4:</u></p> <ul style="list-style-type: none"> 3 clear plastic cups 9oz 3 identical metal spoons 3 dabs of butter <p><u>Teacher</u></p> <ul style="list-style-type: none"> Marker Masking tape Very warm water Room temperature water Cold water Paper plates
<p>Quiz 2</p>			
<p>Review / Flex Day</p>			
<p>Unit Test No PBA</p>			

Unit Learning Goal and Scale
(Level 2.0 reflects a minimal level of proficiency)

Standard(s):

4-PS3-1: Use evidence to construct an explanation relating the speed of an object to the energy of that object. (Unit 1, Lessons 1-2)

4.0	Students will be able to: <ul style="list-style-type: none"> • Explain how the energy of an object is related to the object's speed, and provide real world examples.
3.0	Students will be able to: <ul style="list-style-type: none"> • Explain how the energy of an object is related to the object's speed.
2.0	Students will be able to: <ul style="list-style-type: none"> • Define energy and speed.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Standard(s):

4-PS3-2: Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. (Unit 1, Lessons 5-10)

4.0	Students will be able to: <ul style="list-style-type: none"> • Provide evidence that energy can be transferred from place to place by sound, light, and/or heat, and provide real world examples.
3.0	Students will be able to: <ul style="list-style-type: none"> • Provide evidence that energy can be transferred from place to place by sound, light, and/or heat.
2.0	Students will be able to: <ul style="list-style-type: none"> • Identify when energy is being transferred by sound, light, and/or heat.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Standard(s):

4-PS3-3: Ask questions and predict outcomes about the changes in energy that occur when objects collide. (Unit 1, Lessons 3-4)

4.0	Students will be able to: <ul style="list-style-type: none"> • Predict what changes in energy will occur when objects collide, and provide real world examples.
3.0	Students will be able to: <ul style="list-style-type: none"> • Predict what changes in energy will occur when objects collide.
2.0	Students will be able to: <ul style="list-style-type: none"> • Describe what happens when objects collide.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Unit 1 Modifications for Special Population Students

Advanced Learners	<ul style="list-style-type: none"> • Use Elaborate sections of the lessons to extend student thinking. Lesson 1.5: Sounds of the Game (p. 12-13) <ul style="list-style-type: none"> - Allow students who play instruments to play them alone and as a group. • Allow students to complete Investigations, Think Like a Scientist, Think Like an Engineer, and Science Careers independently. Lesson 1.2: Speed (p. 6-7) Lesson 1.4: Motion (p. 10-11) Lesson 1.6: Sound (p.14-15) Lesson 1.8: Light (p. 18-19) Lesson 1.10: Heat (p. 22-23)
Struggling Learners	<ul style="list-style-type: none"> • Utilize online student text book with text-to-speech option • Provide pre-formatted, partially completed, or fully completed notebook pages • Provide reading assistance (research) <ul style="list-style-type: none"> - Use leveled research materials
English Language Learners	<ul style="list-style-type: none"> • Utilize online student text book with text-to-speech option • Preview vocabulary: <ul style="list-style-type: none"> - Provide visual, verbal, and written examples together - Group related words Lesson 1.1: Batter Up! – <i>energy</i> Lesson 1.3: Hit the Ball – <i>motion, transfer</i> Lesson 1.5: Sounds of the Game – <i>vibrations, transform</i> Lesson 1.9: Heat it Up! – <i>thermal energy</i>
Special Needs Learners	<ul style="list-style-type: none"> • Utilize online student text book with text-to-speech option • Preview vocabulary: <ul style="list-style-type: none"> - Provide visual, verbal, and written examples together - Group related words Lesson 1.1: Batter Up! – <i>energy</i> Lesson 1.3: Hit the Ball – <i>motion, transfer</i> Lesson 1.5: Sounds of the Game – <i>vibrations, transform</i> Lesson 1.9: Heat it Up! – <i>thermal energy</i> • Provide pre-formatted, partially completed, or fully completed notebook pages • Provide reading assistance (research) <ul style="list-style-type: none"> - Use leveled research materials - Assist in identifying relevant facts or provide previously identified facts • Modify Format of “Wrap it Up!” questions <ul style="list-style-type: none"> - Provide sentence starters - Provide word banks or key phrases - Allow answers to be given orally

Interdisciplinary Connections

Indicators:

ELA/Literacy-

RI.4.1-Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-PS3-1)

RI.4.3-Explain events, procedures, ideas, or concepts in a historical, scientific or technical text, including what happened and why, based on specific information in the text. (4-PS3-1)

RI.4.9-Integrate information from two texts on the same topic in order to write or speak about the subject knowledgably. (4-PS3-1)

W.4.2-Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (4-PS3-1)

W.4.7-Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-2, 4-PS3-3)

W.4.8-Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-PS3-1, 4-PS3-2, 4-PS3-3)

W.4.9-Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-PS3-1)

Integration of 21st Century Skills

Indicators:

8.1.5.A.1-Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.

8.1.5.A.3-Use a graphic organizer to organize information about a problem or issue.

8.1.5.E.1-Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.

8.1.5.F.1-Apply digital tools to collect, organize, and analyze data that support a scientific finding.

8.2.5.A.3-Investigate and present factors that influence the development and function of products and systems, e.g. resources, criteria, and constraints.

8.2.5.C.4-Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.

8.2.5.D.2-Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process to evaluate potential solutions.

Unit Title: Unit 2: Physical Science-Uses of Energy

Unit Description:

Students will continue to learn about energy. They will learn about electric circuits, renewable and nonrenewable resources.

Unit Duration: 19 Days

Desired Results

Standard(s):

4-PS3-2: Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. [Assessment Boundary: Assessment does not include quantitative measurements of energy.]

4-PS3-4: Apply science ideas to design, test, and refine a device that converts energy from one form to another. [Clarification Statement: Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound; and, a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device.] [Assessment Boundary: Device should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound.]

4-ESS3-1: Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. [Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.]

3-5-ETS1-1: Define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Indicators:

PS3.A: Definitions of Energy

- The faster a given object is moving, the more energy it possesses. (4-PS3-1)
- Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2, 4-PS3-3)

PS3.B: Conservation of Energy and 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. (4-PS3-2, 4-PS3-3)
- Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2, 4-PS3-4)

PS3.D: 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. (4-PS3-4)

ESS3.A: Natural Resources

- Energy and fuels that humans use are derived from natural sources, and their uses affect the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1)

ETS1.A: Defining Engineering Problems

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (*secondary to 4-PS3-4*)

Understandings:

Students will understand...

- The faster a given object is moving, the more energy it possesses.
- Energy can be moved from place to place by moving objects or through sound, light, or electric currents.
- 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.
- Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy.
- The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use.
- Energy and fuels that humans use are derived from natural sources, and their uses affect the environment in multiple ways. Some resources are renewable over time, and others are not.
- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.

Essential Questions:

- What is electrical energy?
- What is an electric current?
- How does an electric circuit transfer energy?
- How can energy of motion produce electricity?
- What does it mean to "produce energy?"
- What are natural resources?
- What is the difference between renewable and nonrenewable resources?

Assessment Evidence

Performance Tasks:

Investigate Lessons-Students will practice performance tasks in cooperative groups engaging in scientific steps of an investigation.

- Lesson 2.3: Electric Circuits (p. 28-29)
Predict and observe that only objects made of metals will complete a circuit.

Think Like an Engineer - Students will engage in performance tasks to design, build, and test a prototype device and analyze and improve results. These tasks will be recorded in their science notebook and evaluated by a Teacher Rubric and Student Rubric.

- *Finding Solutions to Energy Problems* (p. 32-37)
Identify the problem and constraints an urban planner uses to develop a solution using plant waste to create sustainable energy.
- *Design, Test, and Refine a Device* (p. 38-41)
Create a solar cooking device.
- *Design, Test, and Refine a Device* (p. 42-43)
Create a buzzer for use in a board game.

Think Like a Scientist - Students will engage in performance tasks to plan and conduct an investigation, provide evidence and use that evidence to explain results.

- *Obtain and Combine Information* (p. 50-51)
Use graphs to describe how energy affects the environment and predict what might happen in the future.

Other Evidence:

- Science Notebook Entries
- Quizzes
 - After Lesson 4 -- "Spin It!"
 - After Lesson 7 -- "Energy Resources and the Environment"
- Unit Test

Benchmarks: Physical Science Benchmark will be given after Unit 3.

Learning Plan

Resources: National Geographic Learning: Exploring Science Teacher's Guide, Student Text Books, Interactive eBook and Website, Laptops, Student Science Notebooks

Learning Activities:

Lesson	Activities	Notebook Evidence	Materials/Suggested Resources
<p>2.1: It's Electric (p. 24-25)</p> <p>Standards: 4-PS3-2, 4-PS3-3, 4-PS3-4 PS3.A: Definitions of Energy PS3.B: Conservation of Energy and Energy Transfer</p> <p>Objective(s):</p> <ul style="list-style-type: none"> • Define electrical energy and electric current. • Recognize that electric current transfers energy from place to place. 	<p>Engage: Discuss personal interactions with electrical energy</p> <p>Explore: Preview & Read p. 24-25</p> <p>Explain:</p> <ul style="list-style-type: none"> • Define electrical energy & electric current. Connect speed to energy • Recognize that electric current transfers energy <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research & list steps to change chemical energy into electrical energy 	<ul style="list-style-type: none"> • Steps (or summary) of how chemical energy inside a battery is transformed into electrical energy • "Wrap it Up!" [3] 	<p>Research how chemical energy inside a battery can be transformed into electrical energy</p> <p>Locate information on how rechargeable batteries work</p>

<p>Duration: 1 Day</p>	<ul style="list-style-type: none"> Research & compare finding about rechargeable batteries <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>		
<p>2.2: Electric Circuits (p. 26-27)</p> <p>Standards: 4-PS3-2, 4-PS3-3, 4-PS3-4 PS3.A: Definitions of Energy PS3.B: Conservation of Energy and Energy Transfer</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Define electric current Know that the transfer of electric energy as current requires a complete circuit <p>Duration: 1 Day</p>	<p>Engage: Discuss ways to turn on lights Explore: Preview & Read p. 26-27 Explain:</p> <ul style="list-style-type: none"> Define electrical circuits. Know that current requires a circuit <p>Elaborate: <u>Science Notebook</u> • Draw diagram connecting lanterns to power plant</p> <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> Diagram of lanterns' circuit to power plant "Wrap it Up!" [2] 	<p>N/A</p>
<p>2.3: Electric Circuits *INVESTIGATE (p. 28-29)</p> <p>Standards: 4-PS3-2</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Make observations to provide evidence that energy can be transferred from place to place by electric currents. Implement an experimental investigation to test one variable-the object /material that completes an electrical circuit. <p>Duration: 1 Day</p>	<p>Engage: Describe ways electrical energy is being used in photograph on p. 28-29 Explore: <u>Science Notebook</u> • Preview, Read, & Conduct Investigation on p. 28-29 Explain: Share observations & conclusions Elaborate: Present & discuss guiding questions Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> "Materials Tested to Complete a Circuit" table (TR p. 6) "Wrap it Up!" [3] 	<p><u>Each Group of 4</u></p> <ul style="list-style-type: none"> Small flashlight bulb in holder D-cell battery in holder 3 pieces of electrical wire Rubber band Metal washer Plastic spoon Penny Large, metal paper clip Crayon <p><u>Teacher</u></p> <ul style="list-style-type: none"> Wire stripper/cutter
<p>2.4: Spin It! (p. 30-31)</p> <p>Standards: 4-PS3-2, 4-PS3-4 PS3.A: Definitions of Energy PS3.B: Conservation of Energy and Energy Transfer</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Recall that electric current can transfer energy from place to place and then be used locally to 	<p>Engage: Recall that moving objects have energy and speed affects energy Explore: Preview & Read p. 30-31 Explain:</p> <ul style="list-style-type: none"> Define energy of motion Explain how current is produced <p>Elaborate: <u>Science Notebook</u> • Write step-by-step account of how wind becomes energy</p>	<ul style="list-style-type: none"> Step-by-step account of how wind becomes energy List of ways energy of motion could be utilized "Wrap it Up!" [2] 	<ul style="list-style-type: none"> Bicycle generator website

