

Fourth Grade Science Curriculum

Unit: Energy	Time: 1 st Marking Period	Standards:
<p>Essential Questions</p> <ul style="list-style-type: none">• What is needed to light a bulb?• What is needed to make a complete pathway for current to flow in a circuit?• How can you light two bulbs brightly with one D-cell?• Which design is better for manufacturing long strings of lights: series or parallel?• What materials stick to magnets?• What happens when two or more magnets interact?• What happens when a piece of iron comes close to or touches a permanent magnet?• How can you turn a steel rivet into a magnet that turns on and off?• How can you reinvent the telegraph using your knowledge of energy and electromagnetism?• What do we observe that provides evidence that energy is present?• What happens when objects collide?• How are waves involved in energy transfer?• How does light travel?	<p>Enduring Understandings</p> <ul style="list-style-type: none">• I can list what is needed to light a bulb.• I can describe what is needed to create a pathway of currents.• I can light two bulbs with a single D-cell.• I can describe and create a series and a parallel circuit and identify which is better for a long string of lights.• I can list materials that attract to magnets.• I can describe what happens when two or more magnets interact.• I can describe how a piece of iron can become a temporary magnet.• I can turn a steel rivet magnet on and off.• I can build a telegraph.• I can observe and list evidence that energy is present.• I can explain what happens when objects collide.• I can state in my own words how waves are involved in energy transfer.• I can explain how light travels.	<p>NJSLS 4-PS3-1: Use evidence to construct an explanation relating the speed of an object to the energy of that object.</p> <p>NJSLS 4-PS3-2: Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat and electric currents.</p> <p>NJSLS 4-PS3-3: Ask questions and predict outcomes about the changes in energy that occur when objects collide.</p> <p>NJSLS 4-PS3-4: Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.</p> <p>NJSLS 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.</p> <p>NJSLS 4-PS4-2: Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.</p> <p>NJSLS 4-PS4-3: Generate and compare multiple solutions that use patterns to transfer information.</p> <p>NJSLS 3-5-ETS1-1: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.</p> <p>NJSLS 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.</p> <p>NJSLS 3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects or a model or prototype that can be improved.</p>

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Benchmark Assessment(s)

- Complete investigations 1, 2, 3, 4, and 5 (NJSL 4-PS3-1, 4-PS3-2, 4-PS3-3, 4-PS3-4, 4-PS4-1, 4-PS4-2, 4-PS4-3, 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3)
- Write a journal entry describing what is needed to light a bulb. (NJSL 4-PS3-2)
- Construct an electric circuit that includes a complete pathway through which electric current flows from an energy source to its components. (NJSL 4-PS3-2, 4-PS3-4)
- Conduct an experiment and diagram the experiment illustrating that there is, in a series, a single pathway from the energy source to the components; in a parallel circuit, each component has its own direct pathway to the energy source. (NJSL 4-PS3-2, 4-PS3-4, 3-5-ETS1-1, 3-5-ETS1-2)
- Design a circuit with two bulbs and a d-cell. (NJSL 4-PS3-2)
- Construct a T-chart listing various materials that attract or repel magnets. (NJSL 4-PS3-1)
- Demonstrate during a lab what happens when two or more magnets interact. (NJSL 4-PS3-1, 4-PS3-3)
- Compose a summary or create an illustration of how a piece of iron can become a temporary magnet. (NJSL 4-PS3-3, 4-PS3-4)
- Build an Electromagnet using wires, d-cells, and rivets. (NJSL 4-PS3-3, 4-PS3-4)
- Build a telegraph and using a code create a message to other 4th grade students (NJSL 4-PS3-1, 4-PS4-3).
- Create a chart documenting observed evidence that energy is present. (NJSL 4-PS3-1, 4-PS3-2, 4-PS3-4)
- Create a three-column chart documenting what happens when objects of different sizes and different starting positions collide with other objects. (NJSL 4-PS3-1, 4-PS3-3, 3-5-ETS1-3)
- Interpret the Energy Transfer graph and discuss the patterns they notice in a journal entry. (NJSL 4-PS3-1, 4-PS3-2, 4-PS4-1)
- Construct a reflection model of their own showing how light travels, then present to the class. (NJSL 4-PS3-2, 4-PS4-2)
- Utilize a Frayer model to discuss light. (NJSL 4-PS3-2, 4-PS4-2)

Other Assessments

- ✓ Teacher observations
- ✓ Class Discussions
- ✓ Lab Participation
- ✓ Models Built
- ✓ Science Notebooks
- ✓ Response Sheets
- ✓ Focus Question Responses
- ✓ Lab Assessments
- ✓ I-check 1, 2, 3, 4, & 5
- ✓ Energy Unit Post-test

Materials

- Materials listed in Teacher's Manual on pages 108, 124-125, 142, 154, 182, 191, 206, 236, 246, 253, 278, 288, 297, 330, 346, and 361.

