



Full Option Science System (FOSS™) Grades K–8

Correlation
With

District of Columbia Science Content Standards



District of Columbia Science Content Standards

CORRELATION
TO

Full Option Science System (FOSS™)

This correlation shows representative examples of investigations and activities from the FOSS program that address the Science Standards. A citation does not reflect all of the investigations or activities that might address a particular proficiency.

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Kindergarten

Scientific Thinking and Inquiry

K.1 Broad Concept: Scientific progress is made by asking questions and conducting careful investigations. As a basis for understanding this concept and to address the content in this grade, students should develop their own questions about objects or events they can observe, and then perform simple investigations. Students:

Standard	FOSS
1. Describe objects accurately by drawing pictures.	Animals Two by Two Investigation 1, Part 1, pp. 10-16 Investigation 2, Part 1, pp. 9-13 Investigation 3, Part 1, pp. 8-12 Fabric Investigation 2, Part 1, pp. 7-11
2. Raise questions about the natural world and know that scientific inquiry can be used to seek answers to questions about it.	Animals Two by Two Investigation 1, Part 3, pp. 22-25 Wood and Paper Investigation 3, Part 3, pp. 18-25 Science Stories, pp. 9-12 Trees Investigation 1, Parts 6-7, pp. 31-37
3. Gather information about objects through the use of one or more of the senses, such as sight, smell, touch, and (under supervision) taste.	Animals Two by Two Investigation 3, Parts 1-3, pp. 8-20 Wood and Paper Investigation 1, Parts 1-2, pp. 8-19 Fabric Investigation 1, Part 1, pp. 6-11 Trees Investigation 3, Parts 7-8, pp. 29-34
4. Use magnifiers to see small features of objects.	Animals Two by Two Investigation 4, Part 1, pp. 8-11 Fabric Investigation 1, Part 4, pp. 20-22
5. Use a thermometer to measure temperature.	Trees Materials Section, Tools for Observing Weather, pp. 10-13

Earth Science

K.2 Broad Concept: Objects in the sky move in predictable patterns. As a basis for understanding this concept, Students:

Standard	FOSS
1. Recognize that day and night repeat in a predictable pattern.	
2. Recognize that seasons repeat in predictable patterns over time.	Trees Investigation 3, Parts 1-9, pp. 10-38 Science Stories, pp. 14-23
3. Know the sun, moon, and stars can be observed at certain times of the day.	

Physical Science

K.3 Broad Concept: Objects can be described by their observable properties. As a basis for understanding this concept, students:

Standard	FOSS
1. Recognize that objects are made of materials with particular properties, such as clay, cloth, paper, metal, etc.	Fabric Investigation 1, Parts 1-2, pp. 6-15 Investigation 2, Part 1, pp. 7-11 Science Stories, pp. 4-13 Wood and Paper Investigation 1, Parts 1-2, pp. 8-20 Investigation 3, Part 1, pp. 8-12
2. Investigate and compare physical properties of objects (e.g., color, size, shape, weight, texture, flexibility, attraction to magnets, ability to float and sink).	Fabric Investigation 1, Parts 1-2, pp. 6-15 Investigation 2, Part 1, pp. 7-11 Science Stories, pp. 16-23 Wood and Paper Investigation 1, Parts 1-3, pp. 8-23 Investigation 3, Parts 2-4, pp. 13-25

K.4 Broad Concept: The motion of objects can be observed and measured. As a basis for understanding this concept, students:

Standard	FOSS
1. Compare the position of an object in relationship to another object.	Wood and Paper Investigation 2, Parts 3-4, pp. 16-23 Animals Two by Two Investigation 1, Part 3, pp. 22-25 Fabric Investigation 1, Parts 4-6, pp. 20-33
2. Explain that things move in many different ways, such as straight, zigzag, round and round, back and forth, and fast and slow).	Animals Two by Two Investigation 2, Parts 1-3, pp. 9-22 Investigation 4, Part 1, pp. 8-11 Wood and Paper Investigation 1, Part 4, pp. 24-27

Life Science

K.5 Broad Concept: Different types of plants and animals inhabit the Earth. As a basis for understanding this concept, students:

