North Carolina Science, Technology, and Engineering Standards Alignment

Grade 5

Forces and Motion

Standards	FOSS Alignment	Assessment
5.P.1 Understand force, motion and the relationship between them.		
5.P.1.1. Explain how factors such as gravity, friction, and change in mass affect the motion of objects.	**FOSS Third Edition Motion, Force, and Models** Investigation 1: Motion and Variables Part 1: Exploring Motion pp. 58-71 *FOSS Digital Resources:* *"Soccer Video"* *"Ball on a Table"* *"Wagon"* *"Pendulum"* *FOSS Science Resources:* *"What Causes Change of Motion"*	**ELA:** Students understand from the reading that starting and stopping are two changes of motion. Unbalance forces (a push or pull) makes an object start to move. Applying a force in the opposite direction will stop movement. All changes require a force.
	FOSS Third Edition Motion, Force, and Models Investigation 1: Motion and Variables Part 2: Testing Variables pp. 72-80	**FQA:** Students set up a controlled experiment to determine if changing variables affect the number of swings the pendulum completes in a unit of time. After setting up a test to establish a standard pendulum swing for comparison, they test bob mass, release position and length of string and record the data. Students state the relationship of the number of swings to the variable and create picture graphs.
	FOSS Third Edition Motion, Force, and Models Investigation 1: Motion and Variables Part 3: Predicting Swings pp. 81-90 *FOSS Science Resources:* *"Galileo and Pendulums"*	**FQA:** Using the data gathers in their tests in Part 2, student construct a two-coordinate graph and compare it to the concrete and pictorial they created in Part 2. They realize they use the same data and provide the same information in different ways. Using the two-coordinate graph, they estimate how many swings an 80cm pendulum will make in 15 seconds. They test their prediction.
	FOSS Third Edition Motion, Force, and Models Investigation 2: Balls, Ramps and Energy Part 1: Rolling Balls Down Slopes pp. 104-111	**FQA:** Students set up a two-ramp runway system with only one ball rolling down a ramp at a time. Students design and conduct the test run and multiple runs of rolling the ball down the ramp at various starting positions, and various sized balls. They are introduced to potential energy and kinetic energy. Students record their speeds of the ball for each test and draw conclusions based on their evidence: i.e. Balls rolling from higher positions on ramps have more potential energy, which the force of gravity converts into kinetic energy; lower positioned balls have less potential energy - higher-positioned balls roll faster and farther. Ball size does not affect speed, but starting position on the ramp does affect speed.

Standards	FOSS Alignment	Assessment
5.P.1 Understand force, motion and the relationship between them.		
5.P.1.1. Explain how factors such as gravity, friction, and change in mass affect the motion of objects.	**FOSS Third Edition Motion, Force, and Models** Investigation 2: Balls, Ramps and Energy Part 2: Transferring Energy pp. 112-119 *FOSS Science Resources:* *"Bowling"*	**FQA:** After conducting several controlled collision experiments where student roll a steel ball down a ramp and it collides with a obstacle placed on the runway, students are introduced to work, friction, and energy and apply those concepts to their experiments and in their analysis of the data they have collected. They conclude that when a rolling ball collides with an object, the rolling ball transfers energy to the stationary object, causing it to move. Kinetic energy transfers from the ball to the object and puts the obstacle/object in motion.
	FOSS Third Edition Motion, Force, and Models Investigation 2: Balls, Ramps and Energy Part 3: Energy and Force pp. 120-129 *FOSS Science Resources:* *"Force and Energy"* *"Potential and Kinetic Energy at Work"*	**FQA:** Students measure the strength of the collision force of a large ball rolling down the ramp from different starting positions. They then test a smaller ball rolling down the ramp from different starting positions. From the data gathered from their tests, students discover that there is a relationship between the starting position on the ramp and the amount of force a ball can apply and that a small ball can move the cork as far as a larger ball if the small ball starts from a much higher position. They conclude an object in motion has kinetic energy. When a moving object collides with a stationary object, the moving object applies a force to the stationary object. This collision involves a transfer of energy from the moving object to the stationary object.
	FOSS Third Edition Motion, Force, and Models Investigation 2: Balls, Ramps and Energy Part 4: Momentum pp. 130-142 *FOSS Digital Resources:* *"All About Motion and Balance"* *FOSS Science Resources:* *"Coming to a Stop"* *"Concussion Discussion"*	**FQA:** Adding a hill in the middle of their ramp, students test the hypothesis that balls that hit with more force are also the ones that do more work when they collide with objects in their paths. Students design investigations where they test a large ball, a middle size ball, and a small ball released from 3 different starting positions. They conclude from their evidence that the large ball, starting from the highest position had the most momentum as it pushed the cork the farthest. The collision between ball and cork transferred kinetic energy from the ball to the cork. At the moment of collision, the ball applied a force to the cork, putting it into motion. As the cork and ball rubbed along the runway, the rubbing or friction acted to slow the cork and ball system.

Grade 5

Forces and Motion (cont.)

