North Carolina Science, Technology, and Engineering Standards Alignment

Grade 4

Forces and Motion

Standards	FOSS Alignment	Assessment
4.P.1 Explain how various forces affect the motion of an object.		
4.P.1.1. Explain how magnets interact with all things made of iron and with other magnets to produce motion without touching them.	**FOSS Next Generation Energy** Investigation 2: The Force of Magnetism Background for the Teacher pp. 174-178 Part 1: Magnets and Materials pp. 182-190 *FOSS Digital Resources:* *"Virtual Investigation: What Sticks and What Conducts"*	**PA:** Students predict was test objects given to them might stick to the magnet. They then test the objects. Students look over the items and observe closer the items they thought were metal but which didn't stick to the magnet. They learn only one common metal sticks - iron. If a magnet sticks to an object, that object is made of the materials iron or steel (a mixed of iron and other metals). They look at a black rock which does stick to the magnet and infer it must contain iron. The teacher will confirm this and introduce the rock as a mineral called Magnetite which is rich in iron. They test other items in the classroom and out of doors.
	FOSS Next Generation Energy Investigation 2: The Force of Magnetism Part 2: Magnetic Fields pp. 191-205	**PA:** Students explore what happens when magnets interact and discover sometimes the magnets pull and stick together - attract - and sometimes the two magnets push away from each other - repel. This this activity, students discover permanent magnets have opposite ends - an "S" and an "N." These two different ends are called poles - a south pole (S) and a north pole (N). They also discover when the bar magnet is free hanging the bar will turn it's north pole to the north and the south pole to the south.
	FOSS Next Generation Energy *FOSS Science Resources:* *"All About Magnets,"* *"Tutorial: Magnetic Poles"* *"Magnetic Poles"* *"Magnetic Poles Quiz"* *FOSS Science Resources:* *"Energy Sources"*	**FQA:** Students explore permanent magnets' interaction with iron objects when a piece of non-steel is put in between the magnet and the steel object. They continue to investigate the attraction over distance and discover magnets can attract iron from a distance and do not have to touch the object. They discover the invisible magnetic field. The object may appear to float if the magnetic force is greater than the force produced by gravity. They also demonstrate that when an iron object gets close or touches a magnet, it becomes a temporary magnet with a magnetic field of its own and can act on other pieces of iron or steel.

Grade 4

Forces and Motion (cont.)

Standards	FOSS Alignment	Assessment
4.P.1 Explain how various forces affect the motion of an object.		
4.P.1.1. Explain how magnets interact with all things made of iron and with other magnets to produce motion without touching them.	**FOSS Next Generation Energy** Investigation 2: The Force of Magnetism Part 3: Magnetic Forces pp. 206-222 *FOSS Science Resources:* *"Energy Sources"*	**PA:** Students conduct experiments to determine "What happens to the force of attraction between two magnets as the distance between them changes?" In their group they discuss how to measure the force and develop procedures. They conduct the experiment and record their observations. They graph the number of washers used between the magnet and the iron object and the changes in the space. Through their observations and evidence they determine that the greater the distance between magnets, the weaker the force. Using their graph data, they make predictions as to the number of washers it will take to break the force of attraction. Students test their predictions.
4.P.1.2. Explain how electrically charged objects push or pull on other electrically charged objects and produce motion.	**FOSS Next Generation Energy** Investigation 3: Electromagnets Part 1: Building an Electromagnet pp. 236-245 *FOSS Science Resources:* *"Electricity Creates Magnetism"*	**FQA:** Students construct an electromagnet. Students label a diagram with all component parts and include the function of each of the components. They address the focus question of turning a steel rivet into a magnet that turns off and on. They note that when electricity flows through a circuit, a magnetic field is produced around the wire. When the circuit is closed, electricity flows from the negative terminal through the wire wrapped around the rivet but does not flow through the rivet.
	FOSS Next Generation Energy Investigation 3: Electromagnets Part 2: Changing the Strength pp. 246-252 *FOSS Digital Resources:* *"Kitchen Magnets "* *"Tutorial: Electromagnets"* *"Virtual Electromagnet"* *FOSS Science Resources:* *"Using Magnetic Fields"* *"Electromagnets Everywhere"*	**PA:** In their groups, students plan an investigation to try and determine if the number of winds of wire around a core affect the strength of the magnetism. The conduct the investigation using their plan and collect data. They analyze and interpret the data and draw a conclusion. Students explain how the different numbers of winds affected the strength of the electromagnet making sure to give evidence - i.e. How many washers a 20-wind electromagnet lifted; how many a 40-wind electromagnet lifted, etc.