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SUGGESTED ACTIVITIES

- Read, listen, and/or discuss science resources text of:
 - *Edison Sees the Light; Energy Sources; Series and Parallel Circuits; Science Practices; Engineering Practices; Thinking like an Engineer; Engineering a Solar Lighting System*
 - *When Magnet Meets Magnet; Magnificent Magnetic Models; Make a Magnetic Compass*
 - *Electricity Creates Magnetism; Using Magnetic Fields; Electromagnets Everywhere; Morse Gets Clicking*
 - *Energy; What Causes Change of Motion?; Bowling; Force and Energy; Potential and Kinetic Energy at Work*
 - *Waves; Light Interactions; Throw a Little Light on Sight; More Light on the Subject; Alternative Sources of Electricity; Ms. Osgood's Class Report*
- Review the on-line resources entitled:
 - Lighting a Bulb; Flow of Electricity; Tutorial Simple Circuits; Tutorial Conductors and Insulators; Turn on the Switch; Conductor Detector; D-cell Orientation
 - What Sticks and What Conducts?; Magnetic Poles Tutorial; Magnetic Poles; Magnetic Poles Quiz
 - Kitchen Magnets; Tutorial: Electromagnets; Virtual Electromagnet
 - Sound Energy; Waves; Real World Science: Sound; All about Waves; All about Light; Wave
- Review the on-line video:
 - All About Magnets
 - Soccer; Ball on Table; Wagon; All About the Transfer of Energy
- Online Activities:
 - Reflecting Light; Colored Light

REINFORCEMENT

- Provide printed notes, organizers, charts, etc. for student notebooks.
- Have students use post-it notes/highlighters to mark key points in notebooks/materials.
- Vocabulary matching game
- Show video: All About the Transfer of Energy – Foss Teacher Page/Digital Only Resources/Streaming Video

ENRICHMENT

Play-Doh Circuit– Enrichment Activity:

Students use play dough (Play-Doh) and modeling clay to create a simple circuit that lights an LED (light-emitting diode) and explore conductors and insulators. Play-Doh is made with a mixture of water and salt making it a good conductor. Modeling clay will be the insulator. You will need Play-Doh, modeling clay, battery pack, batteries, alligator clip wires, and LED light bulbs. Once you have all the materials, let the students sculpt, play and create. Have students make a very simple series circuit. At its most basic form, the students are forming a circle that allows the electricity to flow in one direction to light up a light. Start by having the students take two pieces of conductive dough. Next, place a wire into each one making sure the two pieces of dough do not touch. Then have the students close the circuit by placing a wire from an LED into each piece of dough. If the LED doesn't light up, have the students flip it around. LEDs only allow energy to flow in one direction. Have the students close the circuit again. Now have them push the pieces of dough together. What happens to the light? They have a short circuit. To fix it, have them place a piece of insulating dough between the pieces of conductive dough. The light shines again. Discuss the properties of insulators and conductors and the differences between the compositions of the two kinds of dough used.

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Suggested Websites

- www.fossweb.com
- www.knowledgeadventure.com/games/magnets
- http://www.physics-chemistry-interactive-flash-animation.com/electricity_interactive

Suggested Materials

- Preferably classroom sized monitor/smartboard
- Laptop and/or tablets

Cross-Curricular Connections

21st Century Skills:

9.2.4.A.1 Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

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

CRP4 Communicate clearly and effectively and with reason.

CRP8 Utilize critical thinking to make sense of problems and persevere in solving them.

Technology:

8.25.C4 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.5 Explain the functions of a system and subsystems.

8.2.5.D.5 Describe how resource such as material, energy, information, time, tools, people and capital are used in products or systems.

Social and Emotional Learning:

The students will recognize the importance of self-confidence in handling daily tasks and challenges as the teacher promotes a positive learning environment that is conducive to doing their personal best even if the task is brand new.

The students will recognize the skills needed to establish and achieve personal and educational goals through classroom discussions, creating written personal goals, and returning to those goals periodically to note productivity toward them, or achievement of them.