<p>produce motion, sound, heat or light.</p> <ul style="list-style-type: none"> Explain that current is produced by transforming the energy of motion into electrical energy. <p>Duration: 1 Day</p>	<ul style="list-style-type: none"> Research bicycle generators Brainstorm ways energy of motion could be utilized <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>		
Quiz 1			
<p>2.5: Finding Solutions to Energy Problems *THINK LIKE AN ENGINEER Case Study (p. 32-37)</p> <p>Standards: 4-PS3-4 ETS1.A: Defining Engineering Problems</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Identify an engineering problem, its constraints, and criteria for a solution. <p>Duration: 2 Days</p>	<p>Engage: Discuss ways life would be different without electricity</p> <p>Explore: Preview & Read p. 32-37</p> <p>Explain:</p> <ul style="list-style-type: none"> Identify the problem Define <i>sustainable</i> Identify constraints of the problem Specify criteria for successful solution Remember that energy can be transferred Identify the solution <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research & take notes about Tanzania Extend thinking about biodigesters as an energy solution Research solar energy Prepare presentation of findings with visuals <p>Evaluate: <u>Science Notebook</u> - Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> Notes about Tanzania "Wrap it Up!" [2] 	<p>Research Tanzania RE: biodigesters</p> <p>Connect to Jane Goodall's Gombe Chimpanzee Reserve</p>
<p>2.6: Design, Test, and Refine a Device *THINK LIKE AN ENGINEER (p. 38-41)</p> <p>Standards: 4-PS3-4, 3-5-ETS1-1, 3-5-ETS1-3</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. Define a design problem that includes specified criteria for success and constraints. Plan and carry out a fair test to identify aspects of a prototype that can be improved. 	<p>Engage: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Read introduction on p. 38 Identify problem, criteria, and constraints <p>Explore: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Design & build solar oven prototype Test solar oven & record observations <p>Explain: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Refine or change solution Compare data Analyze & explain results <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Share prototypes & conclusions Revise & test design <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> Definition of problem Criteria for success List of constraints Prototype design Plan for construction "Solar Oven Test 1" table (TR p. 7) "Solar Oven Test 2" table (TR p. 7) Paragraph explaining design solution "Wrap it Up!" [2] 	<p style="text-align: center;"><u>For groups of 4:</u></p> <ul style="list-style-type: none"> 2 thermometers Stopwatch Variety of Supplies <ul style="list-style-type: none"> Cardboard boxes Clear tape Aluminum foil Plastic wrap Foam core Bubble wrap Rubber bands Chenille stems Black construction paper <p style="text-align: center;"><u>Teacher</u></p> <ul style="list-style-type: none"> Pictures of simple solar ovens Extra boxes Extra supplies

<p>Duration: 3 Days</p>			
<p>2.7: Design, Test, and Refine a Device *THINK LIKE AN ENGINEER (p. 42-43)</p> <p>Standards: 4-PS3-4, 3-5-ETS1-1, 3-5-ETS1-3</p> <p>Objective:</p> <ul style="list-style-type: none"> • Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. • Define a design problem that includes specified criteria for success and constraints. • Plan and carry out a fair test to identify aspects of a prototype that can be improved. <p>Duration: 2 Days</p>	<p>Engage: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Read introduction on p. 42 • Identify problem, criteria, and constraints <p>Explore: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Design & build buzzer prototype • Test buzzer & record observations <p>Explain: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Refine or change solution • Test & record observations • Analyze & explain results <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Share prototypes & conclusions • Revise & test design <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • Definition of problem • Criteria for success • List of constraints • Prototype design • Plan for construction • “Buzzer Test 1” table (TR p. 7) • “Buzzer Test 2” table (TR p. 7) • Paragraph explaining design solution • “Wrap it Up!” [2] 	<p>Research Solar Energy – how simple solar devices are helping people in poor and remote areas</p>
<p>2.8: Nonrenewable Energy Resources (p. 44-45)</p> <p>Standards: 4-ESS3-1, 4-PS3-4 ESS3.A: Natural Resources PS3.D: Energy in Chemical Processes and Everyday Life</p> <p>Objective:</p> <ul style="list-style-type: none"> • Explain what the expression “produced energy” refers to. • List Energy Resources derived from natural resources that are not renewable over time. <p>Duration: 1 Day</p>	<p>Engage: Discuss what fossils have to do with energy.</p> <p>Explore: Preview & Read p. 44-45</p> <p>Explain:</p> <ul style="list-style-type: none"> • Describe how energy is “produced” • Define fossil fuel & nonrenewable energy resource <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research & take notes about the formation and extraction of coal, natural gas, and oil (petroleum) <p>Evaluate: <u>Science Notebook</u> - Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • Notes about formation and extraction of coal, natural gas, and oil (petroleum) • “Wrap it Up!” [3] 	<p>Research more about coal, natural gas, and oil (petroleum) RE: how it was formed and extracted</p>
<p>2.9: Renewable Energy Resources (p. 46-47)</p> <p>Standards: 4-ESS3-1 ESS3.A: Natural Resources</p> <p>Objective:</p> <ul style="list-style-type: none"> • List Energy Resources derived from natural 	<p>Engage: Discuss the type of energy wind has</p> <p>Explore: Preview & Read p. 46-47</p> <p>Explain:</p> <ul style="list-style-type: none"> • Define renewable energy resources • Identify renewable energy resources 	<ul style="list-style-type: none"> • Table of top 10 countries for each type of renewable energy use • “Wrap it Up!” [2] 	<p>Research how to find out how other countries use renewable energy resources RE: which use the most and how do they use it</p>

<p>sources that are renewable over time.</p> <p>Duration: 1 Day</p>	<p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research & make a table about how other countries use renewable energy resources <p>Evaluate: <u>Science Notebook</u></p> <p>Complete “Wrap it Up!” questions</p>		
<p>2.10: Energy Resources and the Environment (p. 48-49)</p> <p>Standards: 4-ESS3-1, 4-PS3-4</p> <p>ESS3.A: Natural Resources, PS3.D: Energy in Chemical Processing and Everyday Life</p> <p>Objective:</p> <ul style="list-style-type: none"> • Recall that the energy we use for electricity and transportation has to come from another source. • Compare the effects different energy resources have on the environment. <p>Duration: 1 Day</p>	<p>Engage: Discuss local types of energy resources.</p> <p>Explore: Preview & Read p. 48-49</p> <p>Explain:</p> <ul style="list-style-type: none"> • Describe the need for energy • Evaluate advantages and disadvantages of energy resources <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research tidal energy, geothermal energy, or biofuel • Record advantages and disadvantages <p>Evaluate: <u>Science Notebook</u> - Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • Advantages and disadvantages of tidal energy, geothermal energy, or biofuel • Notes about local use of renewable resources • “Wrap it Up!” [2] 	<p>Research tidal energy, geothermal energy, or biofuel</p> <p>RE: advantages and disadvantages</p>
<p>Quiz 2</p>			
<p>2.11: Obtain and Combine Information *THINK LIKE A SCIENTIST (p. 50-51)</p> <p>Standards: 4-ESS3-1</p> <p>Objective:</p> <ul style="list-style-type: none"> • Obtain and combine information to describe that energy is derived from natural resources and their uses affect the environment. <p>Duration: 1 Day</p>	<p>Engage: Review <i>fossil fuels</i></p> <p>Explore: Preview & Read p. 48-49</p> <p>Explain: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Describe energy resources • Describe how energy use affects the environment <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research & take notes on environmental problems with fossil fuels <p>Evaluate: <u>Science Notebook</u></p> <p>Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • Notes about data to assist with “Wrap it Up!” • Notes about environmental problems with fossil fuels • “Wrap it Up!” [3] 	<p>Research to learn more details about the environmental problems associated with fossil fuels</p>
<p>Review/Flex Day</p>			
<p>Unit 2 Test 80 pts. Question/Answer 20 pts. PBA - “Think Like an Engineer” Lesson 2.7 (Rubric TR p. 11)</p>			

Unit Learning Goal and Scale
(Level 2.0 reflects a minimal level of proficiency)

Standard(s):

4-PS3-2: Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. (Unit 2, Lessons 1-4)

4.0	Students will be able to: <ul style="list-style-type: none"> • Provide evidence that energy can be transferred from place to place by electric currents, and provide real world examples.
3.0	Students will be able to: <ul style="list-style-type: none"> • Provide evidence that energy can be transferred from place to place by electric currents.
2.0	Students will be able to: <ul style="list-style-type: none"> • Identify when energy is being transferred by electric currents.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Standard(s):

4-PS4-4: Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

3-5-ETS1-1

Define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-3

Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. (Unit 2, Lessons 5-7, 11)

4.0	Students will be able to: <ul style="list-style-type: none"> • Independently design a device that converts energy from one form to another reflecting a need or want that includes specified criteria, plan and carry out fair tests to control variables and consider failure points, and identify aspects of a model or prototype that can be improved.
3.0	Students will be able to: <ul style="list-style-type: none"> • Design a device that converts energy from one form to another reflecting a need or want that includes specified criteria, plan and carry out fair tests to control variables and consider failure points, and identify aspects of a model or prototype that can be improved.
2.0	Students will be able to: <ul style="list-style-type: none"> • Design and test a device that converts energy from one form to another.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Standard(s):	
4-ESS3-1: Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. (Unit 2, Lessons 8-10)	
4.0	Students will be able to: <ul style="list-style-type: none"> Describe that energy and fuels are derived from natural resources and their uses affect the environment, and provide real world examples.
3.0	Students will be able to: <ul style="list-style-type: none"> Describe that energy and fuels are derived from natural resources and their uses affect the environment.
2.0	Students will be able to: <ul style="list-style-type: none"> Define and identify natural resources.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Unit 2 Modifications for Special Population Students	
Advanced Learners	<ul style="list-style-type: none"> Use Elaborate sections of the lessons to extend student thinking. <ul style="list-style-type: none"> Lesson 8: Nonrenewable Energy Resources (p. 44-45) <ul style="list-style-type: none"> Students develop presentations about fossil fuels that include diagrams from the internet and compare their findings to find similarities and differences. Lesson 10: Energy Resources and the Environment (p. 48-49) <ul style="list-style-type: none"> Students work in a small group to discuss renewable resources, determine which would work best in their area, and create a presentation to support their choice. Allow students to complete investigations, Think Like a Scientist, Think Like an Engineer, and Science Careers independently. <ul style="list-style-type: none"> Lesson 2.3: Electric Circuits (p. 28-29) Lesson 2.5: Finding Solutions to Energy Problems (p. 32-37) Lesson 2.6: Design, Test, and Refine a Device (p. 38-41) Lesson 2.7: Design, Test, and Refine a Device (p. 42-43) Lesson 2.11: Obtain and Combine Information (p. 50-51)
Struggling Learners	<ul style="list-style-type: none"> Utilize online student text book with text-to-speech option Provide pre-formatted, partially completed, or fully completed notebook pages Provide reading assistance (research) <ul style="list-style-type: none"> Use leveled research materials
English Language Learners	<ul style="list-style-type: none"> Utilize online student text book with text-to-speech option Preview vocabulary: <ul style="list-style-type: none"> Provide visual, verbal, and written examples together Group related words <ul style="list-style-type: none"> Lesson 2.1: It's Electric – <i>electrical energy, electrical current</i> Lesson 2.2: Electric Circuits – <i>electrical circuit</i> Lesson 2.4: Spin It! – <i>energy of motion</i> Lesson 2.8: Nonrenewable Energy Resources – <i>fossil fuel, nonrenewable energy resources</i> Lesson 2.9: Renewable Energy Resources – <i>renewable energy resources, solar energy, wind energy</i>
Special Needs Learners	<ul style="list-style-type: none"> Utilize online student text book with text-to-speech option Preview vocabulary: <ul style="list-style-type: none"> Provide visual, verbal, and written examples together Group related words <ul style="list-style-type: none"> Lesson 2.1: It's Electric – <i>electrical energy, electrical current</i> Lesson 2.2: Electric Circuits – <i>electrical circuit</i> Lesson 2.4: Spin It! – <i>energy of motion</i> Lesson 2.8: Nonrenewable Energy Resources – <i>fossil fuel, nonrenewable energy resources</i> Lesson 2.9: Renewable Energy Resources – <i>renewable energy resources, solar energy, wind energy</i>

- Provide pre-formatted, partially completed, or fully completed notebook pages
- Provide reading assistance (research)
 - Use leveled research materials
 - Assist in identifying relevant facts or provide previously identified facts
- Modify Format of “Wrap it Up!” questions
 - Provide sentence starters
 - Provide word banks or key phrases
 - Allow answers to be given orally

Interdisciplinary Connections

Indicators:

ELA/Literacy-

W.4.7-Conduct short research projects that build knowledge through investigation of different aspects of a topic. *(4-PS3-2, 4-PS3-4)*

W.4.8-Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. *(4-PS3-2, 4-PS3-4)*

W.4.9-Draw evidence from literary or informational texts to support analysis, reflection, and research. *(4-ESS3-1)*

Mathematics-

MP.2-Reason abstractly and quantitatively. *(4-ESS3-1)*

MP.4-Model with mathematics. *(4-ESS3-1)*

4.OA.A.1-Interpret a multiplication equation as a comparison, e.g., interpret $35=5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. *(4-ESS3-1)*

4.OA.A.3-Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Access the reasonableness of answers using mental computation and estimation strategies including rounding. *(4-PS3-4)*

Integration of 21st Century Skills

Indicators:

8.1.5.A.1-Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.

8.1.5.A.3-Use a graphic organizer to organize information about a problem or issue.

8.1.5.E.1-Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.

8.1.5.F.1-Apply digital tools to collect, organize, and analyze data that support a scientific finding.

8.2.5.A.3-Investigate and present factors that influence the development and function of products and systems, e.g. resources, criteria, and constraints.

8.2.5.B.2-Examine systems used for recycling and recommend simplification of the systems and share with product developers.

8.2.5.B.3-Investigate ways that various technologies are being developed and used to reduce improper uses of resources.

8.2.5.B.4-Research technologies that have changed due to society's changing needs and wants.

8.2.5.C.1-Collaborate with peers to illustrate components of a designed system.

8.2.5.C.2-Explain how specifications and limitations can be used to direct a product's development.

8.2.5.C.4-Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.