Standards	FOSS Alignment	Assessment
5.P.1 Understand force, motion and the relationship between them.		
5.P.1.1. Explain how factors such as gravity, friction, and change in mass affect the motion of objects.	**FOSS Third Edition Motion, Force, and Models** Investigation 3: Springs and Energy Part 1: Flipper System Introduction pp. 152-158 *FOSS Digital Resources:* *"Springs"*	**FQA:** Students identify a system as parts that work together to do something or perform a function. They experiment with a flipper system and explain how they applied a force to compress the flip stick, which is held in place by the flipper base. The rubber stopper, placed on the flip stick, is launched into the air with the potential energy stored in the flip stick is released. In a controlled experiment, they launch both a cock and a stopper and discover the stopper goes further due to its larger mass.
	FOSS Third Edition Motion, Force, and Models Investigation 3: Springs and Energy Part 2: Controlled Experiments pp. 159-166 *FOSS Science Resources:* *"Springs in Action"*	**FQA:** Students design a controlled experiment to determine if the flipper lengths have an effect on the distance the mass moved. Students discuss what variables remained the same and which were changed. They graph the results and communicate their findings that the shortest flip stick produced the most force and gave the stopper the greatest motion.
	FOSS Third Edition Motion, Force, and Models Investigation 3: Springs and Energy Part 3: Flip Out pp. 167 - 174	**FQA:** Students design a controlled experiment that shows the relationship between the distance that the flip stick is depressed and the distance the cork travels (the amount of energy transferred to an object). They graph the data and use the graph to illustrate their conclusion that the more compression (the more the spring is depressed), the more potential energy, the farther the stopper went.
	FOSS Third Edition Motion, Force, and Models *FOSS Science Resources:* *"Graphing Data"*	Investigation 3 I-Check

Standards	FOSS Alignment	Assessment
5.P.1 Understand force, motion and the relationship between them.		
5.P.1.2. Infer the motion of objects in terms of how far they travel in a certain amount of time and the direction in which they travel.	**FOSS Third Edition Motion, Force, and Models** Investigation 2: Balls, Ramps and Energy Part 1: Rolling Balls Down Slopes pp. 104-111	**FQA:** Students, using a two ramp and runway systems with only one ball rolling down a ramp at a time. Students design and conduct the test run and multiple runs of rolling the ball down the ramp at various starting positions, and various sized balls. They are introduced to potential energy and kinetic energy. Students record their speeds of the ball for each test and draw conclusions based on their evidence: i.e. Balls rolling from higher positions on ramps have more potential energy, which the force of gravity converts into kinetic energy; lower positioned balls have less potential energy, making higher-positioned balls roll faster and farther. Ball size does not affect speed, but starting position on the ramp does affect speed.
	FOSS Third Edition Motion, Force, and Models Investigation 2: Balls, Ramps and Energy Part 2: Transferring Energy pp. 112-119 *FOSS Science Resources:* *"Bowling"*	**FQA:** After conducting several controlled collision experiments where student roll a steel ball down a ramp and it collides with an obstacle placed on the runway, students are introduced to work, friction, and energy and apply those concepts to their experiments and in their analysis of the data they have collected. They conclude that when a rolling ball collides with an object, the rolling ball transfers energy to the stationary object, causing it to move. Kinetic energy transfers from the ball to the object and puts the obstacle/object in motion.
	FOSS Third Edition Motion, Force, and Models Investigation 2: Balls, Ramps and Energy Part 3: Energy and Force pp. 120-129 *FOSS Science Resources:* *"Force and Energy"* *"Potential and Kinetic Energy at Work"*	**FQA:** Students measure the strength of the collision force of a large ball rolling down the ramp from different starting positions. They then test a smaller ball rolling down the ramp from different starting positions. From the data gathered from their tests, students discover that there is a relationship between the starting position on the ramp and the amount of force a ball can apply and that a small ball can move the cork as far as a larger ball if the small ball starts from a much higher position. They conclude an object in motion has kinetic energy. When a moving object collides with a stationary object, the moving object applies a force to the stationary object. This collision involves a transfer of energy from the moving object to the stationary object.