The students will recognize and identify the thoughts, feelings and perspectives of others while working together in lab groups or partnerships on a weekly basis.

The students will demonstrate an understanding of the need for mutual respect when viewpoints differ by practicing the “listening first” technique, and by learning appropriate phrases for retort.

The students will role play in order to demonstrate an awareness of the expectations for social interactions in a variety of settings such as during science lab, in the lunchroom, on the playground, in the hallway, when listening to others presenting material or findings, and more.

The students will develop, implement and model effective problem solving and critical thinking skills orally in whole group discussions, orally in small groups, and throughout usage of their interactive science notebooks.

Language Arts and Math:

Investigation 1: Energy and Circuits

RI 4: Determine the meaning of general academic domain-specific words or phrases.

SL 1: Engage in collaborative discussions.

4.OA.C.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.

4.NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.

Investigations 2: The Force of Magnetism

RI 6: Compare and contrast a firsthand and secondhand account of the same topic.

RI 7: Interpret information presented visually, and explain how the information contributes to an understanding of the text.

RI 8: Explain how an author uses reasons and evidence to support particular points in a text.

4.NF.C.6 Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.

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Investigation 3: Electromagnets

W 8: Gather relevant information from experiences and print, and categorize the information.

SL 1: Engage in collaborative discussions.

SL 4: Report on a text in an organized manner, using appropriate facts and relevant details.

Investigation 4: Energy Transfer

RI 10: Read and comprehend science texts.

SL 4: Report on a text in an organized manner, using details.

L 4: Determine or clarify the meaning of unknown words.

L 6: Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases.

4.NFA.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $\frac{1}{2}$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

Investigation 5: Waves

SL 4: Report on a text in an organized manner, using details.

L 6: Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases.

4.MD.A.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.

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Unit: Soils, Rocks, and Landforms	Time: 2 nd Marking Period	Standards:
<p>Essential Questions</p> <ul style="list-style-type: none">• What is soil?• What causes big rocks to break down into smaller rocks?• How are rocks affected by acid rain?• How do weathered rock pieces move from one place to another?• How does slope affect erosion and deposition?• How do floods affect erosion and deposition?• How do fossils get in rocks and what can they tell us about the past?• How can we represent the different elevations of landforms?• What events can change Earth’s surface quickly?• What are natural resources and what is important to know about them?• How do people use natural resources to make or build things?	<p>Enduring Understandings</p> <ul style="list-style-type: none">• I can define the term soil.• I can list the causes of the breakdown of big rocks.• I can explain how rocks are affected by acid rain.• I can explain how rock pieces move from one place to another.• I can describe how a slope effects erosion and deposition.• I can demonstrate how floods affect erosion and deposition.• I can articulate how fossils get in rocks and what it tells us about the past.• I can show different elevations of landforms.• I can describe events that can change the Earth’s surface quickly.• I can define natural resources and list why they are important.• I can show how natural resources are used to make or build things.	<p>NJSLS 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.</p> <p>NJSLS 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.</p> <p>NJSLS 4-ESS2-2: Analyze and interpret data from maps to describe patterns of Earth’s features.</p> <p>NJSLS 4-ESS3-2: Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.</p>
<p>Benchmark Assessment(s)</p> <ul style="list-style-type: none">➤ Complete investigation 1, 2, 3, and 4. (NJSLS 4-ESS1-1, 4-ESS2-1, 4-ESS2-2, 4-ESS3-2)➤ Construct a pie chart showing the materials in soil. (NJSLS 4-ESS2-1)➤ List the causes of big rocks breaking down in a science journal entry. (NJSLS 4-ESS2-1)➤ Create an Acid Rain Viewfinder (shared documents) to show effects of acid rain. (NJSLS 4-ESS2-1)➤ After observing a stream table; draw a before and after picture then write conclusions about what was observed. (NJSLS 4-ESS1-1)➤ Illustrate the effects of slope on erosion and deposition in science notebooks. (NJSLS 4-ESS1-1, 4-ESS2-1)➤ Using the focus question: “How do floods affect erosion and deposition?”, students make predictions, record data, draw conclusions in a journal entry. (NJSLS 4-ESS1-1, 4-ESS2-1)➤ After observing a Petoskey stone, compose an essay about what the stone tells about the past. (NJSLS 4-ESS1-1)➤ Construct a topographical map showing different elevations of landforms. (NJSLS 4-ESS2-2)➤ Create a poster of the different events which can change the Earth’s surface quickly. (NJSLS 4-ESS2-1, 4-ESS2-2)➤ Create a story map about why natural resources are important. (NJSLS 4-ESS3-2)➤ Create a collage showing different things made from natural resources. (NJSLS 4-ESS3-2)		<p>Other Assessments</p> <ul style="list-style-type: none">✓ Teacher observations✓ Class Discussions✓ Lab Participation✓ Models Built✓ Science Notebooks✓ Response Sheets✓ Focus Question Response✓ Lab Assessments✓ I-check 1, 2, 3, 4, & 5✓ Soils, Rocks, & Landforms Post-Test <p>Materials</p> <ul style="list-style-type: none">• Materials listed in Teacher’s Manual on pages 86, 102, 112, 150, 162, 175, 182, 208, 219, 231, 240, 260, 270, and 278.