8.2.5.D.1-Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered.

8.2.5.D.2-Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process to evaluate potential solutions.

8.2.5.D.7-Explain the impact that resources such as energy and materials used in a process to produce products or systems have on the environment.

Unit Title: Unit 3: Physical Science-Waves

Unit Description:

The students will be introduced to waves. They will learn about wave properties and information technology.

Unit Duration: 13 Days

Desired Results

Standard(s):

4-PS4-1: Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. [Clarification Statement: Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves.] [Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.]

4-PS4-3: Generate and compare multiple solutions that use patterns to transfer information. [Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.]

3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Indicators:

PS4.A: 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; it does not move in the direction of the wave except when the water meets the beach. (*Note: This grade band endpoint was moved from K-2.*) (4-PS4-1)

PS4.C: Information Technologies and Instrumentation

- Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information--convert it from digitized form to voice--and vice versa. (4-PS4-3)

ETS1.C: Optimizing the design solution

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (*secondary to 4-PS4-3*)

Understandings:

Students will understand...

- 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; it does not move in the direction of the wave except when the water meets the beach.
- Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information--convert it from digitized form to voice--and vice versa.
- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.

Essential Questions:

- How do waves travel?
- What is amplitude?
- What is wavelength?
- How is the motion of waves transferred into energy?
- How is information transmitted over long distances?
- How is digitized information used?

Assessment Evidence

Performance Tasks:

Investigate Lessons-Students will practice performance tasks in cooperative groups engaging in scientific steps of an investigation.

- Lesson 3.3: *Wavelength and Amplitude* (p. 56-57)
Create wave models and describe the properties of each wave.
- Lesson 3.4: *How Waves Move Objects* (p. 58-59)
Create waves and observe the wave and motion of the objects in the water.
- Lesson 3.7: *Use a Code* (p. 64-65)
Create and transmit a message using Morse code.

Think Like an Engineer-Students will engage in performance tasks to design, build, and test a prototype device and analyze and improve results. These tasks will be recorded in their science notebook and evaluated by a Teacher Rubric and Student Rubric.

- *Compare Multiple Solutions* (p. 66-67)
Create a way to transmit Morse code.

Science Career-Students will engage in performance tasks to learn about careers in science, the work scientists do, and how it connects to the current learning.

- *Animal Tracker* (p. 68-69)
Learn about behavioral ecologists and how they use technology to track animal movement.

Other Evidence:

- Science Notebook Entries
- Quizzes
 - After Lesson 7 -- "Use a Code"
- Unit Test
- Physical Science Benchmark

Benchmarks: Physical Science Benchmark will be given at the end of this unit.

Learning Plan

Resources: National Geographic Learning: Exploring Science Teacher's Guide, Student Text Books, Interactive eBook and Website, Laptops, Student Science Notebooks

Learning Activities:

Lesson	Activities	Notebook Evidence	Materials and Suggested Resources
3.1: Waves (p. 52-53) Standards: 4-PS4-1 PS3.A: Wave Properties Objective(s): <ul style="list-style-type: none"> • Describe waves as a regular pattern of motion produced by a disturbance. • Explain the motion of water waves. Duration: 1 Day	Engage: Discuss evidence of waves at the beach transferring energy. Explore: Preview & Read p. 52-53. Explain: <ul style="list-style-type: none"> • Describe waves • Explain wave motion Elaborate: <i>Science Notebook</i> <ul style="list-style-type: none"> • Research videos of waves • Describe wave motion Evaluate: <i>Science Notebook</i> - Complete "Wrap it Up!" questions	<ul style="list-style-type: none"> • Description of wave motion • "Wrap it Up!" [2] 	Research to find videos of water waves, ocean waves, or surfers RE: Describe the motion
3.2: Wave Properties (p.54-55) Standards: 4-PS4-1 PS3.A: Wave Properties	Engage: Discuss the causes of water waves Explore: Preview & Read p. 54-55. Explain:	<ul style="list-style-type: none"> • Definition of frequency (as a wave property) • "Wrap it Up!" [2] 	Use Glossaries, dictionaries, textbooks, or websites RE: Define frequency Relate to Wavelength

<p>Objective(s):</p> <ul style="list-style-type: none"> Describe the wave properties of amplitude and wavelength. <p>Duration: 1 Day</p>	<ul style="list-style-type: none"> Define amplitude and wavelength Describe wave properties <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research the definition of frequency Discuss how frequency is related to wavelength <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>		
<p>3.3: Wavelength and Amplitude *INVESTIGATE (p. 56-57)</p> <p>Standards: 4-PS4-1</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Develop a model of waves to describe patterns in terms of amplitude and wavelength. <p>Duration: 1 Day</p>	<p>Engage: Review amplitude and wavelength Explore: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Preview, Read, & Conduct Investigation on p. 56-57 <p>Explain: Share observations & conclusions Elaborate: Present & discuss guiding questions Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions.</p>	<ul style="list-style-type: none"> Labeled drawings of waves “Wrap it Up!” [2] 	<p><u>Each group of 2:</u></p> <ul style="list-style-type: none"> Chenille stem Marker
<p>3.4: How Waves Move Objects *INVESTIGATE (p. 58-59)</p> <p>Standards: 4-PS4-1</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Develop a model of waves to describe amplitude and wavelength. Use the model to describe how waves cause objects to move. <p>Duration: 1 Day</p>	<p>Engage: Share experiences being moved by waves Explore: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Preview, Read, & Conduct Investigation p. 58-59 <p>Explain: Share observations & conclusions Elaborate: Design investigation to see if objects under water are affected by waves Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> “Water Wave Observations” table (TR p. 13) “Wrap it Up!” [2] 	<p><u>Each group of 4:</u></p> <ul style="list-style-type: none"> Rectangular pan or storage container Pitcher filled half way with water 4x6 index card Assortment of floatable objects <p><u>Teacher</u></p> <ul style="list-style-type: none"> Paper towels
<p>3.5: Information Technology – GPS (p. 60-61)</p> <p>Standards: 4-PS4-3 PS4.C: Information Technologies and Instrumentation</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Identify digitized information. Describe how information can be transmitted over long distances. <p>Duration: 1 Day</p>	<p>Engage: Display and discuss mapping software Explore: Preview & Read p. 60-61. Explain:</p> <ul style="list-style-type: none"> Identify digitized information Describe how GPS works <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Explore and take notes about location on <i>EarthExplorer</i> Explore and take notes about <i>Google Earth</i> <p>Evaluate: <u>Science Notebook</u> - Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> Notes about specific location on EarthExplorer Notes about finding on Google Earth “Wrap it Up!” [2] 	<p>USGS Website: EarthExplorer RE: Access school address</p>

<p>3.6: Information Technology – Cell Phones (p. 62-63)</p> <p>Standards: 4-PS4-3 PS4.C: Information Technologies and Instrumentation</p> <p>Objective(s):</p> <ul style="list-style-type: none"> • Explain how cell phones use digitized information • Describe the advantages of digitized information <p>Duration: 1 Day</p>	<p>Engage: Recall information about GPS</p> <p>Explore: Preview & Read p. 62-63.</p> <p>Explain:</p> <ul style="list-style-type: none"> • Explain how cell phones work • Describe advantages of digitized information <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research and take notes about bit, byte, megabyte (MB), and gigabyte (GB) <p>Evaluate: <u>Science Notebook</u> - Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • Notes on terms: bit, byte, megabyte (MB), gigabyte (GB) • “Wrap it Up!” [2] 	<p>Research terms: bit, byte, megabyte (MB), and gigabyte (GB)</p>
<p>3.7: Use a Code *INVESTIGATE (p. 64-65)</p> <p>Standards: 4-PS4-3</p> <p>Objective:</p> <ul style="list-style-type: none"> • Use a pattern to transfer information. <p>Duration: 1 Day</p>	<p>Engage: Share experiences with using codes</p> <p>Explore: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Preview, Read, & Conduct Investigation on p. 64-65 <p>Explain: Share observations & conclusions</p> <p>Elaborate: Present & discuss guiding questions</p> <p>Evaluate: <u>Science Notebook</u> - Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • “Trial Morse Code” table (TR p. 14) • “Wrap it Up!” [2] 	<p><u>Each group of 2:</u></p> <ul style="list-style-type: none"> • Flashlight <p style="text-align: center;"><u>Teacher</u></p> <p>N/A</p>
<p>Quiz 1</p>			
<p>3.8: Compare Multiple Solutions *THINK LIKE AN ENGINEER (p. 66-67)</p> <p>Standards: 4-PS4-3, 3-5-ETS1-3 ETS1.C: Optimizing the Design Solution</p> <p>Objective:</p> <ul style="list-style-type: none"> • Generate and compare multiple solutions that use patterns to transfer information. • Determine which of the solutions best solves the problem, given the criteria and constraints. <p>Duration: 2 Days</p>	<p>Engage: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Read introduction on p. 66 • Identify problem, criteria, and constraints <p>Explore: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Design & build communication device prototype • Test communication device & record observations <p>Explain: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Refine or change solution • Analyze & explain results <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Invent code <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • Problem, criteria, and constraints • “Solutions for Sending a Message” table (TR p. 15) • “Wrap it Up!” [2] 	<p><u>Each group of 4:</u></p> <ul style="list-style-type: none"> • Things found in a cabin EX: <ul style="list-style-type: none"> ○ shoes ○ guide book ○ flyswatter ○ plastic combs ○ box of tissues ○ tin cup/bowl ○ spoons ○ soap in a soapbox ○ flying disc ○ playing cards ○ empty water bottles <p style="text-align: center;"><u>Teacher</u> Samples of codes</p>
<p>3.9: Animal Tracker *SCIENCE CAREER (p. 68-69)</p>	<p>Engage: Share use of technology to observe animals</p>	<ul style="list-style-type: none"> • Questions about animal behavior • “Wrap it Up!” [2] 	<p>Search Crittercam on Nat Geo site RE: Generate questions</p>

<p>Standards: Scientific Knowledge is Based on Empirical Evidence</p> <p>Objective:</p> <ul style="list-style-type: none"> • Connect the concept of information technology with the career of a behavioral ecologist. <p>Duration: 1 Day</p>	<p>Explore: Preview & Read p. 46-47</p> <p>Explain:</p> <ul style="list-style-type: none"> • Describe the work of a behavioral ecologist • Connect information technology to the career of an ecologist • Find out more <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research Crittercam • Record questions <p>Evaluate: <u>Science Notebook</u></p> <p>Complete “Wrap it Up!” questions</p>		
Review/Flex Day			
Unit 3 Test			
20 pts. PBA – “Think Like an Engineer” Lesson 3.8 (Rubric TR p. 16)			
Benchmark 1 (Physical Science)			

Unit Learning Goal and Scale <i>(Level 2.0 reflects a minimal level of proficiency)</i>	
Standard(s):	
4-PS4-1: Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. (Unit 3, Lessons 1-4)	
4.0	Students will be able to: <ul style="list-style-type: none"> • Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move, and provide real world examples.
3.0	Students will be able to: <ul style="list-style-type: none"> • Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
2.0	Students will be able to: <ul style="list-style-type: none"> • Define wave and wavelength. Develop a model of waves.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Standard(s):	
4-PS4-3: Generate and compare multiple solutions that use patterns to transfer information. (Unit 3, Lessons 5-8)	
4.0	Students will be able to: <ul style="list-style-type: none"> • Generate and compare multiple solutions that use patterns to transfer information, and provide real world examples.
3.0	Students will be able to: <ul style="list-style-type: none"> • Generate and compare multiple solutions that use patterns to transfer information.
2.0	Students will be able to: <ul style="list-style-type: none"> • Identify solutions that use patterns to transfer information.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Standard(s):	
3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. (Unit 3, Lesson 8)	
4.0	Students will be able to: <ul style="list-style-type: none"> Independently plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
3.0	Students will be able to: <ul style="list-style-type: none"> Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
2.0	Students will be able to: <ul style="list-style-type: none"> Plan and carry out fair tests of a model or prototype.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Unit 3 Modifications for Special Population Students

Advanced Learners	<ul style="list-style-type: none"> Use Elaborate sections of the lessons to extend student thinking. <ul style="list-style-type: none"> Lesson 3.1: Waves (p. 52-53) <ul style="list-style-type: none"> Students choose a video of waves and explain how it demonstrates wave motion. Lesson 3.3: Wavelength and Amplitude (p. 56-57) <ul style="list-style-type: none"> Students investigate longitudinal waves. Allow students to complete investigations, Think Like a Scientist, Think Like an Engineer, and Science Careers independently. <ul style="list-style-type: none"> Lesson 3.3: Wavelength and Amplitude (p. 56-57) Lesson 3.4: How Waves Move Objects (p. 58-59) Lesson 3.7: Use a Code (p. 64-65) Lesson 3.8: Compare Multiple Solutions (p. 66-67) Lesson 3.9: Animal Tracker (p. 68-69)
Struggling Learners	<ul style="list-style-type: none"> Utilize online student text book with text-to-speech option Provide pre-formatted, partially completed, or fully completed notebook pages Provide reading assistance (research) <ul style="list-style-type: none"> Use leveled research materials
English Language Learners	<ul style="list-style-type: none"> Utilize online student text book with text-to-speech option Preview vocabulary: <ul style="list-style-type: none"> Provide visual, verbal, and written examples together Group related words <ul style="list-style-type: none"> Lesson 3.1: Waves – <i>wave</i> Lesson 3.2: Wave Properties – <i>amplitude, wavelength</i> Lesson 3.5: Information Technology – GPS – <i>digitized, Global Positioning System (GPS), transmit</i>
Special Needs Learners	<ul style="list-style-type: none"> Utilize online student text book with text-to-speech option Preview vocabulary: <ul style="list-style-type: none"> Provide visual, verbal, and written examples together Group related words <ul style="list-style-type: none"> Lesson 3.1: Waves – <i>wave</i> Lesson 3.2: Wave Properties – <i>amplitude, wavelength</i> Lesson 3.5: Information Technology – GPS – <i>digitized, Global Positioning System (GPS), transmit</i> Provide pre-formatted, partially completed, or fully completed notebook pages Provide reading assistance (research) <ul style="list-style-type: none"> Use leveled research materials Assist in identifying relevant facts or provide previously identified facts

- Modify Format of “Wrap it Up!” questions
 - Provide sentence starters
 - Provide word banks or key phrases
 - Allow answers to be given orally

Interdisciplinary Connections

Indicators:

ELA/Literacy-

RI.4.1-Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. *(4-PS4-3)*

RI.4.9-Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. *(4-PS4-3)*

SL.4.5-Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. *(4-PS4-1)*

Mathematics-

MP.4-Model with mathematics. *(4-PS4-1)*

4.G.A.1-Draw points, lines, line segments, rays, angles, (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. *(4-PS4-1)*

Integration of 21st Century Skills

Indicators:

8.1.5.A.1-Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.