Standards	FOSS Alignment	Assessment
5.P.1 Understand force, motion and the relationship between them.		
5.P.1.3. Illustrate the motion of an object using a graph to show a change in position over a period of time.	**FOSS Third Edition Motion, Force, and Models** Investigation 1: Motion and Variables Part 3: Predicting Swings pp. 81-90 *FOSS Science Resources:* *"Galileo and Pendulums"*	**FQA:** Using the data gathered in their tests in Part 2, student construct a two-coordinate graph and compare it to the concrete and pictorial they created in Part 2. They realize they use the same data and provide the same information in different ways. Using the two-coordinate graph, they estimate how many swings an 80cm pendulum will make in 15 seconds. They test their prediction.
	FOSS Third Edition Motion, Force, and Models Investigation 3: Springs and Energy Part 2: Controlled Experiments pp. 159-166 *FOSS Science Resources:* *"Springs in Action"*	**FQA:** Students design a controlled experiment to determine if the flipper lengths have an effect on the distance the mass moved. Students discuss what variables remained the same and which were changed. They graph the results and communicate their findings that the shortest flip stick produced the most force and gave the stopper the greatest motion.
5.P.1.4. Predict the effect of a given force or a change in mass on the motion of an object.	**FOSS Third Edition Motion, Force, and Models** Investigation 2: Balls, Ramps and Energy Part 3: Energy and Force pp. 120-129 *FOSS Science Resources:* *"Force and Energy"* *"Potential and Kinetic Energy at Work"*	**FQA:** Students measure the strength of the collision force of a large ball rolling down the ramp from different starting positions. They then test a smaller ball rolling down the ramp from different starting positions. From the data gathered from their tests, students discover that there is a relationship between the starting position on the ramp and the amount of force a ball can apply and that a small ball can move the cork as far as a larger ball if the small ball starts from a much higher position. They conclude an object in motion has kinetic energy. When a moving object collides with a stationary object, the moving object applies a force to the stationary object. This collision involves a transfer of energy from the moving object to the stationary object.
	FOSS Third Edition Motion, Force, and Models Investigation 4: Momentum Part 4: Momentum pp. 130-142 *FOSS Digital Resources:* *"All About Motion and Balance"* *FOSS Science Resources:* *"Coming to a Stop"* *"Concussion Discussion"*	**PA:** Students are challenged to develop a method for demonstrating that two balls have equal momentum. They run two equivalent mass balls into one another. They conclude the amount of force needed to bring two balls with the same momentum to a stop is the same. If the momentum of the more massive ball is the same as the less massive ball, both balls will stop moving forward when they collide.

Grade 5

Forces and Motion (cont.)

Standards	FOSS Alignment	Assessment
5.P.1 Understand force, motion and the relationship between them.		
5.P.1.4. Predict the effect of a given force or a change in mass on the motion of an object.	**FOSS Third Edition Motion, Force, and Models** Investigation 3: Springs and Energy Part 2: Controlled Experiments pp. 159-166 *FOSS Science Resources:* *"Springs in Action"*	**FQA:** Students design a controlled experiment to determine if the flipper lengths have an effect on the distance the mass moved. Students discuss what variables remained the same and which were changed. They graph the results and communicate their findings that the shortest flip stick produced the most force and gave the stopper the greatest motion.
	FOSS Third Edition Motion, Force, and Models Investigation 3: Springs and Energy Part 3: Flip Out pp. 167-174	**FQA:** Students design a controlled experiment that shows the relationship between the distance that the flip stick is depressed and the distance the cork travels (the amount of energy transferred to an object). They graph the data and use the graph to illustrate their conclusion that the more compression (the more the spring is depressed), the more potential energy, the farther the stopper went.
	FOSS Third Edition Motion, Force, and Models *FOSS Science Resources:* *"Graphing Data"*	Investigation 3 I-Check

Grade 5

Matter: Properties and Change

Standards	FOSS Alignment	Assessment
5.P.2 Understand the interactions of matter and energy and the changes that occur.		
5.P.2.1. Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff).	**FOSS Third Edition Weather on Earth** Investigation 3: Water Planet Part 3: Water Cycle pp. 192-204 *FOSS Digital Resources:* *"Water Cycle"* *FOSS Science Resource:* *"The Water Cycle"*	**FQA:** After classroom discussions with the teacher, viewing video on the water cycle and reading about the water cycle, students summarize their understanding of the water cycle as water in motion. The Sun drives the water cycle and involves water leaving Earth's surface, moving to a new location as vapor and clouds, and returning to Earth's surface as rain or snow (precipitation).
5.P.2.2. Compare the weight of an object to the sum of the weight of its parts before and after an interaction.	**FOSS Next Generation Mixtures and Solutions** Investigation 1: Separating Mixtures Part 2: Separating a Salt Solution pp. 106-116	**PA:** Students address the claim/hypothesis that when salt dissolves in water, the salt is gone. They develop procedures for conducting an inquiry to produce evidence to support or refute the claim. They compare the mass of both the salt and the water and log the results of the mass separately and then combined. They conclude, with their evidence, that the mass, when the solid and liquid are combined is the same as the combined weight of each separately. They demonstrate their understanding of the conversion of mass.
	FOSS Next Generation Mixtures and Solutions Investigation 2: Developing Models Part 3: Models for Change in Properties *FOSS Digital Resources:* *"Changings in the Properties of Matter"* *FOSS Science Resources:* *"Solid to Liquid"* *"Liquid and Gas Changes"* *"Celsius and Fahrenheit"*	**PA:** Students demonstrate that the same amount of water in a liquid state and a solid state (ice) have the same mass.
5.P.2.3. Summarize properties of original materials, and the new material(s) formed, to demonstrate that a change has occurred.	**FOSS Next Generation Mixtures and Solutions** Investigation 1: Separating Mixtures Part 1: Making and Separating Mixtures pp. 94-105 *FOSS Digital Resources:* *"Tutorial: Mixtures"*	**FQA:** Students discover that if a solid material is mixed with water and the solid material disappears in the water and cannot be separated out, the mixture is a solution. Students further define mixture, solution, solvent and solute and provide evidence that mixtures can be separated back into the original materials using screens and filters.