Grade 4

Forces and Motion (cont.)

Standards	FOSS Alignment	Assessment
4.P.1 Explain how various forces affect the motion of an object.		
4.P.1.2. Explain how electrically charged objects push or pull on other electrically charged objects and produce motion.	**FOSS Next Generation Energy** Investigation 3: Electromagnets Part 3: Reinventing the Telegraph pp. 253-263 *FOSS Science Resources:* *"Morse Gets Clicking"*	Investigation 3 I-Check

Grade 4

Matter: Properties and Change

Standards	FOSS Alignment	Assessment
4.P.2 Understand the composition and properties of matter before and after they undergo a change or interaction.		
4.P.2.1. Compare the physical properties of samples of matter (strength, hardness, flexibility, ability to conduct heat, ability to conduct electricity, ability to be attracted by magnets, reactions to water and fire).	**FOSS Next Generation Energy** Investigation 1: Energy and Circuits Part 2: Conductors and Circuits pp. 123-141 *FOSS Digital Resources:* *"Tutorial: Simple Circuits"* *"Tutorial: Conductors and Insulators"* *"Turn on the Switch"* *"Conductor Detector"* *"D-cell Orientation"* *FOSS Science Resources:* *"Energy Sources"*	**FQA:** Students add a switch to their circuit and are introduced to conductors and insulators. They make a conductor detector and test different physical objects in their classroom to determine if they are conductors or insulators. Students explain what is needed to make a complete pathway for current to flow in a circuit. Pathways need to be made of conductors with no insulators blocking the flow of electricity. Conductors are made of metal. They also explain the function of a switch is to open and close the circuit and control the flow of the electricity.
4.P.2.2. Explain how minerals are identified using tests for the physical properties of hardness, color, luster, cleavage and streak.	**Delta Science Reader Minerals, Rocks and Fossils** *"What Are Minerals?" pp. 2-7*	
4.P.2.3. Classify rocks as metamorphic, sedimentary or igneous based on their composition, how they are formed and the processes that create them.	**FOSS Next Generation Soils, Rocks and Landforms** Investigation 4: Natural Resources Part 3: Earth Materials in Use *FOSS Science Resources:* *"Where Do Rocks Come From?" pp. 67-75*	

Grade 4

Energy: Conservation and Transfer

Standards	FOSS Alignment	Assessment
4.P.3 Recognize that energy takes various forms that may be grouped based on their interaction with matter.		
4.P.3.1. Recognize the basic forms of energy (light, sound, heat, electrical, and magnetic) as the ability to cause motion or create change.	**FOSS Next Generation Energy** Investigation 1: Energy and Circuits Part 1: Lighting a Bulb pp. 108-123 *FOSS Digital Resources:* *"Lighting a Bulb"* *"Flow of Electricity"* *FOSS Science Resources:* *"Edison Sees the Light"*	**FAQ:** Students are introduced to electrical energy through readings, interactive activities, and class discussing. They are challenged to make a bulb light with a D-Cell. The class as a whole reviews the successes and discusses questions on how the successful wires were connected and look at what was not successful. Vocabulary terms are introduced and they use those terms to answer the question "What is needed to light a bulb?" They look at a diagram of a bulb-and-battery circuit and make a claim as to whether the build will light. They construct an agreement using a model to explain the path of the electricity and the energy transfer from the D-Cell to the light.
	FOSS Next Generation Energy Investigation 1: Energy and Circuits Part 2: Conductors and Circuits pp. 123-141 *FOSS Digital Resources:* *"Tutorial: Simple Circuits"* *"Tutorial: Conductors and Insulators"* *"Turn on the Switch"* *"Conductor Detector"* *"D-cell Orientation"* *FOSS Science Resources:* *"Energy Sources"*	**PA:** Students build a circuit with the D-cell to turn a motor. Students claim is light and electric current are ways energy moves. Anywhere there is light or electric current, there is energy. Students defend with evidence that the movement of the motor spinning the flag is evidence of energy transfer to the motor.
	FOSS Next Generation Energy Investigation 2: The Force of Magnetism Part 2: Magnetic Fields pp. 191-205 *FOSS Digital Resources:* *"All About Magnets"* *"Tutorial: Magnetic Poles"* *"Magnetic Poles"* *"Magnetic Poles Quiz"* *FOSS Science Resources:* *"When Magnet Meets Magnet"*	**FQA:** Students explore permanent magnets interaction with iron objects when a piece of non-steel is put in between the magnet and the steel object. They continue to investigate the attraction over distance and discover magnets can attract iron from a distance and do not have to be touch the object. They discover the invisible magnetic field. The object may appear to float if the magnetic force is great than the force produced by gravity. They also demonstrate that when an iron object gets close or touches a magnet, it becomes a temporary magnet with a magnetic field of its own and can act on other pieces of iron or steel.