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SUGGESTED ACTIVITIES

- Read, listen, and/or discuss the science resources textbook of:
 - *What is Soil?; Weathering*
 - *Erosion and Deposition; Landforms Photo Album; Fossils Tell a Story; Pieces of a Dinosaur Puzzle*
 - *Topographic Maps; The Story of Mount Shasta; It Happened So Fast!*
 - *Monumental Rocks; Geoscientists at Work; Making Concrete; Earth Material in Art; Where Do Rocks Come From?*
- Review the on-line sources entitled:
 - Weathering and Erosion; Soils
 - Geology Lab: Stream Tables; Tutorial-Stream Tables: Slope and Flood; Virtual Investigation: Stream Tables
 - Volcanoes; Mount St. Helens Impact
- Review the on-line activity entitled: Topographer
- Review the on-line video: Natural Resources
- View videos: *Weathering and Erosion; Fossils*
- Participate in on-line classroom blog entry/discussion

REINFORCEMENT

- Provide printed notes, organizers, charts, etc. for student notebooks.
- Have students pair-up with a partner to share answers to focus questions.
- Have students use post-it notes/highlighters to mark key points in notebooks/materials.
- Read: *Earth Steps: A Rock's Journey Through Time*, by Diane Nelson Spickert.

ENRICHMENT

Earth and Mars – Enrichment Activity:

Students will gain a new perspective on planet earth using the Microsoft Worldwide Telescope (WWT). WWT is visualization software that enables your computer to function as a virtual telescope—bringing together imagery from the best ground and space-based telescopes in the world for an exciting and interactive exploration of the universe.

<http://www.worldwidetelescope.org/webclient/>. The class as a whole learns the difference between geography and topography, locates all the planets in the solar system, and briefly compares the topography of Earth and Mars. Students explore the topography of Earth. Views of oceans, continents, the polar ice caps, mountain ranges, deserts and an in-depth look at the Grand Canyon engage students in learning essential information about the surface of our planet. Then, the class explores the surface of Mars, its craters, mountains, and ice caps, and takes a close look at its grand canyon, the Valleys Marineris. Students have an opportunity to explore on their own one feature of the surface of both Earth and Mars, research the two, compare them, and present their findings in an Office PowerPoint

Suggested Websites

- www.fossweb.com
- www.dicovereducation.com/planetearth
- <https://www.youtube.com/watch?v=XlebFtd-t8Y>

Suggested Materials

- Preferably classroom sized monitor/smartboard
- Laptop and/or tablets

Cross-Curricular Connections

21st Century Skills:

9.2.4.A.1 Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

9.2.4.A.2 Identify various life roles and civic and work-related activities in the school, home, and community.

CRP4 Communicate clearly and effectively and with reason.

CRP8 Utilize critical thinking to make sense of problems and persevere in solving them.

Technology:

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

8.25.C4 Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.

Social and Emotional Learning:

The students will recognize the importance of self-confidence in handling daily tasks and challenges as the teacher promotes a positive learning environment that is conducive to doing their personal best even if the task is brand new.

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The students will recognize the skills needed to establish and achieve personal and educational goals through classroom discussions, creating written personal goals, and returning to those goals periodically to note productivity toward them, or achievement of them.

The students will recognize and identify the thoughts, feelings and perspectives of others while working together in lab groups or partnerships on a weekly basis.

The students will demonstrate an understanding of the need for mutual respect when viewpoints differ by practicing the “listening first” technique, and by learning appropriate phrases for retort.

The students will role play in order to demonstrate an awareness of the expectations for social interactions in a variety of settings such as during science lab, in the lunchroom, on the playground, in the hallway, when listening to others presenting material or findings, and more.