8.1.5.A.3-Use a graphic organizer to organize information about a problem or issue.

8.1.5.E.1-Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.

8.1.5.F.1-Apply digital tools to collect, organize, and analyze data that support a scientific finding.

8.2.5.A.3-Investigate and present factors that influence the development and function of products and systems, e.g. resources, criteria, and constraints.

8.2.5.B.4-Research technologies that have changed due to society's changing needs and wants.

8.2.5.C.1-Collaborate with peers to illustrate components of a designed system.

8.2.5.C.2-Explain how specifications and limitations can be used to direct a product's development.

8.2.5.C.4-Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.

8.2.5.C.7-Work with peers to redesign an existing product for a different purpose.

8.2.5.D.1-Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered.

8.2.5.D.2-Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process to evaluate potential solutions.

9.2.4.A.3-Investigate both traditional and nontraditional careers and relate information to personal likes and dislikes.

Unit Title: Unit 4: Life Science-Structure, Function, and Information Processing

Unit Description:

The students will be introduced to structure, function, and information processing of plants and animals. They will learn about the internal and external structures of plants and animals, and how animals process light and sound.

Unit Duration: 16 Days

Desired Results

Standard(s):

4-PS4-2: Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. [Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.]

4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]

4-LS1-2: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. [Clarification Statement: Emphasis is on the systems of internal transfer.] [Assessment Boundary: Assessment does not include the mechanisms by the brain stores and recalls information or the mechanisms of how sensory receptors function.]

Indicators:

PS4.B: Electromagnetic Radiation

- An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2)

LS1.A: Structure and Function

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)

LS1.D: 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. (4-LS1-2)

Understandings:

Students will understand that...

- An object can be seen when light reflected from its surface enters the eyes.
- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.
- 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

Essential Questions:

- What roles do the internal and external structures of plants serve in their growth, survival, behavior, and reproduction?
- What roles do the internal and external structures of animals serve in their growth, survival, behavior, and reproduction?
- What roles do animals' senses play in guiding their actions?
- How do eyes process light to see objects?

Assessment Evidence

Performance Tasks:

Investigate Lessons - Students will practice performance tasks in cooperative groups engaging in scientific steps of an investigation.

- Lesson 4.8: *How We See* (p. 90-91)
Draw a model to show how light reflecting from an object enters your eye allowing you to see the object.

Think Like a Scientist-Students will engage in performance tasks to plan and conduct an investigation, provide evidence and use that evidence to explain results. These tasks will be recorded in their science notebook and evaluated by a Teacher Rubric and Student Rubric.

- *Construct an Argument* (p. 76-77b)
Compare the internal and external structures of a buttercup and a wild rose. Explain how the structures of a buttercup help it to grow, survive, and reproduce.
- *Construct an Argument* (p.84-85b)
Compare the internal and external structures of a wolf and an elephant. Explain how the structures of a wolf help it to grow, survive, and reproduce.
- *Use a Model* (p. 92-93b)
Design a model to show how a mouse and a snake might receive information through their senses.

Science Career-Students will engage in performance tasks to learn about careers in science, the work scientists do, and how it connects to the current learning.

- *Dog Whisperer* (p. 94-97)
Learn about dog psychologists and how they shows owners how to change the way they treat their dogs to improve their behavior.

Other Evidence:

- Science Notebook Entries
- Quizzes
 - After Lesson 8 -- "How We See"
- Unit Test

Benchmarks: Life and Earth Science Benchmark will be given after Unit 6.

Learning Plan

Resources: National Geographic Learning: Exploring Science Teacher's Guide, Student Text Books, Interactive eBook and Website, Laptops, Student Science Notebooks

Learning Activities:

Lesson	Activities	Notebook Evidence	Materials and Suggested Resources
<p>4.1: External Structures of a Wild Rose (p. 72-73)</p> <p>Standards: 4-LS1-1 LS1.A: Structure and Function</p> <p>Objective(s):</p> <ul style="list-style-type: none"> • Identify the external structures of a wild rose. • Describe the functions served by the external structures of a wild rose. 	<p>Engage: Describe a rose Explore: Preview & Read p. 72-73 Explain:</p> <ul style="list-style-type: none"> • Identify external structures of wild rose • Describe functions of external structures of wild rose <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research plant structures used for growth, survival, and reproduction 	<ul style="list-style-type: none"> • Table of plant structures involved in growth, survival, or reproduction • "Wrap it Up!" [3] 	Plant structure research

<p>Duration: 1 Day</p>	<ul style="list-style-type: none"> • Compile information into class table • Extend thinking about wild rose's external structures <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>		
<p>4.2: Internal Structures of a Wild Rose (p. 74-75)</p> <p>Standards: 4-LS1-1 LS1.A: Structure and Function</p> <p>Objective(s):</p> <ul style="list-style-type: none"> • Identify the internal structures of a wild rose. • Describe the functions served by the internal structures of a wild rose. <p>Duration: 1 Day</p>	<p>Engage: Recall information about external structures of wild rose</p> <p>Explore: Preview & Read p. 74-75</p> <p>Explain:</p> <ul style="list-style-type: none"> • Identify internal structures of wild rose • Describe functions of internal structures of wild rose <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research images of leaves, stems, and flowers under a microscope • Extend thinking about wild rose's internal structures <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> • Diagram with labels of plant structures • "Wrap it Up!" [3] 	<p>Plant part images under a microscope</p>
<p>4.3: Construct an Argument *THINK LIKE A SCIENTIST (p. 76-77)</p> <p>Standards: 4-LS1-1</p> <p>Objective(s):</p> <ul style="list-style-type: none"> • Construct an argument that plants have internal and external structures that function to support survival, growth, and reproduction. <p>Duration: 1 Day</p>	<p>Engage: Recall information about internal and external structures of wild roses</p> <p>Explore: Preview & Read p. 76-77</p> <p>Explain:</p> <p>Elaborate:</p> <p>Evaluate: <u>Science Notebook</u> - Complete "Wrap it Up!" questions.</p>	<ul style="list-style-type: none"> • Diagram with labels of internal and external structures of buttercup • "Wrap it Up!" [3] 	<p><u>Each group of 4:</u></p> <ul style="list-style-type: none"> • Sticky Notes <p><u>Teacher</u></p> <p>N/A</p>
<p>4.4: External Structures of an Elephant (p. 78-79)</p> <p>Standards: 4-LS1-1 LS1.A: Structure and Function</p> <p>Objective(s):</p> <ul style="list-style-type: none"> • Identify the external structures of an elephant. 	<p>Engage: Describe elephants</p> <p>Explore: Preview & Read p. 78-79</p> <ul style="list-style-type: none"> • Identify internal structures of elephant • Describe functions of internal structures of elephant <p>Elaborate: <u>Science Notebook</u></p>	<ul style="list-style-type: none"> • Collage of elephant research • Notes on elephant's trunk • "Wrap it Up!" [3] 	<p>Research human and elephant intelligence and socialism</p>

<ul style="list-style-type: none"> Describe the functions performed by the external structures of an elephant. <p>Duration: 1 Day</p>	<ul style="list-style-type: none"> Research connection between humans' and Asian elephants' intelligence and socialism Create collage from research Notes about function of elephant's trunk <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>		
<p>4.5: Internal Structures of an Elephant (p. 80-81)</p> <p>Standards: 4-LS1-1 LS1.A: Structure and Function</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Identify the internal structures of an elephant. Describe the functions served by the internal structures of an elephant. <p>Duration: 1 Day</p>	<p>Engage: List human internal organs Explore: Preview & Read p. 80-81 Explain:</p> <ul style="list-style-type: none"> Identify internal organs of elephant Describe functions of internal organs of elephant <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research organs and functions of elephant's respiratory, digestive, and nervous systems Notes about differences between elephants' and humans' internal organs <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> Notes on internal systems Notes comparing elephants to humans "Wrap it Up!" [3] 	<p>Organs and functions of elephant body systems</p>
<p>4.6: Bones and Muscles of an Elephant (p. 82-83)</p> <p>Standards: 4-LS1-1 LS1.A: Structure and Function</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Identify the bones and muscles of an elephant. Describe the functions served by the bones and muscles of an elephant. <p>Duration: 1 Day</p>	<p>Engage: Share experiences with bones and muscles Explore: Preview & Read p. 82-83 Explain:</p> <ul style="list-style-type: none"> Identify bones and muscles of elephant Describe function of bones and muscles of elephant <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research how skeletal muscles work to move animals' bodies Extend thinking about elephant bones and survival <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> Notes about skeletal muscles moving bodies "Wrap it Up!" [3] 	<p>Research how skeletal muscles move animals' bodies</p>
<p>4.7: Construct an Argument *THINK LIKE A SCIENTIST</p>	<p>Engage: Recall information about internal and external structures of elephants</p>	<ul style="list-style-type: none"> List of internal and external structures of wolf 	<p><u>Each group of 4:</u></p> <ul style="list-style-type: none"> Sticky Notes

<p>(p. 84-85)</p> <p>Standards: 4-LS1-1</p> <p>Objective:</p> <ul style="list-style-type: none"> • Construct an argument that animals have internal and external structures that function to support survival, growth, and behavior. <p>Duration: 1 Day</p>	<p>Explore: Preview & Read p. 84-85</p> <p>Explain: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • List internal and external structures of wolf • Compare structures of wolf and elephant <p>Elaborate:</p> <ul style="list-style-type: none"> • Construct argument how structures help the wolf survive, grow, behave, or reproduce • Present rebuttals • Generalize findings <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • Compare structures of wolf and elephant • Fact based argument claim • “Wrap it Up!” [3] 	<p><u>Teacher</u></p> <p>N/A</p>
<p>4.8: Animal Senses (p. 86-87)</p> <p>Standards: 4-LS1-2 LS1.D: Information Processing</p> <p>Objective:</p> <ul style="list-style-type: none"> • Describe how animals use sense receptors, process information, and use perceptions and memories to guide their actions. <p>Duration: 1 Day</p>	<p>Engage: Discuss senses used when eating an apple</p> <p>Explore: Preview & Read p. 44-45</p> <p>Explain:</p> <ul style="list-style-type: none"> • Describe animal sense <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research how snakes detect sound, how flied see, and how grasshoppers feel • Extend thinking about animal senses <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • Notes about snakes, flies, and grasshoppers • “Wrap it Up!” [2] 	<p>Research how snakes hear and see, and grasshoppers feel</p>
<p>4.9: Light and Sight (p. 88-89)</p> <p>Standards: 4-PS4-2 PS4.B: Electromagnetic Radiation</p> <p>Objective:</p> <ul style="list-style-type: none"> • Describe how an object can be seen. <p>Duration: 1 Day</p>	<p>Engage: Recall information about animal senses</p> <p>Explore: Preview & Read p. 46-47</p> <p>Explain:</p> <ul style="list-style-type: none"> • Describe light and sight <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research animals that see well in the dark • Label diagrams of structures <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • Diagram with labels of animal structures for seeing in the dark • “Wrap it Up!” [3] 	<p>Research animals that see in the dark</p>
<p>4.10: How We See *INVESTIGATE (p. 90-91)</p> <p>Standards: 4-PS4-2</p>	<p>Engage: Recall clouded leopard’s sight and compare to human’s sight</p> <p>Explore: <u>Science Notebook</u></p>	<ul style="list-style-type: none"> • “How Light Allows Objects to Be Seen” table • “Wrap it Up!” [2] 	<p><u>Each group of 4:</u></p> <ul style="list-style-type: none"> • Flashlight • Box of classroom objects EX: <ul style="list-style-type: none"> ○ Ruler