Standards	FOSS Alignment	Assessment
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4.P.3.1. Recognize the basic forms of energy (light, sound, heat, electrical, and magnetic) as the ability to cause motion or create change.	**FOSS Next Generation Energy** Investigation 2: The Force of Magnetism Part 3: Magnetic Forces pp. 206-222 *FOSS Science Resources:* *"Magnificent Magnetic Models"* *"Make a Magnetic Compass"*	**PA:** Students conduct experiments to determine "What happens to the force of attraction between two magnets as the distance between them changes?" In their group they discuss how to measure the force and develop procedures. They conduct the experiment and record their observations. They graph the number of washers used between the magnet and the iron object and the changes in the space. Through their observations and evidence they determine that the greater the distance between magnets, the weaker the force. Using their graph data, they make predictions as to the number of washers it will take to break the force of attraction. Students test their predictions.
	FOSS Next Generation Energy Investigation 3: Electromagnets Part 1: Building an Electromagnet pp. 236-245 *FOSS Science Resources:* *"Electricity Creates Magnetism"*	**FQA:** Students construct an electromagnet. Students label a diagram with all component parts and include the function of each of the components. They address the focus question of turning a steel rivet into a magnet that turns off and on. They note that when electricity flows through a circuit, a magnetic field is produced around the wire. When the circuit is closed, electricity flows from the negative terminal through the wire wrapped around the rivet but does not flow through the rivet.
	FOSS Next Generation Energy Investigation 3: Electromagnets Part 2: Changing the Strength pp. 246-252 *FOSS Digital Resources:* *"Kitchen Magnets "* *"Tutorial: Electromagnets"* *"Virtual Electromagnet"* *FOSS Science Resources:* *"Using Magnetic Fields"* *"Electromagnets Everywhere"*	**PA:** In their groups, students plan an investigation to try and determine if the number of winds of wire around a core affect the strength of the magnetism. The conduct the investigation using their plan and collect data. They analyze and interpret the data and draw a conclusion. Students explain how the different numbers of winds affected the strength of the electromagnet making sure to give evidence - i.e. How many washers a 20-wind electromagnet lifted; how many a 40-wind electromagnet lifted, etc.

Grade 4

Energy: Conservation and Transfer (cont.)

Standards	FOSS Alignment	Assessment
4.P.3 Recognize that energy takes various forms that may be grouped based on their interaction with matter.		
4.P.3.1. Recognize the basic forms of energy (light, sound, heat, electrical, and magnetic) as the ability to cause motion or create change.	**FOSS Next Generation Energy** Investigation 3: Electromagnets Part 3: Reinventing the Telegraph pp. 253-263 *FOSS Science Resources:* *"Morse Gets Clicking"*	Investigation 3 I-Check
	FOSS Next Generation Energy Investigation 5: Waves Background for the Teacher pp. 318-325 Part 1: Forms of Waves pp. 330-345 *FOSS Digital Resources:* *"Real World Science: Sound"* *FOSS Science Resources:* *"Waves"* *"More About Sound"*	**FQA:** Students hear a sound and are asked what evidence of energy is present (Sound) and vibrations from a evidenced by touching the black paper of the speaker. Students are introduced to the three properties of waves: Amplitude, Wavelength and Frequency. They experience waves they can see - moving a rope. From readings and video, they learn that sound waves can't be seen and that they must have a medium to travel through - solid, liquid or gas. Without a medium, sound waves cannot be heard. They learn how sound waves are recorded and recognize a diagram of a sound wave of a high pitch noise compared to a low pitch, etc. Students answer the focus question about how are waves involved in energy transfer by describing, as an example, a musical instrument with a vibrating column of air (energy transfer). They explain a diagram of a bell and the resulting sound waves and note that the curved lines show vibration in a series of compression pulses; and the arrow shows the direction of the transfer of energy.