Standards	FOSS Alignment	Assessment
5.P.2 Understand the interactions of matter and energy and the changes that occur.		
5.P.2.3. Summarize properties of original materials, and the new material(s) formed, to demonstrate that a change has occurred.	**FOSS Next Generation Mixtures and Solutions** Investigation 1: Separating Mixtures Part 2: Separating a Salt Solution pp. 106-116 *FOSS Digital Resources:* *"Tutorial: Solutions"* *FOSS Science Resources:* *"Mixtures"*	**PA:** Students leave their salt solution out and the water evaporates leaving salt. The students describe the salt crystals remaining and how they differ from the original salt use in the mixture. They conclude that the water turned from a liquid to a gas and the salt to the crystals but that mass was conserved. Matter can change shape, state, or location, but it can never be lost or destroyed.
	FOSS Next Generation Mixtures and Solutions Investigation 1: Separating Mixtures Part 3: Separating a Dry Mixture pp. 117-127 *FOSS Digital Resources:* *"Separating Mixtures"* *"Virtual Investigation: Separating Mixtures"* *"Elements, Compounds, and Mixtures"* *FOSS Science Resources:* *"Taking Mixtures Apart"* *"Science Practices"* *"Engineering Practices"*	**PA:** Students combine a mixture of solid materials and design a plan to separating the resulting mixture. Students share their design plan with the class and discuss the merits of each design. They use the resulting plan to conduct the investigation. They separate the mixture and then discuss the properties of each and what property allowed them to separate each.
	FOSS Next Generation Mixtures and Solutions Investigation 1: Separating Mixtures Part 4: Outdoor Solutions pp. 128 - 137 *FOSS Science Resources*: *"Extracts"* *"The Story of Salt"*	Investigation 1 I-Check
	FOSS Next Generation Mixtures and Solutions Investigation 2: Developing Models Part 3: Models for Change in Properties *FOSS Digital Resources:* *"Changings in the Properties of Matter"* *FOSS Science Resources:* *"Solid to Liquid"* *"Liquid and Gas Changes"* *"Celsius and Fahrenheit"*	**PA:** From their readings, video and in classroom investigations, students summarize their understanding that matter takes up space and has many physical properties, including smell, texture, taste, mass, volume, and density. Solids have definite shapes; liquids have definite volumes, but don't hold their shape and spread out to fill the space they are in; gases do not have defined shapes and cannot be seen. Evaporation occurs when the surface of a liquid warms up and turns into a gas; sublimation occurs when a solid turns directly into a gas; condensation occurs when water vapor cools down enough to revert to liquid water. Heat energy changes a solid to a liquid and/or gas.

Grade 5

Energy: Conservation and Transfer

Standards	FOSS Alignment	Assessment
5.P.3 Explain how the properties of some materials change as a result of heating and cooling.		
5.P.3.1. Explain the effects of the transfer of heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation)	**FOSS Third Edition Weather on Earth** Investigation 2: Heating Earth Part 1: Heating Earth Materials	**FQA:** Students are introduced to radiation and energy transfer through investigations and observation of the difference in soil temperature and water temperature when placed in the sunshine (or under heat lamps). Students write that solar energy is transferred to soil and water, explaining that dry soil gets hotter than water and when removed from the light/heat source, cools down more. Water takes more energy to change the temperature than an equal volume of dry soil.
	FOSS Third Edition Weather on Earth *FOSS Science Resources:* *"Uneven Heating"*	**ELA:** Students understand from the reading what causes Earth's surface to heat up and can explain some of the variables that cause uneven heating on the Earth's surface.
	FOSS Third Edition Weather on Earth Investigation 2: Heating Earth Part 2: Conduction pp. 129-140	**PA:** Students are introduced to heat transfer by contact and an energy-transfer challenge. The teacher observes the students describing and setting up an investigation where a temperature strip is attached to an aluminum and a steel bar and both are placed in hot water. Students discuss their results and support their conclusion that metals conduct heat.
	FOSS Third Edition Weather on Earth *FOSS Science Resources:* *"Heating the Air: Radiation and Conduction"*	**ELA:** Students understand from the reading that radiation of solar energy to Earth increases the motion of particles in Earth's surface. The warmed land and water transfer energy to air through conduction at Earth's surface. Radiation from Earth is another way that energy transfers to particles of gases in air.