<p>Objective:</p> <ul style="list-style-type: none"> Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. <p>Duration: 1 Day</p>	<ul style="list-style-type: none"> Preview, Read, & Conduct Investigation p. 90-91 <p>Explain: Share observations and conclusions.</p> <p>Elaborate: Present and discuss guiding question</p> <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>		<ul style="list-style-type: none"> Scissors Glue Pencil Marker Erase <p style="text-align: right;"><u>Teacher</u></p> <p>N/A</p>
Quiz 1			
<p>4.11: Use a Model *THINK LIKE A SCIENTIST (p. 92-93)</p> <p>Standards: 4-LS1-2</p> <p>Objective:</p> <ul style="list-style-type: none"> Use a model to describe how animals receive, process, and respond to information. <p>Duration: 2 Days</p>	<p>Engage: Summarize information about animal senses</p> <p>Explore: Preview & Read p. 48-49</p> <p>Explain:</p> <ul style="list-style-type: none"> Make a model of how mouse receives, processes, and responds to information Discuss model Research snakes Revise model – add snake <p>Elaborate:</p> <ul style="list-style-type: none"> Share models in partners Research how owls receive, process, and respond to information Extend thinking by adding owl to model <p>Evaluate: <u>Science Notebook</u> - Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> Model of mouse senses Evidence of collaboration Revised model with snake Proof of snake research <ul style="list-style-type: none"> “Wrap it Up!” [3] 	<p style="text-align: center;"><u>Each student:</u></p> <ul style="list-style-type: none"> Science Notebook Pencil <p style="text-align: center;"><u>Teacher</u></p> <p>Snakes website Rattlesnake website</p>
<p>4.12: Dog Whisperer *SCIENCE CAREER (p. 94-95)</p> <p>Standards: Scientific Knowledge is Based on Empirical Evidence</p> <p>Objective:</p> <ul style="list-style-type: none"> Connect the concepts of animals’ structure, function, and information processing with the career of an exceptional dog trainer, or “dog whisperer.” <p>Duration: 1 Day</p>	<p>Engage: Share experiences with dogs and behaviors</p> <p>Explore: Preview & Read p. 48-49</p> <p>Explain:</p> <ul style="list-style-type: none"> Describe work of dog trainer Connect Science topics to Career of Dog Whisperer <p>Elaborate:</p> <ul style="list-style-type: none"> Research Cesar Milan Extend thinking about animal behavior <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> “Wrap it Up!” [3] 	<p>Research Cesar Milan</p>
Review/Flex Day			
<p>Unit 4 Test 80 pts. Question/Answer 20 pts. PBA – “Think Like a Scientist” Lesson 4.11 (Rubric TR p. 23)</p>			

Standard(s): 4-PS4-2	
Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. (Unit 4, Lessons 9-10)	
4.0	Students will be able to: <ul style="list-style-type: none"> • Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen, and provide real world examples.
3.0	Students will be able to: <ul style="list-style-type: none"> • Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
2.0	Students will be able to: <ul style="list-style-type: none"> • Develop a model to show how light allows objects to be seen.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Standard(s): 4-LS1-1	
Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. (Unit 4, Lessons 1-7)	
4.0	Students will be able to: <ul style="list-style-type: none"> • Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction, and provide real world examples.
3.0	Students will be able to: <ul style="list-style-type: none"> • Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
2.0	Students will be able to: <ul style="list-style-type: none"> • Describe the internal and external structures of plants and animals.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Standard(s): 4-LS1-2	
Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. (Unit 4, Lessons 8, 11)	
4.0	Students will be able to: <ul style="list-style-type: none"> • 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, and provide real world examples.
3.0	Students will be able to: <ul style="list-style-type: none"> • 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.
2.0	Students will be able to: <ul style="list-style-type: none"> • Use a model to show how animals use their senses.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Unit 4 Modifications for Special Population Students

Advanced Learners	<ul style="list-style-type: none"> • Use Elaborate sections of the lessons to extend student thinking. Lesson 4.3: Construct an Argument (p. 76-77b) <ul style="list-style-type: none"> - Students conduct additional research to observe the broad variety within typical plant structures. Lesson 4.9: Light and Sight (p. 88-89) <ul style="list-style-type: none"> - Students present labeled drawings of animals and explain findings to the class. • Allow students to complete investigations, Think Like a Scientist, Think Like an Engineer, and Science Careers independently. Lesson 4.3: Construct an Argument (p. 76-77b) Lesson 4.7: Construct an Argument (p.84-85b) Lesson 4.8: How We See (p. 90-91) Lesson 4.11: Use a Model (p. 92-93b) Lesson 4.12: Dog Whisperer (p. 94-97)
Struggling Learners	<ul style="list-style-type: none"> • Utilize online student text book with text-to-speech option • Provide pre-formatted, partially completed, or fully completed notebook pages • Provide reading assistance (research) <ul style="list-style-type: none"> - Use leveled research materials
English Language Learners	<ul style="list-style-type: none"> • Utilize online student text book with text-to-speech option • Preview vocabulary: <ul style="list-style-type: none"> - Provide visual, verbal, and written examples together - Group related words Lesson 4.2: Internal Structures of a Wild Rose – <i>pistil, stamens</i> Lesson 4.9: Light and Sight – <i>reflects</i>
Special Needs Learners	<ul style="list-style-type: none"> • Utilize online student text book with text-to-speech option • Preview vocabulary: <ul style="list-style-type: none"> - Provide visual, verbal, and written examples together - Group related words Lesson 4.2: Internal Structures of a Wild Rose – <i>pistil, stamens</i> Lesson 4.9: Light and Sight – <i>reflects</i> • Provide pre-formatted, partially completed, or fully completed notebook pages • Provide reading assistance (research) <ul style="list-style-type: none"> - Use leveled research materials - Assist in identifying relevant facts or provide previously identified facts • Modify Format of “Wrap it Up!” questions <ul style="list-style-type: none"> - Provide sentence starters - Provide word banks or key phrases - Allow answers to be given orally

Interdisciplinary Connections

Indicators:

ELA/Literacy-

RI.4.1-Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-LS1-1)

SL.4.5-Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-PS4-2, 4-LS1-2)

Mathematics-

MP.4-Model with mathematics. (4-PS4-2)

4.G.A.1-Draw points, lines, line segments, rays, angles, (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (4-PS4-2)

4.G.A.3-Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. (4-LS1-1)

Integration of 21st Century Skills

Indicators:

- 8.1.5.A.1**-Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
- 8.1.5.A.3**-Use a graphic organizer to organize information about a problem or issue.
- 8.1.5.E.1**-Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.
- 8.1.5.F.1**-Apply digital tools to collect, organize, and analyze data that support a scientific finding.
- 8.2.5.A.3**-Investigate and present factors that influence the development and function of products and systems, e.g. resources, criteria, and constraints.
- 8.2.5.B.4**-Research technologies that have changed due to society's changing needs and wants.
- 8.2.5.C.1**-Collaborate with peers to illustrate components of a designed system.
- 8.2.5.C.2**-Explain how specifications and limitations can be used to direct a product's development.
- 8.2.5.C.4**-Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
- 8.2.5.D.1**-Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered.
- 8.2.5.D.2**-Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process to evaluate potential solutions.
- 9.2.4.A.3**-Investigate both traditional and nontraditional careers and relate information to personal likes and dislikes.

Unit Title: Unit 5: Earth Science-Earth's Systems: Processes That Shape the Earth

Unit Description:

The students will be introduced to the natural processes that shape the Earth. They will learn about ecosystems and how the Earth is changed by wind, water, ice, living things, and landslides.

Unit Duration: 20 Days

Desired Results

Standard(s):

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. [Clarification Statement: Examples of variables to test could include angle of the slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.]

3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Indicators:

ESS2.A: 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. (4-ESS2-1)

ESS2.E: Biogeology

- Living things affect the physical characteristics of their regions. (4-ESS2-1)

Understandings:

Students will understand that...

- 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
- Living things affect the physical characteristics of their regions

Essential Questions:

- How does the amount of rainfall affect the types of living things found in a region?
- How do water, ice, wind, living organisms, and gravity change and shape the land?
- How do weathering, erosion, and deposition shape and change the land?

Assessment Evidence

Performance Tasks:

Investigate Lessons-Students will practice performance tasks in cooperative groups engaging in scientific steps of an investigation.

- Lesson 10: *Weathering and Erosion* (p. 118-119)
Predict and observe two ways weathering and erosion can change sandstone.
- Lesson 4: *How Waves Move Objects* (p. 58-59)
Create waves and observe the wave and motion of the objects in the water.
- Lesson 7: *Use a Code* (p. 64-65)
Create and transmit a message using Morse code.

Think Like an Engineer-Students will engage in performance tasks to design, build, and test a prototype device and analyze and improve results. These tasks will be recorded in their science notebook and evaluated by a Teacher Rubric and Student Rubric.

- Lesson *Make Observations* (p. 126-129)
Create a way to prevent soil eroding from farmer's fields.

Other Evidence:

- Science Notebook Entries
- Quizzes
 - After Lesson 5 -- "Eastern Temperate Forest"
 - After Lesson 13-- "Landslides Change Earth's Surface"
- Unit Test

Benchmarks: Life and Earth Science Benchmark will be given after Unit 6.

Learning Plan

Resources: National Geographic Learning: Exploring Science Teacher's Guide, Student Text Books, Interactive eBook and Website, Laptops, Student Science Notebooks

Learning Activities:

Lesson	Activities	Notebook Evidence	Materials and Suggested Resources
<p>5.1: Rainfall in the United States (p. 100-101)</p> <p>Standards: 4-ESS2-1 ESS2.A: Earth Materials and Systems</p> <p>Objective(s):</p> <ul style="list-style-type: none"> • Describe how the amount of rainfall varies in different parts of the United States. • Explain how the amount of rainfall affects the types of living things found in a region. <p>Duration: 1 Day</p>	<p>Engage: Discuss how heavy rain affects land locally</p> <p>Explore: Preview & Read p. 100-101</p> <p>Explain:</p> <ul style="list-style-type: none"> • Contrast average annual precipitation • Describe how rainfall affects types of living things in a region <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research close-up photos of plants from regions • Label or summarize results <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> • Photos of plants from different regions • "Wrap it Up!" [3] 	<p>Research close up photos of plants</p>
<p>5.2: Pacific Northwest Forest (p.102-103)</p>	<p>Engage: Use map on p. 100-101 to discuss rainfall in Pacific Northwest</p>	<ul style="list-style-type: none"> • Notes about other plants and animals from the Pacific Northwest 	<p>Research plants and animals from the Pacific Northwest</p>

<p>Standards: 4-ESS2-1 ESS2.A: Earth Materials and Systems</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Describe how the amount of rainfall affects the types of living things found in the Pacific Northwest forests. And identify some of the living things of the Pacific Northwest forests. <p>Duration: 1 Day</p>	<p>Explore: Preview & Read p. 102-103</p> <p>Explain:</p> <ul style="list-style-type: none"> Identify animals in Northwest Forests Generalize about plants of Pacific Northwest Draw conclusions about weather <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research other plants and animals from Pacific Northwest Role-play conversation between organisms <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> “Wrap it Up!” [3] 	
<p>5.3: Southwest Desert (p. 104-105)</p> <p>Standards: 4-ESS2-1 ESS2.A: Earth Materials and Systems</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Identify some of the living things in this Sonoran Desert. Describe how the amount of rainfall affects the types of living things found in deserts of the southwestern United States. <p>Duration: 1 Day</p>	<p>Engage: Recall information about Pacific Northwest Forest</p> <p>Explore: Preview & Read p. 104-105</p> <p>Explain:</p> <ul style="list-style-type: none"> Compare rainfall in Southwest desert with Pacific Northwest Explain how living things survive in desert <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research desert plant or animal Label drawing of desert organism <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> Diagram & labels of desert organism “Wrap it Up!” [3] 	<p>Research plants and animals from the Southwest Desert</p>
<p>5.4: Central Plains Grassland (p. 106-107)</p> <p>Standards: 4-ESS2-1 ESS2.A: Earth Materials and Systems</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Contrast the amount of rain that falls in grasslands with the amounts that fall in deserts and forests. Identifies some of the organisms that live in a grassland (prairie). 	<p>Engage: Use map on p. 100-101 to discuss rainfall in grasslands</p> <p>Explore: Preview & Read p. 106-107</p> <p>Explain:</p> <ul style="list-style-type: none"> Describe rainfall in grasslands Explain how animals survive in grasslands Explain how plants survive in grasslands <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research plant& animal survival in grasslands Make study card(s) 	<ul style="list-style-type: none"> Notes about grassland organisms Study card(s) “Wrap it Up!” [3] 	<p>Research plants and animals from the Central Plains Grasslands</p>