The students will develop, implement and model effective problem solving and critical thinking skills orally in whole group discussions, orally in small groups, and throughout usage of their interactive science notebooks.

Language Arts and Math:

Investigation 1: Soils and Weathering

RI 3: Explain procedures or concepts in a scientific text.

4OA.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. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Investigation 2: Landforms

RI 10: Read and comprehend science text.

4NF.C.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual model.

Investigation 3: Mapping Earth's Surface

RI 1: Refer to details/examples when explaining what the text says and when drawing inferences from text.

Investigation 4: Natural Resources

SL 1: Engage in collaborative discussions

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Unit: Environments	Time: 3-4 th Marking Period	Standards:
<p>Essential Questions</p> <ul style="list-style-type: none">• How do mealworm structures and behaviors help them grow and survive?• What moisture and light conditions do isopods prefer?• What are the environmental factors in an aquatic system?• What are the roles of organisms in a food chain?• How do animals use their sense of hearing?• How can we find out if salinity affects brine shrimp hatching?• Does changing the environment allow the brine shrimp eggs to hatch?• What are some benefits of having variation within a population?• How much water is needed for early growth of different kinds of plants?• What are some examples of plant adaptations?	<p>Enduring Understandings</p> <ul style="list-style-type: none">• I can state how the behavior and structures of mealworms help them grow and survive.• I can state the moisture and light conditions for isopods.• I can list environmental factors in an aquatic system.• I can state/list the roles of organisms in a food chain.• I can describe how animals use their sense of hearing.• I can state that salinity affects brine shrimp hatching.• I can show how changes to the environment can, cannot, or slow down the hatching of brine shrimp eggs.• I can list the advantages and disadvantages of having variations within a population.• I can determine how much water is needed for early growth of different kinds of plants.• I can list examples of plant adaptations.	<p>NJSLS 4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.</p> <p>NJSLS 4-LS1-2: Use a model to describe that animals receive different types of information through their sense, process the information in their brain, and respond to the information in different ways.</p> <p>NJSLS 4-ESS3-1: Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.</p>
<p>Benchmark Assessment(s)</p> <ul style="list-style-type: none">➤ Complete investigation 1, 2, 3, and 4. (NJSLS 4-LS1-1, 4-LS1-2, 4-ESS3-1)➤ Observe mealworms behaviors and structures, and then complete observation chart of mealworms and paste illustrations provided of the mealworm’s growth-stages in notebook. (NJSLS 4-LS1-1, 4-ESS3-1)➤ Construct an isopod for observation purposes, and complete observation summary chart provided in notebook of isopods. (NJSLS 4-LS1-1)➤ Compose a list of environmental factors that determine what isopods need for their environment. (NJSLS 4-LS1-1)➤ Design an aquarium that includes environmental factors in an aquatic system for fresh water. (NJSLS 4-LS1-1)➤ Create an illustration designing a food chain and the role of each member of the chain. (NJSLS 4-LS1-1)➤ Design paper-bag blindfolds to fit over head, and then compose a list or summary of how animals use their hearing to survive. (NJSLS 4-LS1-2)➤ Examine behavior of brine shrimp eggs by conducting an experiment with various levels of salinity. (NJSLS 4-LS1-1)➤ Complete graphic organizer of t-chart stating cause and effect of hatched brine shrimp eggs, and determine the range of tolerance of brine shrimp by changing the environment of added salt levels. (NJSLS 4-LS1-1, 4-LS1-2)➤ Record advantages and disadvantages of observed variations of populations in Activity Results chart provided in notebook. (NJSLS 4-LS1-2, 4-LS3-2)➤ Conduct an experiment that consists of no or various levels of salt and water with a seed, and document the aforementioned by completing a bar graph noting the sprout and root observations. (NJSLS 4-LS1-1, 4-ESS3-1)➤ Register in notebook patterns or colors of plant adaptations during the observation period, and after viewing provided video, document the definition and examples of plant adaptations. (NJSLS 4-LS1-1, 4-LS3-2)		<p>Other Assessments</p> <ul style="list-style-type: none">✓ Teacher observations✓ Class Discussions✓ Lab Participation✓ Models Built✓ Science Notebooks✓ Response Sheets✓ Focus Question Response✓ Lab Assessments✓ I-check 1, 2, 3, 4, & 5✓ Environments Post-test <p>Materials</p> <ul style="list-style-type: none">• Materials listed in Teacher’s Manual on pages 88, 109, 122, 105, 161, 172, 184, 214, 223, 236, 244, 274, 292, and 303.