Standards	FOSS Alignment	Assessment
5.P.3 Explain how the properties of some materials change as a result of heating and cooling.		
5.P.3.1. Explain the effects of the transfer of heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation)	**FOSS Next Generation Mixtures and Solutions** Investigation 2: Developing Models Part 3: Models for Change in Properties *FOSS Digital Resources:* *"Changings in the Properties of Matter"* *Mixtures and Solutions Science Resources:* *"Solid to Liquid"* *"Liquid and Gas Changes"* *"Celsius and Fahrenheit"*	**FQA:** Students describe the changes they observed when they put a plastic cup with various solids into hot water. They discuss the results of heating: Margarine turned to liquid, chocolate and candle wax was softened and changed shape and the rock stayed the same. They share ideas of how they might get the rock to melt - get it hotter. Students make a model in their notebooks to explain heat transfer from evidence they gathered in their investigation, their reading, and from viewing video on changing properties. They write that the difference between dissolving and melting noting that heat energy is needed to change the properties of matter from a solid, to a liquid or gas (phases of matter) and that the differences between solids, liquids, and gases is the amount of energy in each phase. They confirm heat energy transfers in the air melting ice. They demonstrate that the same amount of water in a liquid state and a solid state (ice) have the same mass.
5.P.3.2. Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications.	**FOSS Third Edition Weather on Earth** Investigation 2: Heating Earth Part 4: Color and Energy Transfer pp. 151-162	**PA:** Students experiment with building a solar water heater. Through trials, they determine that a black container, covered with a black plastic sheet absorbed (soaked up) more of the Sun's energy than the white plastic which reflected much of the Sun's energy.
	FOSS Third Edition Weather on Earth *FOSS Science Resources:* *"Solar Technology"*	**ELA:** Students discuss the features of solar water heaters, the advantages of solar cookers, and Maria Telkes contribution to solar technology.
	FOSS Next Generation Mixtures and Solutions Investigation 2: Developing Models Part 3: Models for Change in Properties *FOSS Digital Resources:* *"Changings in the Properties of Matter"* *FOSS Science Resources:* *"Solid to Liquid"* *"Liquid and Gas Changes"* *"Celsius and Fahrenheit"*	**PA:** Students learn from readings and viewing videos that solids melt at different temperatures. They infer that many things they think are always solid, like their rock in their classroom investigation, will melt if enough heat energy is transferred to them. They learn metals melt: jewelers melt gold and silver to make jewelry; bronze is melted to make statues; iron and copper are melted to separate them from ores taken from mines and used commercially; sand is melted to make glass.

Grade 5

Earth Systems, Structures and Processes

Standards	FOSS Alignment	Assessment
5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time.		
5.E.1.1. Compare daily and seasonal changes in weather conditions (including wind speed and direction, precipitation, and temperature) and patterns.	**FOSS Third Edition Weather on Earth** Investigation 1: What Is Weather? Part 1: The Air Around Us pp. 62-74 *FOSS Science Resources:* *"What is Air?"*	**FQA:** Students do several investigations observing air in connected plungers. They read "What Is Air?" and discuss the question. Students answer this question with statements that air is an invisible gas that fills space everywhere on Earth, air is matter, occupies space, and is compressible.
	FOSS Third Edition Weather on Earth Investigation 1: What Is Weather? Part 2: Earth's Atmosphere pp. 75-82 *FOSS Digital Resources:* *"Earth's Atmosphere"* *FOSS Science Resources:* *"Earth's Atmosphere"*	**FQA:** From video clips, reading and viewing the Atmosphere poster, students explain that the troposphere layer of the atmosphere is of most interest to meteorologists because that is where clouds, wind, storms, and other types of weather happen.
	FOSS Third Edition Weather on Earth Investigation 1: What Is Weather? Part 3: Local Weather pp. 83-103 *FOSS Digital Resources:* *"All About Meteorology"*	**FQA:** Students log daily detailed weather data gathered with various instruments - thermometer, hygrometer, barometer, anemometer, wind vane. Students demonstrate their understanding by addressing how meteorologists measure and record weather including what variables and instruments they use.
	FOSS Third Edition Weather on Earth *FOSS Science Resources:* *"Weather Instruments"*	The Investigation 1 Interdisciplinary Extensions offer students the opportunity to explore weather topics and weather reports further.
5.E.1.2. Predict upcoming weather events from weather data collected through observation and measurements.	**FOSS Third Edition Weather on Earth** Investigation 1: What Is Weather? Part 1: The Air Around Us pp. 62-74 *FOSS Science Resources:* *"What is Air?"*	**FQA:** Students do several investigations observing air in connected plungers. They read "What Is Air?" and discuss the question. Students answer this question with statements that air is an invisible gas that fills space everywhere on Earth, air is matter, occupies space, and is compressible.
	FOSS Third Edition Weather on Earth Investigation 1: What Is Weather? Part 2: Earth's Atmosphere pp. 75-82 *FOSS Digital Resources:* *"Earth's Atmosphere"* *FOSS Science Resources:* *"Earth's Atmosphere"*	**FQA:** From video clips, reading and viewing the Atmosphere poster, students explain that the troposphere layer of the atmosphere is of most interest to meteorologists because that is where clouds, wind, storms, and other types of weather happen.

Grade 5

Earth Systems, Structures and Processes (cont.)