<p>Duration: 1 Day</p>	<p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>		
<p>5.5: Eastern Temperate Forest (p. 108-109)</p> <p>Standards: 4-ESS2-1 ESS2.A: Earth Materials and Systems</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Describe the rainfall in an eastern temperate forest. Identify some of the organisms that live in an eastern temperate forest. <p>Duration: 1 Day</p>	<p>Engage: Use map on p. 100-101 to discuss rainfall in eastern temperate forest</p> <p>Explore: Preview & Read p. 108-109</p> <p>Explain:</p> <ul style="list-style-type: none"> Describe climate in Eastern temperate forest Identify living things in temperate forests Explain how living things survive in temperate forests <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research how climate affects a variety of organisms in the Eastern temperate forest <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> Notes about climate and organisms in Eastern temperate forest “Wrap it Up!” [3] 	<p>Research how climate affects organisms in the Eastern Temperate Forest</p>
<p>Quiz 1</p>			
<p>5.6: Weathering (p. 110-111)</p> <p>Standards: 4-ESS2-1 ESS2.A: Earth Materials and Systems</p> <p>Objective(s):</p> <ul style="list-style-type: none"> Define a weathering and identify agents of weathering. Explain how water and wind can break rocks into smaller particles. <p>Duration: 1 Day</p>	<p>Engage: Discuss what wind with dirt and sand feels like</p> <p>Explore: Preview & Read p. 110-111</p> <p>Explain:</p> <ul style="list-style-type: none"> Define & describe weathering & sediment Explain how rocks weather <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research how water and wind weather rocks in arid areas Draw and label process of weathering to form rock arch <ul style="list-style-type: none"> Make collage of weathered rocks <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> Diagram of weathering process “Wrap it Up!” [2] 	<p>Research how water and wind weather rocks in arid areas</p>
<p>5.7: Erosion and Deposition (p. 112-113)</p> <p>Standards: 4-ESS2-1 ESS2.A: Earth Materials and Systems</p>	<p>Engage: Discuss how earth-moving machines change the land</p> <p>Explore: Preview & Read p. 112-113</p> <p>Explain:</p>	<ul style="list-style-type: none"> Notes about local erosion and deposition “Wrap it Up!” [3] 	<p>Research how erosion and deposition change local land</p>

<p>Objective:</p> <ul style="list-style-type: none"> Recognize how erosion and depositions of sediment can shape and change the land. <p>Duration: 1 Day</p>	<ul style="list-style-type: none"> Define & describe sediment & deposition Recognize how erosion and deposition shape and change land <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research how erosion and deposition change local land Table summarizing findings Design travel brochure for landmark <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>		
<p>5.8: Wind Changes the Land (p. 114-115)</p> <p>Standards: 4-ESS2-1 ESS2.A: Earth Materials and Systems</p> <p>Objective:</p> <ul style="list-style-type: none"> Explain how wind can weather rocks to form sediment, as well as erode and deposit sediment. Describe how sand dunes form. <p>Duration: 1 Day</p>	<p>Engage: Discuss sand dunes</p> <p>Explore: Preview & Read p. 114-115</p> <p>Explain:</p> <ul style="list-style-type: none"> Explain how wind breaks rocks into smaller pieces Explain how wind moves sediment around Describe how sand dunes form <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research linear, crescent, star, dome and parabolic dunes Make table with drawings to summarize findings <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> Table with drawings of types of sand dunes “Wrap it Up!” [3] 	<p>Research types of dunes</p>
<p>5.9: Water Changes the Land (p. 116-117)</p> <p>Standards: 4-ESS2-1 ESS2.A: Earth Materials and Systems</p> <p>Objective:</p> <ul style="list-style-type: none"> Recognize how landforms such as canyons form as the result of erosion by water. <p>Duration: 1 Day</p>	<p>Engage: Discuss what running water during a heavy rain looks like</p> <p>Explore: Preview & Read p. 116-117</p> <p>Explain:</p> <ul style="list-style-type: none"> Explain how moving water changes land Explain how canyons form <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research history, organisms, geology, etc. of Zion National Park Combine finding to create class presentation <p>Evaluate: <u>Science Notebook</u></p>	<ul style="list-style-type: none"> Notes about Zion National Park “Wrap it Up!” [2] 	<p>Research Zion National Park</p>

	Complete "Wrap it Up!" questions		
<p>5.10: Weathering and Erosion *INVESTIGATE (p. 118-119)</p> <p>Standards: 4-ESS2-1 ESS2.A: Earth Materials and Systems</p> <p>Objective:</p> <ul style="list-style-type: none"> • Model the processes of weathering and the version. • Describe how weathering and erosion can change the land. <p>Duration: 1 Day</p>	<p>Engage: Identify and describe examples of weathering Explore: <i>Science Notebook</i></p> <ul style="list-style-type: none"> • Preview, Read, & Conduct Investigation p. 118-119 <p>Explain: Share observations & conclusions Elaborate: Present & discuss guiding question Evaluate: <i>Science Notebook</i> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> • "Observations of Sandstone" table (TR p. 25) • "Wrap it Up!" [3] 	<p><u>Each group of 4:</u></p> <ul style="list-style-type: none"> • 5 pieces of sandstone • Paper towel • Pitcher of water • 16 oz. jar with lid • Hand lens • Stopwatch
<p>5.11: Ice Changes the Land (p. 120-121)</p> <p>Standards: 4-ESS2-1 ESS2.A: Earth Materials and Systems</p> <p>Objective:</p> <ul style="list-style-type: none"> • Recognize has some landforms and land features are the result of changes made by ice. <p>Duration: 1 Day</p>	<p>Engage: Discuss what happens to a container of liquid left in the freezer Explore: Preview & Read p. 120-121</p> <ul style="list-style-type: none"> • Define glaciers • Explain how ice changes Earth's surface <p>Elaborate: <i>Science Notebook</i></p> <ul style="list-style-type: none"> • Research how landforms (kames, drumlins, eskers, moraines, kettle lakes, striations, horns, aretes, and cirques) are formed by ice • Make chart to record findings <p>Evaluate: <i>Science Notebook</i> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> • Chart of findings about landforms formed by ice • "Wrap it Up!" [2] 	<p>Research how landforms are formed by ice</p>
<p>5.12: Living Things Change the Land (p. 122-123)</p> <p>Standards: 4-ESS2-1 ESS2.A: Earth Materials and Systems ESS2.E: Biogeology</p> <p>Objective:</p> <ul style="list-style-type: none"> • Explain how living things can break rocks and soil into smaller particles and move them around to change the land on which they live. <p>Duration: 1 Day</p>	<p>Engage: Share observations of animals changing the land Explore: Preview & Read p. 122-123 Explain:</p> <ul style="list-style-type: none"> • Explain how organisms affect land <p>Elaborate: <i>Science Notebook</i></p> <ul style="list-style-type: none"> • Research how organisms change land • Share personal experiences with organisms changing land <p>Evaluate: <i>Science Notebook</i></p>	<ul style="list-style-type: none"> • Notes about how organisms change land • "Wrap it Up!" [2] 	<p>Research how organisms change land</p>

	Complete "Wrap it Up!" questions		
<p>5.13: Landslides Change Earth's Surface (p. 124-125)</p> <p>Standards: 4-ESS2-1 ESS2.A: Earth's Materials and Systems</p> <p>Objective:</p> <ul style="list-style-type: none"> Explain the role of gravity in moving soil and rocks around. Define <i>landslide</i>, and explain what causes these movements of rocks and soil. <p>Duration: 1 Day</p>	<p>Engage: Discuss how steepness of a slide affects speed</p> <p>Explore: Preview & Read p. 124-125</p> <p>Explain:</p> <ul style="list-style-type: none"> Define gravity Describe landslides & explain what causes them <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research images of gravity moving rocks and soil Discuss ways to mass movements can be prevented or reduced <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> Images of gravity moving earth "Wrap it Up!" [3] 	<p>Research images of gravity moving rocks and soil</p>
Quiz 2			
<p>5.14: Make Observations *THINK LIKE AN ENGINEER (p. 126-129)</p> <p>Standards: 4-ESS2-1, 3-5-ETS1-3</p> <p>Objective:</p> <ul style="list-style-type: none"> Work with a group to design and test a method to reduce the rate of erosion on a hillside. Use evidence from their test to defend the effectiveness of their method for slowing the rate of erosion. <p>Duration: 3 Days</p>	<p>Engage: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Describe examples of weathering Read introduction on p. 126 Define problem <p>Explore</p> <ul style="list-style-type: none"> Design & build erosion reducer prototype Test erosion reducer & record observations <p>Explain: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Refine or change solution Test & record observations Analyze & present results <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Revise designs <p>Evaluate: <u>Science Notebook</u> - Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> Question from p. 126 "Amount of Erosion" tables (TR p. 26) "Wrap it Up!" [3] 	<p><u>Each group of 4:</u></p> <ul style="list-style-type: none"> Soil, potting soil, or sand 3 sturdy plastic or aluminum pans (deep enough to hold soil) Watering cans with sprinkler heads Pans for collecting water Plastic measuring cups or graduated cylinders Water Rulers Bricks or blocks of wood Stopwatches Mulch, shredded newspaper, grass clippings, small stones, craft sticks Aluminum foil Poster board Markers <p style="text-align: right;"><u>Teacher</u></p> <p>N/A</p>
Review / Flex Day			
<p>Unit 5 Test 20 pts. PBA – "Think Like an Engineer" 5.14 (Rubric TR p. 27)</p>			

Unit Learning Goal and Scale

(Level 2.0 reflects a minimal level of proficiency)

Standard(s):

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. (Unit 5, Lessons 1-13)

4.0	<p>Students will be able to:</p> <ul style="list-style-type: none"> • Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation, and provide real world examples.
3.0	<p>Students will be able to:</p> <ul style="list-style-type: none"> • Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
2.0	<p>Students will be able to:</p> <ul style="list-style-type: none"> • Identify different causes of weathering and erosion. Identify where weathering and erosion have occurred.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Standard(s):

3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. (Unit 5, Lesson 14)

4.0	<p>Students will be able to:</p> <ul style="list-style-type: none"> • Independently plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
3.0	<p>Students will be able to:</p> <ul style="list-style-type: none"> • Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
2.0	<p>Students will be able to:</p> <ul style="list-style-type: none"> • Plan and carry out fair tests of a model or prototype.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Unit 5 Modifications for Special Population Students

Advanced Learners

- Use Elaborate sections of the lessons to extend student thinking.
 - Lesson 5.2 Pacific Northwest (p. 102-103)
 - Pairs of students role-play a conversation between a plant and animal found in the Pacific Northwest.
 - Lesson 5.5: Eastern Temperate Forest (p. 108-109)
 - Students present their research to describe how the characteristics of a specific type of organism allow it to survive in the temperate forest.
 - Lesson 5.7: Erosion and Deposition (p. 112-113)
 - Students choose a favorite landform feature in their area and create a travel brochure.
 - Lesson 5.10: Weathering and Erosion (p. 118-119)
 - Students complete experiment with additional rocks of different hardness and present their results.
 - Lesson 5.13: Landslides Change Earth's Surface (p. 124-125)
 - Students work in a small group to discuss how some types of mass movements can be prevented or reduced.

	<ul style="list-style-type: none"> • Allow students to complete investigations, Think Like a Scientist, Think Like an Engineer, and Science Careers independently. Lesson 5.4: How Waves Move Objects (p. 58-59) Lesson 5.7: Use a Code (p. 64-65) Lesson 5.10: Weathering and Erosion (p. 118-119) Lesson 5.14: Make Observations (p. 126-129)
Struggling Learners	<ul style="list-style-type: none"> • Utilize online student text book with text-to-speech option • Provide pre-formatted, partially completed, or fully completed notebook pages • Provide reading assistance (research) <ul style="list-style-type: none"> – Use leveled research materials
English Language Learners	<ul style="list-style-type: none"> • Utilize online student text book with text-to-speech option • Preview vocabulary: <ul style="list-style-type: none"> ○ Provide visual, verbal, and written examples together ○ Group related words Lesson 5.6: Weathering – <i>weathering, sediment</i> Lesson 5.7: Erosion and Deposition – <i>erosion, deposition</i> Lesson 5.8: Wind Changes the Land – <i>sand dunes</i> Lesson 5.11: Ice Changes the Land – <i>glacier</i> Lesson 5.12: Living Things Change the Land – <i>organisms</i> Lesson 5.13: Landslides Change Earth’s Surface – <i>gravity, landslide</i>
Special Needs Learners	<ul style="list-style-type: none"> • Utilize online student text book with text-to-speech option • Preview vocabulary: <ul style="list-style-type: none"> – Provide visual, verbal, and written examples together – Group related words Lesson 5.6: Weathering – <i>weathering, sediment</i> Lesson 5.7: Erosion and Deposition – <i>erosion, deposition</i> Lesson 5.8: Wind Changes the Land – <i>sand dunes</i> Lesson 5.11: Ice Changes the Land – <i>glacier</i> Lesson 5.12: Living Things Change the Land – <i>organisms</i> Lesson 5.13: Landslides Change Earth’s Surface – <i>gravity, landslide</i> • Provide pre-formatted, partially completed, or fully completed notebook pages • Provide reading assistance (research) <ul style="list-style-type: none"> – Use leveled research materials – Assist in identifying relevant facts or provide previously identified facts • Modify Format of “Wrap it Up!” questions <ul style="list-style-type: none"> – Provide sentence starters – Provide word banks or key phrases – Allow answers to be given orally

Interdisciplinary Connections

Indicators:

ELA/Literacy-

W.4.8-Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-ESS2-1)

Mathematics-

MP.2-Reason abstractly and quantitatively. (4-ESS2-1)

MP.4-Model with mathematics. (4-ESS2-1)

MP.5-Use appropriate tools strategically. (4-ESS2-1)

4.MD.A.1-Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (4-ESS2-1)

4.MD.A.2-Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. (4-ESS2-1)

Integration of 21st Century Skills

Indicators:

- 8.1.5.A.1**-Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
- 8.1.5.A.3**-Use a graphic organizer to organize information about a problem or issue.
- 8.1.5.E.1**-Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.
- 8.1.5.F.1**-Apply digital tools to collect, organize, and analyze data that support a scientific finding.
- 8.2.5.A.3**-Investigate and present factors that influence the development and function of products and systems, e.g. resources, criteria, and constraints.
- 8.2.5.B.4**-Research technologies that have changed due to society's changing needs and wants.
- 8.2.5.C.1**-Collaborate with peers to illustrate components of a designed system.
- 8.2.5.C.2**-Explain how specifications and limitations can be used to direct a product's development.
- 8.2.5.C.4**-Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
- 8.2.5.D.1**-Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered.
- 8.2.5.D.2**-Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process to evaluate potential solutions.