Grade 4

Energy: Conservation and Transfer (cont.)

Standards	FOSS Alignment	Assessment
4.P.3 Recognize that energy takes various forms that may be grouped based on their interaction with matter.		
4.P.3.1. Recognize the basic forms of energy (light, sound, heat, electrical, and magnetic) as the ability to cause motion or create change.	**FOSS Next Generation Energy** Investigation 5: Waves Part 2: Light Travels pp. 346-360 *FOSS Digital Resources:* *"All About Light"* *"Reflecting Light"* *"Colored Light"* *FOSS Science Resources:* *"Light Interactions"* *"Throw a Little Light on Sight"* *"More Light on the Subject"*	**FQA:** Students read and discuss: Light is energy. It comes from systems that radiate light. Light travels in rays; light rays travel from a light source in straight lines. Light rays don't curve around things until they run into something. In a series of challenges, students discover that mirrors reflect light. The light hits the mirrors and bounce off in different directions, allowing them to use a mirror to see behind themselves. Students need to be able to explain that the light hits the mirror and changes direction so it can be redirected into their eyes, allowing them to see an object behind them. They practice others ways of reflecting light. They then observe light through water and explain that while the pencil appears broken, it actually is the light changing direction, or refracting, when it travels through water. They discuss a video on All About Light and share that light energy can change into heat energy when light is absorbed by matter. They explain that light that is absorbed by matter is converted into another form of energy - heat energy. Finally, they evaluated a line model of how people see which is incorrect. They state the error and the correction.

Grade 4

Energy: Conservation and Transfer (cont.)

Standards	FOSS Alignment	Assessment
4.P.3 Recognize that energy takes various forms that may be grouped based on their interaction with matter.		
4.P.3.2. Recognize that light travels in a straight line until it strikes an object or travels from one medium to another, and that light can be reflected, refracted, and absorbed.	**FOSS Next Generation Energy** Part 2: Light Travels pp. 346-360 *FOSS Digital Resources:* *"All About Light"* *"Reflecting Light"* *"Colored Light"* *FOSS Science Resources:* *"Light Interactions"* *"Throw a Little Light on Sight"* *"More Light on the Subject"*	**FQA:** Students read and discuss: Light is energy. It comes from systems that radiate light. Light travels in rays; light rays travel from a light source in straight lines, light rays don't curve around things until they run into something. In a series of challenges, students discover that mirrors reflect light. The light hits the mirrors and bounce off in different directions, allowing them to use a mirror to see behind themselves. Students need to be able to explain that the light hits the mirror and changes direction so it can be redirected into their eyes, allowing them to see an object behind them. They practice others ways of reflecting light. They then observe light through water and explain that while the pencil appears broken, it actually is the light changing direction, or refracting, when it travels through water. They discuss a video on All About Light and share that light energy can change into heat energy when light is absorbed by matter. They explain that light that is absorbed by matter is converted into another form of energy - heat energy. Finally, they evaluated a line model of how people see which is incorrect. They state the error and the correction.

Grade 4

Earth in the Universe

Standards	FOSS Alignment	Assessment
4.E.1 Recognize the major components and patterns observed in the earth/moon/sun system.		
4.E.1.1. Explain the cause of day and night based on the rotation of Earth on its axis.	**Delta Science Reader Earth, Moon and Sun System** What Are Earth, the Moon, and the Sun? Earth pp. 4 How Do Earth, the Moon, and the Sun Interact? Earth and the Sun pp. 14	Students explain a day is 24 hours. Each day the sun, moon and stars seems to rise in the east and then move slowly across the sky and set in the west. Students demonstrate the rotation by using a globe and shining a flashlight on the globe while it spins to illustrate the cause of day and night.
4.E.1.2. Explain the monthly changes in the appearance of the moon, based on the moon's orbit around the Earth.	**Delta Science Reader Earth, Moon and Sun System** What Are Earth, the Moon, and the Sun? Earth, the Moon, and the Sun pp. 18	Students explain that as the moon rotates, different parts face the Sun. The phases of the Moon happen because the Moon revolves around the Earth. As the Moon moves in its orbit, we see more or less of the side of the Moon that is lighted by the Sun.