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SUGGESTED ACTIVITIES

- Read, listen, and/or discuss science resources text of:
 - *Two Terrestrial Environment; Darkling Beetles; Setting up a Terrarium; Isopods; Amazon Rain Forest Journal*
 - *Freshwater Environments; What is an Ecosystem?; Food Chains and Food Webs; Human Activities and Aquatic Ecosystem; Comparing Aquatic and Terrestrial Ecosystems; Animal Sensory Systems; Saving Murrelets Through Mimicry*
 - *Brine Shrimp; The Mono Lake Story; What Happens When Ecosystems Change?; The Shrimp Club; Variation and Selection*
 - *Environmental Scientists; Range of Tolerance; How Organisms Depend on One Another; Animals from the Past*
- Review the on-line video entitled:
 - *Animal Language and Communication; All About Plant Adaptations*
- Review the on-line activities entitled:
 - *Virtual Aquarium; Virtual Terrarium; Food Webs; Trout Range of Tolerance; Analyzing Environmental Experiments*
- Participate in on-line classroom blog entry/discussion

REINFORCEMENT

- Provide printed notes, organizers, charts, etc. for student notebooks.
- Have students use post-it notes/highlighters to mark key points in notebooks/materials.
- Show video: *Deserts – Foss Teacher Page/Digital Only Resources/Streaming Video*
- Vocabulary matching game

ENRICHMENT

Biomarkers – Enrichment Activity:

Start by discussing that life has a special chemistry. Present to students two plastic bags of salt and sugar. Discuss with them to describe what's inside (similar-looking white, granular powders). Pour a teaspoon of salt onto one ceramic plate and a teaspoon of sugar onto another. Using a lighter or a match, try to light the salt. (It won't light.) Repeat with the sugar. (It will turn black and burn.) Ask, which powder came from something living? How do you know? Explain that salt is a mineral that contains no carbon. Carbon is an essential molecule of life. Since carbon compounds burn, the fact that salt doesn't burn suggests that it contains no carbon and is not a product of a living organism. Sugar comes from plants. It contains carbon, which turns black when burned. Examples: burned toast and meat. Life uses carbon in so many ways that scientists think that all life will use carbon. As a result, spacecraft and rovers looking for chemicals associated with life look for carbon-based compounds.

- Expand: Discuss other worlds such as Enceladus (one of Saturn's Moons). We have found water there. What other things are necessary to have life on this moon?

Suggested Websites

- www.fossweb.com
- <https://www.youtube.com/watch?v=VWgyEemLFYU>

Suggested Materials

- Preferably classroom sized monitor/smartboard
- Laptop and/or tablets

Cross-Curricular Connections

21st Century Skills:

CRP2: Apply appropriate academic and technical skills.

CRP4: Communicate clearly and effectively and with reason.

Technology:

8.2.5.B.1 Examine ethical considerations in the development and production of a product through its life cycle.

8.2.5.C.5 Explain the functions of a system and subsystems.

Social and Emotional Learning:

The students will recognize the importance of self-confidence in handling daily tasks and challenges as the teacher promotes a positive learning environment that is conducive to doing their personal best even if the task is brand new.

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The students will recognize the skills needed to establish and achieve personal and educational goals through classroom discussions, creating written personal goals, and returning to those goals periodically to note productivity toward them, or achievement of them.

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The students will demonstrate an understanding of the need for mutual respect when viewpoints differ by practicing the “listening first” technique, and by learning appropriate phrases for retort.

The students will role play in order to demonstrate an awareness of the expectations for social interactions in a variety of settings such as during science lab, in the lunchroom, on the playground, in the hallway, when listening to others presenting material or findings, and more.

The students will develop, implement and model effective problem solving and critical thinking skills orally in whole group discussions, orally in small groups, and throughout usage of their interactive science notebooks.

Language Arts or Math:

Investigation 1: Environmental Factors

RI 4: Determine the meaning of general academic domain-specific words or phrases.

4MD.A.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.

Investigation 2: Ecosystems

SL 1: Engage in collaborative discussions.

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.

Investigation 3: Brine Shrimp Hatching

RI 3: Explain procedures or concepts in a scientific text.

4NF.B.4.B Understand a multiple of a/b as a multiple of $1/b$, and use this understanding to multiply a fraction by a whole number.

Investigation 4: Range of Tolerance

RI 4: Determine the meaning of general academic domain-specific words or phrases.

4MD.A.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.