Unit Title: Unit 6: Earth Science-Natural Hazards

Unit Description:

The students will be introduced to natural hazards. They will learn about earthquakes, tsunamis, and volcanoes, and how to respond to natural hazards.

Unit Duration: 23 Days

Desired Results

Standard(s):

4-ESS1-1: Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. [Clarification Statement: Examples of evidence from patterns could include rock layers with shell fossils above rock layers with plant fossils and no shells, indicating a change from water to land over time; and a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.] [Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.]

4-ESS2-2: Analyze and interpret data from maps to describe patterns of Earth's features. [Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]

4-ESS3-2: Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. [Clarification Statement: Examples of solutions could include designing an earthquake-resistant building and improving monitoring of volcanic activity.] [Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.]

3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Indicators:

ESS1.C: 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. (4-ESS1-1)

ESS2.B: 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 areas of Earth. (4-ESS2-2)

ESS3.B: Natural Hazards

- A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2) (*Note: This Disciplinary Core Idea can also be found in 3.WC.*)

ETS1.B: Designing Solutions to Engineering Problems

- Testing a solution involves investigating how well it performs under a range of likely conditions. (*secondary to 4-ESS3-2*)

Understandings:

Students will understand that...

- 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.
- 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 areas of Earth.
- A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts.
- Testing a solution involves investigating how well it performs under a range of likely conditions.

Essential Questions:

- What is a hazard?
- What are some different kinds of hazards caused by natural processes?
- What causes natural hazards?
- How do natural hazards shape the Earth?
- How can human reduce the impact of natural hazards?
- How can humans collect and use information for detect natural hazards early?

Assessment Evidence

Performance Tasks:

Investigate Lessons - Students will practice performance tasks in cooperative groups engaging in scientific steps of an investigation.

- *Lesson 6.3: Earthquakes* (p. 134-135)
Create a model to show how earthquakes affect structures built on sand or mud.

Think Like an Engineer - Students will engage in performance tasks to design, build, and test a prototype device and analyze and improve results. These tasks will be recorded in their science notebook and evaluated by a Teacher Rubric and Student Rubric.

- *Building for the Future* (p. 150-153)
Research and describe two ways that engineers have devised to help reduce hazards from earthquakes.
- *Generate and Compare Solutions* (p. 154-157)
Design and build earthquake resistant buildings.

Think Like a Scientist-Students will engage in performance tasks to plan and conduct an investigation, provide evidence and use that evidence to explain results. These tasks will be recorded in their science notebook and evaluated by a Teacher Rubric and Student Rubric.

- *Analyze and Interpret Data* (p. 148-149)
Use a world map to analyze the locations of earthquakes and active volcanoes and compare their locations.
- *Identify Evidence* (p.162-165)
Identify evidence from patterns and fossils to explain how the Grand Canyon has changed over time.

Science Career - Students will engage in performance tasks to learn about careers in science, the work scientists do, and how it connects to the current learning.

- *Crisis Mapper* (p. 68-69)
Learn about crisis mappers and how they use information from the government and social media to map the impact of natural disasters.

Other Evidence:

- Science Notebook Entries
- Quizzes
 - After Lesson 9 -- “Patterns of Water and Land Features”
- Unit Test
- Life and Earth Science Benchmark

Benchmarks: Life and Earth Science Benchmark will be given after this unit.

Learning Plan

Resources: National Geographic Learning: Exploring Science Teacher’s Guide, Student Text Books, Interactive eBook and Website, Laptops, Student Science Notebooks

Learning Activities:

Lesson	Activities	Notebook Evidence	Materials and Suggested Resources
<p>6.1: Natural Hazards (p. 130-131)</p> <p>Standards: 4-ESS3-2 ESS3.B: Natural Hazards</p> <p>Objective(s):</p> <ul style="list-style-type: none"> • Identify some natural hazards 	<p>Engage: Share experiences with natural hazards</p> <p>Explore: Preview & Read p. 130-131</p> <p>Explain:</p> <ul style="list-style-type: none"> • Define hazard • Identify natural hazards 	<ul style="list-style-type: none"> • Notes about specific natural hazards • “Wrap it Up!” [3] 	<p>Research earthquakes, tsunamis, and volcanic eruptions</p>

<ul style="list-style-type: none"> • Explain why earthquakes, tsunamis, and volcanic eruptions can be hazardous events <p>Duration: 1 Day</p>	<ul style="list-style-type: none"> • Explain why earthquakes, volcanoes, and tsunamis can be hazardous <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research & take notes about specific earthquakes, tsunamis, and volcanic eruptions <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>		
<p>6.2: Earthquakes (p. 132-133)</p> <p>Standards: 4-ESS3-2 ESS3.B: Natural Hazards</p> <p>Objective(s):</p> <ul style="list-style-type: none"> • Describe earthquakes • Identify the hazards to humans that result from earthquakes <p>Duration: 1 Day</p>	<p>Engage: Share experiences with water waves</p> <p>Explore: Preview & Read p. 132-133</p> <p>Explain:</p> <ul style="list-style-type: none"> • Define fault • Describe earthquakes • Identify hazards caused by earthquakes <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research images and descriptions of Japan Earthquake, March 2011 • Create collage • Extend thinking about earthquake hazards <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • Notes about Japan Earthquake, March 2011 • “Wrap it Up!” [3] 	<p>Research Japan Earthquake, March 2011</p>
<p>6.3: Earthquakes *INVESTIGATE (p. 134-135)</p> <p>Standards: PS3.B, PS3.C</p> <p>Objective(s):</p> <ul style="list-style-type: none"> • Define liquefaction • Model what happens during liquefaction <p>Duration: 1 Day</p>	<p>Engage: Discuss <i>quicksand</i></p> <p>Explore: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Preview, Read, & Conduct Investigation on p. 134-135 <p>Explain: Share observations & conclusions</p> <p>Elaborate: Present & discuss guiding questions</p> <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • Table of predictions and observations for investigation • “Wrap it Up!” [3] 	<p><u>Each group of 4:</u></p> <ul style="list-style-type: none"> • 1 lb. fine-grain sand • Water • Rectangular wooden block • Plastic pan • Mallet
<p>6.4: Tsunamis (p. 136-137)</p> <p>Standards: 4-ESS3-2 ESS3.B: Natural Hazards</p> <p>Objective(s):</p> <ul style="list-style-type: none"> • Explain why tsunamis can be hazardous events • Describe damage caused by tsunamis 	<p>Engage: Share experience with large water waves</p> <p>Explore: Preview & Read p. 136-137</p> <p>Explain:</p> <ul style="list-style-type: none"> • Identify 3 causes of tsunamis • Explain why tsunamis are dangerous <p>Elaborate: <u>Science Notebook</u></p>	<ul style="list-style-type: none"> • Notes about tsunami warning systems • Brochure • “Wrap it Up!” [3] 	<p>Tsunami warning systems website</p>

<p>Duration: 1 Day</p>	<ul style="list-style-type: none"> • Research tsunami warning systems <ul style="list-style-type: none"> ○ Produce informational brochure <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>		
<p>6.5: Volcanoes (p. 138-139)</p> <p>Standards: 4-ESS3-2 ESS3.B: Natural Hazards</p> <p>Objective(s):</p> <ul style="list-style-type: none"> • Explain that volcanic eruptions are natural hazards • Describe some types of damage caused by volcanic eruptions <p>Duration: 1 Day</p>	<p>Engage: Present adages about things that happen quickly and relate to natural hazards</p> <p>Explore: Preview & Read p. 138-139</p> <p>Explain:</p> <ul style="list-style-type: none"> • Define and contrast magma & lava • Describe what happens during a volcanic eruption • Explain why volcanoes can be hazardous <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research recent (within 200 years) volcanic eruptions <ul style="list-style-type: none"> ○ Produce timeline <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • Notes about recent volcanic eruptions’ impact on people • Timeline • “Wrap it Up!” [3] 	<p>Volcanic eruptions</p>
<p>6.6: Reducing the Impact of Natural Hazards (p. 140-141)</p> <p>Standards: 4-ESS3-2 ESS3.B: Natural Hazards</p> <p>Objective(s):</p> <ul style="list-style-type: none"> • Explain how people can reduce some of the impacts of an earthquake <p>Duration: 1 Day</p>	<p>Engage: Recall information about earthquakes</p> <p>Explore: Preview & Read p. 140-141</p> <p>Explain:</p> <ul style="list-style-type: none"> • Explain why bridge was designed to withstand earthquakes • Explain how bridge was designed to reduce the impact of earthquakes <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research impacts of earthquake on Bay Bridge <ul style="list-style-type: none"> ○ News article <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • Notes about 1989 earthquake’s impact on Bay Bridge • News Article • “Wrap it Up!” [2] 	<p>1989 Earthquake & Bay Bridge</p>
<p>6.7: Early Warning Systems (p. 142-143)</p> <p>Standards: 4-ESS3-2 ESS3.B: Natural Hazards</p>	<p>Engage: Recall impacts earthquakes and volcanoes have on humans</p> <p>Explore: Preview & Read p. 142-143</p> <p>Explain:</p>	<ul style="list-style-type: none"> • Table about seismometers, tiltmeters, etc • “Wrap it Up!” [2] 	<p>Seisometers, tiltmeters, instruments used to monitor natural hazards</p>

<p>Objective:</p> <ul style="list-style-type: none"> • Explain how people can reduce some of the impacts of natural hazards such as earthquakes and volcanic eruptions <p>Duration: 1 Day</p>	<ul style="list-style-type: none"> • Explain how some of the impacts of earthquakes can be reduced • Explain how some of the impacts of volcanic eruptions can be reduced <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research instruments used to monitor natural hazards <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>		
<p>6.8: Tsunami Detection (p. 144-145)</p> <p>Standards: 4-ESS3-2 ESS3.B: Natural Hazards</p> <p>Objective:</p> <ul style="list-style-type: none"> • Explain how a warning system can alert people to possible tsunamis • Interpret a diagram to explain how the warning system works <p>Duration: 1 Day</p>	<p>Engage: Recall definition and impacts tsunamis have on humans</p> <p>Explore: Preview & Read p. 144-145</p> <p>Explain:</p> <ul style="list-style-type: none"> • Explain how impacts of tsunamis can be reduced • Explain how the tsunami warning system works <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Research “Ring of Fire” <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • Notes about Ring of Fire • “Wrap it Up!” [2] 	Ring of Fire
<p>6.9: Patterns of Water and Land Features (p. 146-147)</p> <p>Standards: 4-ESS2-2 ESS2.B: Plate Tectonics and Large Scale System Interactions</p> <p>Objective:</p> <ul style="list-style-type: none"> • Interpret a map to identify the locations of some land and water features of earth • Recognize that these features occur in patterns <p>Duration: 1 Day</p>	<p>Engage: Define and name mountains</p> <p>Explore: Preview & Read p. 146-147</p> <p>Explain:</p> <ul style="list-style-type: none"> • Recognize that major mountain chains form inside continents or near their edges • Compare and contrast some features of the ocean floor <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> • Label map with mountain ranges, mid-Atlantic Ridge, and deep ocean trench <p>Evaluate: <u>Science Notebook</u> Complete “Wrap it Up!” questions</p>	<ul style="list-style-type: none"> • Map with labels • “Wrap it Up!” [3] 	Copies of map on p. 146-147
<p>Quiz 1</p>			