Standards	FOSS Alignment	Assessment
5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time.		
5.E.1.2. Predict upcoming weather events from weather data collected through observation and measurements.	**FOSS Third Edition Weather on Earth** Investigation 1: What Is Weather? Part 3: Local Weather pp. 83-103 *FOSS Digital Resources:* *"All About Meteorology"*	**FQA:** Students log daily detailed weather data gathered with various instruments - thermometer, hygrometer, barometer, anemometer, wind vane. Students demonstrate their understanding by addressing how meteorologists measure and record weather including what variables and instruments they use.
	FOSS Third Edition Weather on Earth *FOSS Science Resources:* *"Weather Instruments"*	The Investigation 1 Interdisciplinary Extensions offer students the opportunity to explore weather topics and weather reports further.
	FOSS Third Edition Weather on Earth Investigation 4: Weather and Climate Part 2: Weather Maps pp. 228-236 *FOSS Digital Resources:* *"Meteorology"*	**FQA:** Students review weather maps and conduct the "Weather Map" activity, predicting the 5th day of weather after reviewing the set of four daily weather maps.
	FOSS Third Edition Weather on Earth *FOSS Science Resources:* *"Weather Maps"*	**ELA:** From their readings, students should be able to: Note weather variables meteorologists measure; describe three kinds of fronts and the weather they produce; determine from a sample weather map where they think it is raining now and where it will be raining tomorrow; look at high-pressure and low-pressure centers on the map and determine where and what direction the wind is blowing.
5.E.1.3. Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation.	**FOSS Third Edition Weather on Earth** Investigation 3: Water Planet Part 3: Water Cycle pp. 192-204 *FOSS Digital Resources:* *"Water Cycle"* *FOSS Science Resources:* *"The Water Cycle"*	**FQA:** After classroom discussions with the teacher, viewing video on the water cycle and reading about the water cycle, students summarize their understanding of the water cycle as water in motion. The Sun drives the water cycle and involves water leaving Earth's surface, moving to a new location as vapor and clouds, and returning to Earth's surface as rain or snow (precipitation).

Grade 5

Earth Systems, Structures and Processes (cont.)

Standards	FOSS Alignment	Assessment
5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time.		
5.E.1.3. Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation.	**FOSS Third Edition Weather on Earth** Investigation 4: Weather and Climate Background for the Teacher pp. 212-219 Part 1: Severe Weather pp. 222-228 *FOSS Digital Resources:* *"Hurricanes and Tornadoes"* *FOSS Science Resources:* *"Severe Weather"*	**FQA:** Classroom discussion of the weather variables - moisture, energy (heat), air movement - precede reading of severe weather and video clips on Hurricanes and Tornadoes. Students then entered into their notebooks what causes severe weather, noting the water cycle affect and the ocean influence on weather along the West Coast as well as masses of warm, moist air meeting cold, dense air and causing moisture to rapidly condense from the warm air. Warm air is pushed up by colder air when these masses meet.
	FOSS Third Edition Weather on Earth Investigation 4: Weather and Climate Part 2: Weather Maps pp. 228-236 *FOSS Digital Resources:* *"Meteorology"*	**FQA:** Students review weather maps and conduct the "Weather Map" activity, predicting the 5th day of weather after reviewing the set of four daily weather maps.
	FOSS Third Edition Weather on Earth *FOSS Science Resources:* *"Weather Maps"*	**ELA:** From their readings, students should be able to: Note weather variables meteorologists measure; describe three kinds of fronts and the weather they produce; determine from a sample weather map where they think it is raining now and where it will be raining tomorrow; look at high-pressure and low-pressure centers on the map and determine where and what direction the wind is blowing.

Grade 5

Structures and Functions of Living Organisms

Standards	FOSS Alignment	Assessment
5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life.		
5.L.1.1. Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive.	**FOSS Next Generation Living Systems** Investigation 2: Nutrient Systems Part 1: Yeast Nutrition pp. 150-161 *FOSS Science Resources:* *"There's Yeast in My Bread"*	**PA:** Students design and conduct an investigation to observe what is needed to activate yeast. They analyze the results of CO_2 build up and conclude, based on evidence, that sugar is the nutrient the yeast cells use to metabolize. Students learn through reading that yeast is a single cell organism that takes its nutrients in through their membrane. They describe how a yeast cells takes in a molecule of sugar, breaks off several carbon atoms and emits them as waste. The carbon combines with oxygen, forming CO_2 gas. Students draw a model of the process.
	FOSS Next Generation Living Systems *FOSS Science Resources:* *"Producers"*	**FQA:** Students attempt to answer the question of how plants get the food they need by planting seeds under two different conditions - one in a pot in a sealed clear plastic bag, one in a pot in a sealed black bag. They observe the bags of wheat for 6 days and record their observation. From the reading "Producers" students reason that plants produce their own food - sugar. They use a process called photosynthesis to make sugar from water and carbon dioxide - water from soil through their roots, carbon dioxide from the air. The leaf cells of plants have chlorophyll which absorbs blue and red light (reflects green light). Students used the information gathered from the reading and their observations of their plants to conclude plant cells in sprouting seeds get energy nutrients from food (starch) stored in the seed. Plant cells get their energy nutrients from food produced by the cells containing chlorophyll.