Grade 4

Earth Systems, Structures and Processes

Standards	FOSS Alignment	Assessment
4.E.2 Understand the use of fossils and changes in the surface of the earth as evidence of the history of Earth and its changing life forms.		
4.E.2.1. Compare fossils (including molds, casts, and preserved parts of plants and animals) to one another and to living organisms.	**FOSS Next Generation Soils, Rocks and Landforms** Investigation 1: Soils and Weathering Part 4: Fossil Evidence pp. 182 *FOSS Digital Resources:* *"Fossils Tell a Story"* *"Pieces of a Dinosaur Puzzle"* *FOSS Science Resources:* *"Fossils"*	**FQA:** Students model fossil formation. They view and discuss the video about fossils and answer how fossils get in rocks and what can they tell us about the past. They review aspects learned from the video: They describe types of fossils - petrification, molds, casts, imprints, preserved remains. Most fossils are found in sedimentary rock. Fossils are evidence from the past - e.g. A fish fossil found in a desert is evidence that the land was once covered by water. Comparing fossils to similar plants and animals living today provides evidence of change and adaptation.
	Delta Science Reader Minerals, Rocks and Fossils *"What Are Fossils?" pp. 18-23*	
4.E.2.2. Infer ideas about Earth's early environments from fossils of plants and animals that lived long ago.	**FOSS Next Generation Soils, Rocks and Landforms** Investigation 1: Soils and Weathering Part 4: Fossil Evidence pp. 182 *FOSS Digital Resources:* *"Fossils Tell a Story"* *"Pieces of a Dinosaur Puzzle"* *FOSS Science Resources:* *"Fossils"*	**FQA:** Students model fossil formation. They view and discuss the video about fossils and answer how fossils get in rocks and what can they tell us about the past. They review aspects learned from the video: They describe types of fossils - petrification, molds, casts, imprints, preserved remains. Most fossils are found in sedimentary rock. Fossils are evidence from the past - e.g. A fish fossil found in a desert is evidence that the land was once covered by water. Comparing fossils to similar plants and animals living today provides evidence of change and adaptation.

Standards	FOSS Alignment	Assessment
4.E.2 Understand the use of fossils and changes in the surface of the earth as evidence of the history of Earth and its changing life forms.		
4.E.2.3. Give examples of how the surface of the earth changes due to slow processes such as erosion and weathering, and rapid processes such as landslides, volcanic eruptions, and earthquakes.	**FOSS Next Generation Soils, Rocks and Landforms** Investigation 1: Soils and Weathering Part 1: Soil Composition pp. 86-101 *FOSS Science Resources:* *"What is Soil"*	**FQA:** Students study 4 different soil samples first when the soil is dry, and then when water is added and the vials are allowed to settle. For both, students discuss what different materials were in the 4 samples when the soil was dry. They observe the vials and describe the layers that appear and look for patters in the lays - e.g. Does each have the same size sand layer; does each have the same amount of humus. They are told each sample came from a different location. They make a claim and present the evidence of where they believe each of the samples came from. They write that soil is composed of different sizes of rock (e.g., sand, gravel, pebbles) and humus (decaying plants and animals).
	FOSS Next Generation Soils, Rocks and Landforms Investigation 1: Soils and Weathering Part 2: Physical Weathering pp. 102-111	**FQA:** Students experiment with two different types of rocks and shake (tremble) each in a jar of water, and observe and record the results. One broke into more and bigger pieces, the other had only small, sand-size pieces broken off. They freeze a completely filled glass bottle of water and offer explanations for the fractured glass, e.g. Water freezes and it expands. The water pushes on things around it with a lot of force which was enough to break the bottle. They infer that freezing water can break rocks into smaller pieces. Both are a kind of physical weather. Students draw the conclusion that big rocks break down into smaller pieces and state there evidence.
	FOSS Next Generation Soils, Rocks and Landforms Investigation 1: Soils and Weathering Part 3: Chemical Weathering pp. 112-125 *FOSS Digital Resources:* *"Weathering and Erosion"* *FOSS Science Resources:* *"Weathering"*	**FQA:** Students investigate the effects of acid rain by simulating it by soaking 4 different rocks in vinegar. They discover that in 2 samples (limestone and marble) different crystals are observed after evaporation, an example of chemical weathering.