Standard	FOSS
1. Know there are many different kinds of plants and animals.	Animals Two by Two Investigation 1, Part 4, pp. 26-29 Investigation 2, Parts 1, 3, pp. 9-13, 18-21 Investigation 4, Part 1, pp. 8-11 Science Stories, pp. 3-23 Trees Investigation 1, Part 1, pp. 7-14 Investigation 3, Part 1, pp. 10-11 Science Stories, pp. 4-12
2. Describe that plants and animals are alike in some ways and different in others (e.g., appearance and behavior).	Animals Two by Two Investigation 2, Parts 1, 3, pp. 9-13, 18-21 Investigation 3, Part 3, pp. 17-20 Science Stories, pp. 3-23 Trees

	Investigation 1, Part 1, pp. 7-14 Investigation 2, Part 2, pp. 10-19 Science Stories, pp.4-12
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Grade One

Scientific Thinking and Inquiry

1.1 Broad Concept: Scientific progress is made by asking questions and conducting careful investigations. As a basis for understanding this concept and to address the content in this grade, students should develop their own questions about objects or events they can observe, and then perform investigations. Students:

Standard	FOSS
1. Observe, describe, draw, and sort objects as a way of isolating and categorizing some of their properties.	<p>Pebbles, Sand, and Silt Investigation 2, Parts 1-4, pp. 8-29</p> <p>Solids and Liquids Investigation 1, Parts 1-2, pp. 8-20 Investigation 2, Part 2, pp. 15-20</p> <p>Balance and Motion Investigation 2, Parts 1-3, pp. 8-25</p>
2. Investigate and make observations to seek answers to questions.	<p>Air and Weather Investigation 1, Parts 1-6, pp. 8-38</p> <p>New Plants Investigation 2, Parts 1-2, pp. 8-19</p> <p>Pebbles, Sand, and Silt Investigation 4, Parts 1-3, pp. 8-25</p> <p>Solids and Liquids Investigation 4, Parts 1-2, pp. 7-22</p> <p>Plants and Animals Investigation 1, Part 2, pp. 58-62</p>
3. Recognize and demonstrate what people can learn about plants and animals by observing them closely over a period of time.	<p>New Plants Investigation 1, Parts 1-3, pp. 8-30 Investigation 3, Parts 1-3, pp. 8-25 FOSS Web, Activity: Watch it Grow</p> <p>Insects Investigation 1, Parts 1-3, pp. 8-25 Investigation 2, Parts 1-3, pp. 8-24</p> <p>Plants and Animals Investigation 1, Parts 1-3, pp. 47-72 Investigation 3, Parts 1-3, pp. 87-108 Investigation 4, Parts 1-2, pp. 151-163</p> <p>Insects and Plants Investigation 2, Parts 1-3, pp. 91-115</p>
4. Use tools, such as rulers and magnifiers, to investigate the world and make observations.	<p>Pebbles, Sand, and Silt Investigation 1, Parts 1-3, pp. 8-21</p> <p>Air and Weather Investigation 2, Part 2, pp. 14-19</p> <p>Insects Investigation 1, Parts 1-3, pp. 8-25 Investigation 2, Parts 1-3, pp. 8-24</p>
5. Measure the length of objects having straight edges in centimeters or non-standard units to the nearest unit.	<p>Balance and Motion Investigation 3, Math Extension, p. 27</p> <p>Solids and Liquids Investigation 1, Math Extension, p. 27</p>
6. Demonstrate that magnifiers help people see small features of objects.	<p>Insects Investigation 1, Parts 1-3, pp. 8-25</p>

<p>7. Describe and compare objects in terms of number, shape, texture, size, mass, color and motion.</p> <p>8. Write brief informational descriptions of a real object, person, place or event using information from the observations.</p>	<p>Investigation 2, Parts 1-3, pp. 5-24 Pebbles, Sand, and Silt Investigation 1, Parts 1-3, pp. 8-21 Insects and Plants Investigation 1, Parts 1-3, pp. 52-72 Investigation 5, Parts 1-3, pp. 206-225</p> <p>Pebbles, Sand, and Silt Investigation 2, Parts 1-3, pp. 8-23 Air and Weather Investigation 4, Part 3, pp. 19-24 Balance and Motion Investigation 2, Parts 1-3, pp. 8-25 New Plants Investigation 1, Part 3, pp. 23-30 Insects and Plants Investigation 2, Part 3, pp. 105-115</p> <p>Pebbles, Sand, and Silt Investigation 2, Part 3, pp. 18-23 Air and Weather Investigation 1, Parts 2-3, pp. 14-20 Solids and Liquids Investigation 4, Parts 1-2, pp. 7-22</p>
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Earth Science