Standards	FOSS Alignment	Assessment
5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life.		
5.L.1.2. Compare the major systems of the human body (digestive, respiratory, circulatory, muscular, skeletal, and cardiovascular) in terms of their functions necessary for life.	**FOSS Next Generation Living Systems** Investigation 2: Nutrient Systems Part 3: Animal Nutrition pp. 173-189 *FOSS Digital Resources:* *"Food Chains"* *"Digestion and Excretory Systems"* *FOSS Science Resources:* *"Getting Nutrients"* *"The Human Digestive System"*	**FQA:** Students read The Human Digestive System. They look at the human body diagram and identify the parts, focusing on the digestive and the interconnection of the excretory system. Students assess a model of how nutrients turn into foods that are used by the cells for energy and how the leftovers (waste) move through the large intestine and colon. Students identify how nutrients are taken through the mouth, move through the esophagus. They demonstrate understanding of role of digestive juices in the stomach. They follow the resulting mush to the small intestines and pass through the walls of the intestine to blood capillaries. They trace how the blood system carries the nutrients to the multi cells of the body and the disposition of the waste/bacteria/water through the large intestine, colon, rectum and anus.
	FOSS Next Generation Living Systems Investigation 3: Transport Systems Part 2: Circulatory Systems pp. 226-236 *FOSS Digital Resources:* *"Circulatory and Respiratory Systems"* *"Mammalian Circulatory System"* *FOSS Science Resources:* *"The Human Circulatory System"*	**PA:** After watching a video on the human circulatory and respiratory system, viewing an animation of the circulatory system, reading an article about the human circulatory system, and classroom discussions, students design and construct a model of the circulatory system. Students must label the left and right ventricle bottles and the lung blood and body blood containers. Students must determine which way fluid flows through the "valves." After students have their circulatory system models working, they discuss how the model works, communicating the parts function as a system, demonstrating the blood gets to the lungs from the right side of the heart and blood flows from the lungs to the left side of the heart. They need to communicate the typical path taken by a blood cell as it moves through the human body.

Standards	FOSS Alignment	Assessment
5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life.		
5.L.1.2. Compare the major systems of the human body (digestive, respiratory, circulatory, muscular, skeletal, and cardiovascular) in terms of their functions necessary for life.	**FOSS Next Generation Living Systems** Investigation 3: Transport Systems Part 3: Respiratory Systems pp. 237 - 250 *FOSS Digital Resources:* *"The Human Respiratory System"* *"Other Circulatory and Respiratory Systems"* *FOSS Science Resources:* *"Circulatory and Respiratory Systems"*	**PA:** Students obtain information from reading the article and from the video and discuss in class what they learned about the respiratory system. They identify the main function of a circulatory system is to transport nutrients to the organism's cells and the main function of a respiratory system is toe exchange gases; oxygen into the organism, and carbon dioxide out of the organism.
	FOSS Next Generation Living Systems Investigation 4: Sensory Systems Part 1: Stimulus/Response *FOSS Digital Science Resources:* *"The Brain and Nervous System"* *"Response Timer"* *FOSS Science Resources:* *"Stimulus and Response in Humans"*	**FQA:** Students view a video on the Brain and Nervous System and discuss the reading Stimulus and Response in Humans. They describe the components of the central nervous system and the functions the grain stem controls. They describe sensory neurons and their role. They describe motor neurons and their role. They investigate the response to a falling cup and run the test several times on each hand. They design an investigation to test foot response time and conclude from evidence that the foot responds slower than the hand because it the response message must travel a great distance. They address the focus question of "in dodgeball, how are you able to avoid being hit?" with the explanation that a visual stimulus (seeing the moving ball) starts a successful dodge. The stimulus travels to the grain, where a response message travels on neurons to the muscles that produce the coordinated movements to dodge the ball.

Grade 5

Ecosystems

Standards	FOSS Alignment	Assessment
5.L.2 Understand the interdependence of plants and animals with their ecosystem.		
5.L.2.1. Compare the characteristics of several common ecosystems, including estuaries and salt marshes, oceans, lakes and ponds, forests, and grasslands.	**FOSS Next Generation Living Systems** Investigation 1: Systems Part 1: Everyday Systems pp. 82-99 *FOSS Science Resources:* *"Introduction to Systems"*	**PA:** Students first learn to recognize and identify a system, such as a scissor or piece of rolling luggage, as having interacting parts which may be complex and include subsystems.
	FOSS Next Generation Living Systems Investigation 1: Systems Part 2: The Earth System pp. 100-112 *FOSS Digital Resources:* *"Physical Systems"* *FOSS Science Resources:* *"Is Earth a System?"* *"The Biosphere"*	**PA:** From video, reading and classroom discussions, students are able to make the claim, based on evidence, that Earth is a system with multiple subsystems. Ecosystems are identified as one of the subsystems and from work done on food webs, students infer results of the interconnection between plants and animals to their ecosystem.
	FOSS Next Generation Living Systems Investigation 1: Systems Part 3: Kelp Forest Food Web pp. 113-122 *FOSS Digital Resources:* *"Web of Life: Life in the Sea"* *FOSS Science Resources:* *"Monterey Bay National Marine Sanctuary"* *"Comparing Aquatic and Terrestrial Ecosystems"*	**FQA:** Students study a marine ecosystem in an ocean ecosystem through food web cards, video and readings. They discover different organisms that compete for the same food resource and review the living animal that is hunted and eaten by another animal (prey). Students identify organisms that are both predators and prey in the kelp force ecosystem. They compare aquatic and terrestrial ecosystems based on evidence from readings and video.
	FOSS Next Generation Living Systems Investigation 4: Sensory Systems Part 4: Ecosystems *FOSS Digital Resources:* *"Marine Ecosystems"* *FOSS Science Resources:* *"North Atlantic Ocean Ecosystem"*	**FQA:** Students view and discuss a video on Marine Ecosystems. They address, in writing, the parts of a marine ecosystem: saltwater, oxygen, moving water, temperature, light, and organisms. They briefly describe the role of each part.
	Delta Science Content Readers Ecosystems What is an Ecosystem? Ecosystems Around the World pp. 6	Students identify and compare the different types of ecosystems.