Standards	FOSS Alignment	Assessment
4.E.2 Understand the use of fossils and changes in the surface of the earth as evidence of the history of Earth and its changing life forms.		
4.E.2.3. Give examples of how the surface of the earth changes due to slow processes such as erosion and weathering, and rapid processes such as landslides, volcanic eruptions, and earthquakes.	**FOSS Next Generation Soils, Rocks and Landforms** Investigation 1: Soils and Weathering Part 4: Schoolyard Soils pp. 126-135 *FOSS Digital Resources:* *"Soils"*	Investigation 1 I-Check
	FOSS Next Generation Soils, Rocks and Landforms Investigation 2: Landforms Part 1: Erosion and Deposition pp. 150-161 *FOSS Science Resources:* *"Erosion and Deposition"*	**FQA:** Based evidence from their investigations stimulating deposition of materials in moving water (using a stream table), students, students describe erosion as part of the sediment-moving process: earth materials are carried away by moving water, forming valleys. They describe deposition as part of the process. The eroded earth materials eventually are deposited somewhere downstream with smaller particles usually moving farther than large particles.
	FOSS Next Generation Soils, Rocks and Landforms Investigation 2: Landforms Part 2: Steam – Table Investigations pp. 162-174 *FOSS Digital Resources:* *"Geology Lab: Stream Tables"* *"Tutorial - Stream Tables: Slope and Flood"* *FOSS Science Resources:* *"Landforms Photo Album"*	**PA:** Students work in groups to design and implement several investigates using stream table to research how slope affects erosion and deposition; how floods affect erosion and deposition; and a focus question that they wrote. Students present their results based on the evidence they have collected. Erosion did occur more in the steeper tray; deposition/erosion happened faster in the slope tray; materials traveled farther in the slope tray. Students claim from the evidence that when the land was steeper, the water flowed faster and faster flowing water has more energy to move sand and clay farther along the stream or river channel.
	FOSS Next Generation Soils, Rocks and Landforms Investigation 2: Landforms Part 3: Schoolyard Erosion and Deposition pp. 175-181 *FOSS Digital Science Resources:* *"Virtual Investigation - Stream Tables"*	

Grade 4

Ecosystems

Standards	FOSS Alignment	Assessment
4.L.1 Give examples of changes in an organism's environment that are beneficial to it and some that are harmful.		
4.L.1.1. Give examples of changes in an organism's environment that are beneficial to it and some that are harmful.	**FOSS Next Generation Environments** Investigation 2: Ecosystems Part 2: Food Chains and Food Webs pp. 161-171 *FOSS Science Resources:* *"What Is an Ecosystem?"* *"Food Chains and Food Webs"*	**FQA:** Students learn the roles of organisms in a food chain from their readings and discussions with their group and class. They explain that food is a source of matter and energy and is needed for animals to grow and reproduce. Plants make their own food with energy from the sun, carbon dioxide, and water and are producers that provide the energy and matter for consumers. Decomposers break down dead plant and animals matter into simple chemicals which are recycled in the environment to the producers. They learn animals compete for a food source and that if an event like a forest fire disrupts the environment, destroying the producers, the consumers would have nothing to eat and would also starve the next level of consumers.
	FOSS Next Generation Environments Investigation 2: Ecosystems Part 3: Population Simulation pp. 172-183 *FOSS Digital Resources:* *"Virtual Terrarium"* *"Virtual Aquarium"*	**FQA:** Through a population simulation activity students address how food affects a population in its home range. Their claim that the quantity of the food source in the home range limits the size of the population. If population numbers go over the carrying capacity, the organisms might use up or damage the food source and the area will support fewer animals.
4.L.1.2. Explain how animals meet their needs by using behaviors in response to information received from the environment.	**FOSS Next Generation Environments** Investigation 1: Environmental Factors Part 1: Observing Mealworms pp. 88-108 *FOSS Science Resources:* *"Two Terrestrial Environments"* *"Darkling Beetles"*	**PA:** Students set up an environment for mealworms and observe their structures and behaviors.
	FOSS Next Generation Environments Investigation 1: Environmental Factors Part 2: Designing an Isopod Environment pp. 109-121 *FOSS Science Resources:* *"Setting Up a Terrarium"* *"Isopods"*	**PA:** Students set up an isopod environment. They developed a procedure and test the factor of moisture. Students do a short-run observation (10 - 15 minutes). They record long-run observation requests, the animals moved to the conditions of the environmental factor that was most suitable for their needs.