<p>6.10: Analyze and Interpret Data *THINK LIKE A SCIENTIST (p. 148-149)</p> <p>Standards: 4-ESS2-2</p> <p>Objective:</p> <ul style="list-style-type: none"> Analyze and interpret data from maps to describe patterns of Earth's features <p>Duration: 1 Day</p>	<p>Engage: Summarize information about mountains from map on p. 146-147 Explore: Preview & Read p. 148-149 Explain:</p> <ul style="list-style-type: none"> Analyze map on p. 146-147 Interpret data from map <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research recent earthquake and volcanic activity <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> Notes about earthquake and volcanic activity "Wrap it Up!" (4) 	<p>Recent (within 200 years) earthquake and volcanic activity</p>
<p>6.11: Building for the Future *THINK LIKE AN ENGINEER Case Study (p. 150-153)</p> <p>Standards: 4-ESS3-2 ESS3.B: Natural Hazards</p> <p>Objective:</p> <ul style="list-style-type: none"> Identify some of the hazards resulting from earthquakes Describe two ways that engineers have devised to help reduce the impacts of hazards from earthquakes <p>Duration: 1 Day</p>	<p>Engage: Recall definition of earthquake and hazards caused by earthquakes Explore: Preview & Read p. 150-153 Explain:</p> <ul style="list-style-type: none"> Identify the problem Identify the solution <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research earthquake resistant buildings <ul style="list-style-type: none"> Present diagrams and descriptions <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> Notes about earthquake resistant buildings "Wrap it Up!" [3] 	<p>Earthquake Resistant buildings</p>
<p>6.12: Generate and Compare Solutions *THINK LIKE AN ENGINEER (p. 154-157)</p> <p>Standards: 4-ESS3-2, 3-5-ETS1-2, ETS1.B: Designing Solutions to Engineering Problems</p> <p>Objective:</p> <ul style="list-style-type: none"> Generate and compare multiple solutions to reduce the impacts of earthquakes on humans Test the solutions to investigate how well they perform under a range of likely earthquake conditions <p>Duration: 5 Days</p>	<p>Engage: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Discuss observations of photographs on p. 150-151 Define problem, criteria, & constraints <p>Explore: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Design & build shake table Test & Record observations <p>Explain: Revise or refine solution Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research ways in which structures are designed to withstand earthquakes <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> Definition of problem, criteria, & constraints Plan with labeled drawing Observations with drawings Notes about how structures withstand earthquakes "Wrap it Up!" [3] 	<p><u>Each Group of 4</u></p> <ul style="list-style-type: none"> Materials for building earthquake-resistant houses Materials for building shake tables Stopwatches Rulers Scissors Glue Staplers Markers Masking tape <p>*Recommended to start collecting materials several weeks in advance</p>

<p>6.13: The Badlands (p. 158-159)</p> <p>Standards: 4-ESS1-1 ESS1.C: The History of Planet Earth</p> <p>Objective:</p> <ul style="list-style-type: none"> Describe how patterns in rock formations in the Badlands region of South Dakota reveal changes over time Explain that the presence and location of certain fossils in the Badlands' rocks indicate the order in which the rock layers were formed <p>Duration: 1 Day</p>	<p>Engage: Describe fossils Explore: Preview & Read p. 158-159 Explain:</p> <ul style="list-style-type: none"> Explain how sedimentary rock forms Explain what rocks and fossils in South Dakota badlands tell about past <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research local & regional rock formations <ul style="list-style-type: none"> Make postcard from past <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> Notes about local & regional rock formations "Wrap it Up!" [3] 	
<p>6.14: Iceland (p. 160-161)</p> <p>Standards: 4-ESS1-1 ESS1.C: The History of Planet Earth</p> <p>Objective:</p> <ul style="list-style-type: none"> Describe how Earth forces are changing rocks in Iceland <p>Duration: 1 Day</p>	<p>Engage: Recall information about mid-ocean ranges and volcanoes Explore: Preview & Read p. 160-161 Explain:</p> <ul style="list-style-type: none"> Locate Iceland Explain how volcanic activity is changing Iceland <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research how Iceland's volcanoes are changing the land <p>Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions</p>	<ul style="list-style-type: none"> Notes about Iceland's volcanoes "Wrap it Up!" [3] 	Volcanoes in Iceland website
<p>6.15: Identify Evidence *THINK LIKE A SCIENTIST (p. 162-165)</p> <p>Standards: 4-ESS1-1</p> <p>Objective:</p> <ul style="list-style-type: none"> Identify evidence from patterns in rock formations that make up the Grand Canyon to explain how it has changed over time Identify evidence from fossils and the rock layers that make up the Grand Canyon to explain how it has changed over time <p>Duration: 1 Day</p>	<p>Engage: Recall information about weathering and erosion Explore: Preview & Read p. 162-165 Explain:</p> <ul style="list-style-type: none"> Contrast plateaus & canyons Review how sedimentary rocks form and change over time Introduce rocks and fossils of Grand Canyon Interpret diagram <p>Elaborate: <u>Science Notebook</u></p> <ul style="list-style-type: none"> Research specific rock formation in the Grand Canyon 	<ul style="list-style-type: none"> Notes about rock formations in Grand Canyon "Wrap it Up!" [3] 	Grand Canyon

	<ul style="list-style-type: none"> ○ Make cross section of rock formation Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions		
6.16: Crisis Mapper *SCIENCE CAREER (p. 166-167) Standards: Science is way of knowing Objective: <ul style="list-style-type: none"> • Connect the concepts of real-time social media and online mapping the problem solving during disaster relief Duration: 1 Day	Engage: Summarize types of natural hazards Explore: Preview & Read p. 166-167 Explain: Describe what Patrick Meier does as a Crisis Mapper Elaborate: <u>Science Notebook</u> <ul style="list-style-type: none"> • Research disaster relief organizations <ul style="list-style-type: none"> ○ Present findings Evaluate: <u>Science Notebook</u> Complete "Wrap it Up!" questions	<ul style="list-style-type: none"> • Notes about disaster relief organizations • "Wrap it Up!" [3] 	Disaster relief organizations
Review / Flex Day			
Unit 6 Test 20 pts PBA: Lesson 6.12			
Benchmark 2 (Life Science and Earth Science)			

Unit Learning Goal and Scale <i>(Level 2.0 reflects a minimal level of proficiency)</i>	
Standard(s): 4-ESS1-1: Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. (Unit 6, Lessons 13-15)	
4.0	Students will be able to: <ul style="list-style-type: none"> • Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time, and provide real world examples.
3.0	Students will be able to: <ul style="list-style-type: none"> • Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.
2.0	Students will be able to: <ul style="list-style-type: none"> • Identify patterns in rock formations and fossils in rock layers.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Standard(s): 4-ESS2-2: Analyze and interpret data from maps to describe patterns of Earth's features. (Unit 6, Lessons 9-10)	
4.0	Students will be able to: <ul style="list-style-type: none"> • Analyze and interpret data from maps to describe patterns of Earth's features, and provide real world examples.

3.0	Students will be able to: <ul style="list-style-type: none"> Analyze and interpret data from maps to describe patterns of Earth's features.
2.0	Students will be able to: <ul style="list-style-type: none"> Interpret data from maps of Earth's features.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Standard(s):	
4-ESS3-2: Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. (Unit 6, Lesson 1-8, 11-12)	
4.0	Students will be able to: <ul style="list-style-type: none"> Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans, and predict how each will benefit humans in the future.
3.0	Students will be able to: <ul style="list-style-type: none"> Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.
2.0	Students will be able to: <ul style="list-style-type: none"> Identify how natural Earth processes impact humans.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Standard(s):	
3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (Unit 6, Lesson 12)	
4.0	Students will be able to: <ul style="list-style-type: none"> Independently generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
3.0	Students will be able to: <ul style="list-style-type: none"> Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
2.0	Students will be able to: <ul style="list-style-type: none"> Generate multiple possible solutions to a problem without considerations for the criteria and constraints of the problem.
1.0	With help, partial success at level 2.0 content and level 3.0 content:
0.0	Even with help, no success

Unit 6 Modifications for Special Population Students

Advanced Learners	<ul style="list-style-type: none"> Use Elaborate sections of the lessons to extend student thinking. <ul style="list-style-type: none"> Lesson 6.2: Earthquakes (p. 132-133) <ul style="list-style-type: none"> Students make a collage documenting the damage of the Japanese Earthquake in March, 2011. Lesson 6.4: Tsunamis (p. 136-137) <ul style="list-style-type: none"> Students create an informational brochure detailing tsunami warning systems and their effectiveness Lesson 6.5: Volcanoes (p. 138-139)
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	<ul style="list-style-type: none"> - Students work in a small group to combine research to create a timeline of geologically recent volcanic eruptions. Lesson 6.6: Reducing the Impact of Natural Hazards (p. 140-141) - Students write a short news article to explain how the Bay Bridge structure was improved to help reduce the impacts of earthquakes. Lesson 6.11: Building for the Future (p. 150-153) - Students present research on earthquake-resistant building designs, including a diagram and a description of how the design works. Lesson 6.13: The Badlands (p. 158-159) - Students use research about regional rock formations and fossils to make a postcard from the past. Lesson 6.15: Identify Evidence (p. 162-165) - Students can quiz themselves about the Grand Canyon using the Brainteaser game at http://kids.nationalgeographic.com/kids/games/geographygames/brainteasergrandcanyon/ Lesson 16: Crisis Mapper (p.166-167) - Pairs of students choose a disaster relief organization to present to the class, including what the agency does, the jobs within the agency, and whether the work is paid or volunteer. <ul style="list-style-type: none"> • Allow students to complete investigations, Think Like a Scientist, Think Like an Engineer, and Science Careers independently. <ul style="list-style-type: none"> Lesson 6.3: Earthquakes (p. 134-135) Lesson 6.10: Analyze and Interpret Data (p. 148-149) Lesson 6.11: Building for the Future (p. 150-153) Lesson 6.12: Generate and Compare Solutions (p. 154-157) Lesson 6.15: Identify Evidence (p.162-165) Lesson 6.16: Crisis Mapper (p. 68-69)
Struggling Learners	<ul style="list-style-type: none"> • Utilize online student text book with text-to-speech option • Provide pre-formatted, partially completed, or fully completed notebook pages • Provide reading assistance (research) <ul style="list-style-type: none"> – Use leveled research materials
English Language Learners	<ul style="list-style-type: none"> • Utilize online student text book with text-to-speech option • Preview Vocabulary <ul style="list-style-type: none"> – Provide visual, verbal, and written examples together – Group related words Lesson 6.1: Natrual Hazards - hazard, earthquake, volcano, tsunami Lesson 6.2: Earthquakes - fault Lesson 6.3: Earthquakes (Inv) - liquefaction Lesson 6.5: Volcanoes - magma, erupts, lava Lesson 6.7: Early Warning Systems - seismometer, evacuate, seismographs Lesson 6.9: Patterns of Water and Land Features - mid-ocean range, deep ocean trench Lesson 6.13: The Badlands - sedimentary rock, fossil Lesson 6.14: Iceland - rift Lesson 6.16: Crisis Mapper - crisis mapping
Special Needs Learners	<ul style="list-style-type: none"> • Utilize online student text book with text-to-speech option • Preview vocabulary: <ul style="list-style-type: none"> – Provide visual, verbal, and written examples together – Group related words Lesson 6.1: Natrual Hazards - <i>hazard, earthquake, volcano, tsunami</i> Lesson 6.2: Earthquakes - <i>fault</i> Lesson 6.3: Earthquakes (Inv) - <i>liquefaction</i> Lesson 6.5: Volcanoes - <i>magma, erupts, lava</i> Lesson 6.7: Early Warning Systems - <i>seismometer, evacuate, seismographs</i> Lesson 6.9: Patterns of Water and Land Features - <i>mid-ocean range, deep ocean trench</i> Lesson 6.13: The Badlands - <i>sedimentary rock, fossil</i> Lesson 6.14: Iceland - <i>rift</i> Lesson 6.16: Crisis Mapper - <i>crisis mapping</i> • Provide pre-formatted, partially completed, or fully completed notebook pages • Provide reading assistance (research)

- Use leveled research materials
- Assist in identifying relevant facts or provide previously identified facts
- Modify Format of “Wrap it Up!” questions
 - Provide sentence starters
 - Provide word banks or key phrases
 - Allow answers to be given orally

Interdisciplinary Connections

Indicators:

ELA/Literacy-

RI.4.1-Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-ESS3-2)

RI.4.7-Interpret information presented, visually, orally, or quantitatively (e.g. in charts, graphs, diagrams, time lines, animations, or interactive elements on web pages) and explain how the information contributes to an understanding of the text in which it appears. (4-ESS2-2)

RI.4.9-Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-ESS3-2)

W.4.7-Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-ESS1-1, 4-ESS2-2)

W.4.8-Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-ESS1-1)

W.4.9-Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-ESS1-1)

Mathematics-

MP.2-Reason abstractly and quantitatively. (4-ESS1-1, 4-ESS3-2)

MP.4-Model with mathematics. (4-ESS1-1, 4-ESS3-2)

4.MD.A.1-Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (4-ESS1-1)

4.MD.A.2-Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. (4-ESS2-2)

4.OA.A.1-Interpret a multiplication equation as a comparison, e.g., interpret $35=5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. (4-ESS3-2)

Integration of 21st Century Skills

Indicators:

8.1.5.A.1-Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.

8.1.5.A.3-Use a graphic organizer to organize information about a problem or issue.

8.1.5.E.1-Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.

8.1.5.F.1-Apply digital tools to collect, organize, and analyze data that support a scientific finding.

8.2.5.A.3-Investigate and present factors that influence the development and function of products and systems, e.g. resources, criteria, and constraints.

8.2.5.B.4-Research technologies that have changed due to society's changing needs and wants.

8.2.5.C.1-Collaborate with peers to illustrate components of a designed system.

8.2.5.C.2-Explain how specifications and limitations can be used to direct a product's development.

8.2.5.C.4-Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.

8.2.5.D.1-Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered.

8.2.5.D.2-Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process to evaluate potential solutions.

9.2.4.A.3-Investigate both traditional and nontraditional careers and relate information to personal likes and dislikes.