Standards	FOSS Alignment	Assessment
5.L.2 Understand the interdependence of plants and animals with their ecosystem.		
5.L.2.2. Classify the organisms within an ecosystem according to the function they serve: producers, consumers, or decomposers (biotic factors).	**FOSS Next Generation Living Systems** Investigation 1: Systems Part 2: The Earth System pp. 100-112 *FOSS Digital Resources:* *"Physical Systems"* *FOSS Science Resources:* *"Is Earth a System?"* *"The Biosphere"*	**PA:** Students discuss the earth system and specifically the biosphere and the ecosystems within. They then investigate and develop a food web after studying organisms presented on food-web cards, classifying each organism within an ecosystem according to the function they serve. They identify and describe producers as organisms that make food using energy from the Sun; consumers, organizations that depend on other organisms for food; and decomposers, organisms that breakdown and consume dead organisms. They are able to correctly organize the cards with food chains.
	Delta Science Content Readers Ecosystems How Do Parts of an Ecosystem Interact? Producers, Consumers, and Decomposers pp. 11	Students give three examples of decomposers. They demonstrate understanding that some consumers eat plants and others eat animals that have eaten plants, but that all animals depend on producers for food.
5.L.2.3. Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.	**FOSS Next Generation Living Systems** Investigation 1: Systems Part 2: The Earth System pp. 100-112 *FOSS Digital Resources:* *"Physical Systems"* *FOSS Science Resources:* *"Is Earth a System?"* *"The Biosphere"*	**PA:** From video, reading and classroom discussions, students are able to make the claim, based on evidence, that Earth is a system with multiple subsystems. Ecosystems are identified as one of the subsystems and from work done on food webs, students infer results of the interconnection between plants and animals to their ecosystem.
	FOSS Next Generation Living Systems Investigation 1: Systems Part 3: Kelp Forest Food Web pp. 113-122 *FOSS Digital Resources:* *"Web of Life: Life in the Sea"* *FOSS Science Resources:* *"Monterey Bay National Marine Sanctuary"* *"Comparing Aquatic and Terrestrial Ecosystems"*	**ELA:** Students read about an kelp forest and, from the reading, infer what happens to waste and dead animals in marine ecosystems. They identify three ways organisms compete in marine ecosystems and identify the most important producer in both freshwater and marine ecosystems based on their reading.

Grade 5

Ecosystems (cont.)

Standards	FOSS Alignment	Assessment
5.L.2 Understand the interdependence of plants and animals with their ecosystem.		
5.L.2.3. Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.	**FOSS Next Generation Living Systems** Investigation 1: Systems Part 4: Recycling pp. 123-134 *FOSS Digital Resources:* *"Simulation: Food Webs"* *FOSS Science Resources:* *"Nature's Recycling System"*	**PA:** Students plan a redworm habitat to investigate what happens when compost worms interact with organic litter. They predict the interaction of the redworm with the organic litter and organize and record observations. In several weeks they will report, with the evidence gathered, whether their prediction was accurate and draw conclusions.
	FOSS Next Generation Living Systems Investigation 4: Sensory Systems Part 4: Ecosystems *FOSS Digital Science Resources:* *"Marine Ecosystems"* *FOSS Science Resources:* *"North Atlantic Ocean Ecosystem"*	**ELA:** Student read "North Atlantic Ocean Ecosystem" and describe a phytoplankton bloom, noting that this is the major producers in the North Atlantic ecosystem. They discuss why the North Atlantic bloom is important to study.

Grade 5

Evolution and Genetics

Standards	FOSS Alignment	Assessment
5.L.3 Understand why organisms differ from or are similar to their parents based on the characteristics of the organism.		
5.L.3.1. Explain why organisms differ from or are similar to their parents based on the characteristics of the organism.	**Delta Science Content Reader Heredity** What is Heredity? Heredity and Traits pp. 4	Students identify a trait that parents pass to their offspring's - Zebra's striped coat.
	Delta Science Content Reader Heredity How Are Traits Inherited? Genes pp. 8 Passing On Genes by Reproducing pp. 10	In sexual reproduction, an offspring receives two full sets of genes and therefore two full sets of chromosomes and therefore is usually not an exact likeness of either parent. A sexual reproduction offspring gets all genes from one parent.
	Delta Science Content Reader Heredity What Are Variations? Variations pp. 16 Dominant and Recessive Traits pp. 17	Variations in offspring from sexual reproduction are due to each offspring getting its own combination of genes from the two parents.
	Delta Science Content Reader Heredity What Are Variations? Crossbreeding and Hybrids pp. 19	The Offspring of a cross of two different species is a crossbreed.
5.L.3.2. Give examples of likenesses that are inherited and some that are not.	**Delta Science Content Reader Heredity** What is Heredity? Heredity and Traits pp. 4	Students identify a trait that parents pass to their offspring's - Zebra's striped coat.
	Delta Science Content Reader Heredity What is Heredity? The Environment and Traits pp. 5	