Grade 4

Ecosystems (cont.)

Standards	FOSS Alignment	Assessment
4.L.1 Give examples of changes in an organism's environment that are beneficial to it and some that are harmful.		
4.L.1.2. Explain how animals meet their needs by using behaviors in response to information received from the environment.	**FOSS Next Generation Environments** Investigation 1: Environmental Factors Part 3: Leaf-Litter Critters pp. 122-132 *FOSS Science Resources:* *"Amazon Rain Forest Journal"*	**ELA:** Students discuss he reading and record answer in the notebooks; e.g. They learned that ants live in social groups called colonies and that they communicate with each other using chemicals they leave on the trail. Leaf-cutter ants carry leaves to the underground nest where they shew the leaves and make them into pulp to grow fungus, which they eat. Army ants make temporary nests because they need to keep moving to new places to get food. Animals depend on plants for food and shelter.
	FOSS Next Generation Environments Investigation 2: Ecosystems Part 1: Designing an Aquarium pp. 150-160 *FOSS Science Resources:* *"Freshwater Environments"*	**FQA:** Students set up an aquarium and keep logs of their observations of the fish, their interactions, and of the aquarium environment. They add crustacean and observe the interactions (the crustaceans are a food source for the goldfish). They identify the environmental factors in an aquatic system based on their observations and from reading "*Freshwater Environments*" - the living factors are the organisms and that nonliving factors include water, things dissolved in the water (gases and solid substances), temperature of the water, light, surfaces, and air temperature on the surface. They look for other environmental interactions such as animals that can live at the lower level deep-water zones because they need little oxygen and light.
	FOSS Next Generation Environments Investigation 2: Ecosystems Part 2: Food Chains and Food Webs pp. 161-171 *FOSS Science Resources:* *"What Is an Ecosystem?"* *"Food Chains and Food Webs"*	**FQA:** Students learn the roles of organisms in a food chain from their readings and discussions with their group and class. They explain that food is a source of matter and energy and is needed for animals to grow and reproduce. Plants make their own food with energy from the sun, carbon dioxide, and water and are producers that provide the energy and matter for consumers. Decomposers break down dead plant and animals matter into simple chemicals which are recycled in the environment to the producers. They learn animals compete for a food source and that if an event like a forest fire disrupts the environment, destroying the producers, the consumers would have nothing to eat and would also starve the next level of consumers.

Grade 4

Ecosystems (cont.)

Standards	FOSS Alignment	Assessment
4.L.1 Give examples of changes in an organism's environment that are beneficial to it and some that are harmful.		
4.L.1.2. Explain how animals meet their needs by using behaviors in response to information received from the environment.	**FOSS Next Generation Environments** Investigation 2: Ecosystems Part 3: Population Simulation pp. 172-183 *FOSS Digital Resources:* *"Virtual Terrarium"* *"Virtual Aquarium"*	**FQA:** Through a population simulation activity students address how food affects a population in its home range. Their claim that the quantity of the food source in the home range limits the size of the population. If population numbers go over the carrying capacity, the organisms might use up or damage the food source and the area will support fewer animals.
	FOSS Next Generation Environments *FOSS Science Resources:* *"Human Activities and Aquatic Ecosystems"* *"Comparing Aquatic and Terrestrial Ecosystems"*	**ELA:** Students read and discuss "*Human Activities and Aquatic Ecosystems.*" Using the information from their graphic organizers, the class discussed various questions. After the discussion, students record: The source of most of the pollution of Lake Erie resulted from human activities. The surface temperatures have risen in all of the world's largest lakes and a change of .05 degrees Celsius can change where lakes freeze and when the ice melts. Invasive species can be established and outcompete native species. Pesticides, acid water, oil spills or sediments could destroy some organisms' habitats and they wouldn't survive. Some organisms grow too much because of the pollution. Some steps taken to clean up Lake Erie were: building new and getter sewage treatment plants; reducing the use of detergents containing phosphates; manage the use of fertilizers and pesticides on farms; stop industries from dumping waste into the late.
	FOSS Next Generation Environments Investigation 2: Ecosystems Part 4: Sound Off pp. 184 - 195 *FOSS Digital Resources:* *"Animal Language and Communication"* *FOSS Science Resources:* *"Animals Sensory Systems"* *"Saving Murrelets through Mimicry"*	**FQA:** After a classroom activity predators and prey and viewing and discussing videos, students independently write in the notebook some examples of how animals use their sense of hearing: A sea lion cub makes a specific sounds its mother can recognize among the calls of many pups in a colony; wolves howl to alert the rest of the pack to the presence of prey.

Grade 4

Ecosystems (cont.)

Standards	FOSS Alignment	Assessment
4.L.1 Give examples of changes in an organism's environment that are beneficial to it and some that are harmful.		
4.L.1.3. Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion).	**FOSS Next Generation Environments** Investigation 2: Ecosystems Part 3: Population Simulation pp. 172-183	**FQA:** Through a population simulation activity students address how food affects a population in its home range. Their claim that the quantity of the food source in the home range limits the size of the population. If population numbers go over the carrying capacity, the organisms might use up or damage the food source and the area will support fewer animals.
	FOSS Next Generation Environments *FOSS Science Resources:* *"Human Activities and Aquatic Ecosystems"* *"Comparing Aquatic and Terrestrial Ecosystems"*	**ELA:** Students read and discuss "*Human Activities and Aquatic Ecosystems.*" Using the information from their graphic organizers, the class discusses various questions. After the discussion, students record: The source of most of the pollution of Lake Erie resulted from human activities. The surface temperatures have risen in all of the world's largest lakes and a change of .05 degrees Celsius can change where lakes freeze and when the ice melts. Invasive species can be established and outcompete native species. Pesticides, acid water, oil spills or sediments could destroy some organisms' habitats and they wouldn't survive. Some organisms grow too much because of the pollution. Some steps taken to clean up Lake Erie were: building new and getter sewage treatment plants; reducing the use of detergents containing phosphates; manage the use of fertilizers and pesticides on farms; stop industries from dumping waste into the late.
4.L.1.4. Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats.	**FOSS Next Generation Environments** Investigation 3: Brine Shrimp Hatching Part 1: Setting Up the Experiment pp. 214-222 Part 2: Determining Range of Tolerance pp. 223-235 Part 3: Determining Viability pp. 236-243	**PA:** Students conduct a controlled experiment to determine which of four sale concentrations allow brine shrimp eggs to hatch. They determine the range of tolerance and optimum conditions for brine shrimp hatching.

Grade 4

Ecosystems (cont.)

Standards	FOSS Alignment	Assessment
4.L.1 Give examples of changes in an organism's environment that are beneficial to it and some that are harmful.		
4.L.1.4. Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats.	**FOSS Next Generation Environments** Investigation 3: Brine Shrimp Hatching Part 4: Variation in a Population pp. 244-254	**FQA:** Students participate in a simulation that introduces variations (color and size) in a population, They note that some variation may make it harder to be found by a predator and if those variations were passed on from the parents to the offspring, it may improve the survival of the next generation.
	FOSS Next Generation Environments *FOSS Science Resources:* *"Variation and Selection"*	**ELA:** Students summarize the article which includes selective breeding, natural selection. Organisms with the ability to adapt to environmental changes and withstand the changes will reproduce and pass along the traits as inherited traits.

Grade 4

Molecular Biology

Standards	FOSS Alignment	Assessment
4.L.2 Understand food and the benefits of vitamins, minerals and exercise.		
4.L.2.1. Classify substances as food or non-food items based on their ability to provide energy and materials for survival, growth and repair of the body.	**FOSS Next Generation Environments** *FOSS Science Resources:* *"Two Terrestrial Environments" pp. 2-12* *"What is an Ecosystem" pp. 32-34*	
4.L.2.2. Explain the role of vitamins, minerals and exercise in maintaining a healthy body.	**FOSS Science Stories Food and Nutrition** Food and Nutrition Vitamins pp. 21-23 The Scourge of Seafarers pp. 24-25	**FQA:** Scurvy, hundreds of years ago, afflicted many seamen. Doctors now know it is caused by a lack of ascorbic acid, also known as vitamin C. We know now limes and other citrus fruit cure scurvy.
	FOSS Science Stories Food and Nutrition Food and Nutrition Finding a Cure for Rickets pp. 35-36	**FQA:** Rickets was found to be caused by a lack of sunlight and vitamin D. Sunlight causes us to produce vitamin D. Making sure children get enough sunlight is important.