1.2 Broad Concept: The earth is composed of land, air and water. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Recognize and explain that water, rocks, soil and living organism are found on the Earth's surface.</p>	<p>Pebbles, Sand, and Silt Investigation 2, Parts 1-3, pp. 8-29 Investigation 4, Parts 1-3, pp. 8-25 Science Stories, pp. 1-14, 20-23 FOSS Web, Activity: Find Earth Materials Insects Investigation 3, Parts 1-3, pp. 8-26 Science Stories, pp. 3-11 FOSS Web, Activity: Insect Hunt Plants and Animals Investigation 3, Parts 1-2, pp. 120-134 Science Resources, pp. 28-45 Insects and Plants Investigation 3, Parts 1-3, pp. 129-151 Science Resources, pp. 3-7, 15-27, 44-55 New Plants Investigation 2, Parts 1-3, pp. 8-28 Science Stories, pp. 22-39</p>
<p>2. Investigate and explain that air is a mixture of different gases that surrounds us and takes up space, and whose movement we feel as wind.</p>	<p>Air and Weather Investigation 3, Parts 1-4, pp. 8-27 Science Stories, pp. 1-6</p>
<p>3. Observe and measure that the sun supplies heat and light to the earth and is necessary for most life.</p>	<p>Air and Weather Investigation 2, Part 2, pp. 14-19 Science Stories, p. 21</p>

Physical Science

1.3 Broad Concept: The motion of objects can be observed, measured, and changed. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Observe and describe that the way to make something move (faster or slower or in a different direction) is by giving it a push or a pull, which is called a force.</p>	<p>Balance and Motion Investigation 2, Parts 1-2, pp. 8-19 Investigation 3, Parts 1-2, pp. 6-18 Science Stories, pp. 10-16 Air and Weather Investigation 1, Parts 4-6, pp. 21-38</p>
<p>2. Explain that the greater the applied force, the greater the change in the motion of the object.</p>	<p>Balance and Motion Investigation 2, Parts 1-2, pp. 8-19 Air and Weather Investigation 1, Parts 4, 6, pp. 21-26, 34-38 Investigation 3, Part 3, pp. 17-21</p>
<p>3. Demonstrate and observe that magnets supply a force that can be used to make some things move without touching them.</p>	<p>Balance and Motion Science Stories, pp 18-21 Solids and Liquids Investigation 3, Science Extension, p. 31</p>
<p>4. Recognize and demonstrate how things near earth fall to the ground unless something holds them up (i.e., they are subject to the force of gravity).</p>	<p>Air and Weather Investigation 1, Part 3, pp. 17-20 Investigation 3, Part 6, pp. 28-33 Balance and Motion Investigation 1, Parts 1-4, pp. 8-28</p>

Life Science

1.4 Broad Concept: Different types of plants and animals inhabit the Earth. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Explain that most living things need food, water, and air.</p>	<p>New Plants Investigation 1, Part 2, pp. 13-22 Investigation 2, Part 1, pp. 8-14 Science Stories, pp. 3-7 Insects Investigation 1, Part 1, pp. 8-13 Investigation 3, Part 2, pp. 12-20 Plants and Animals Investigation 1, Part 2, pp. 47-57 Science Resources, pp. 3-7, 21-24 Insects and Plants Investigation 1, Part 1, pp. 52-61 Investigation 2, Part 2, pp. 95-104 Investigation 3, Part 2, pp. 134-144</p>
<p>2. Observe and describe that there can be differences, such as size or markings, among the individuals within one particular plant or animals group (e.g., maple trees, zebras). Variation is a normal characteristic of many kinds of living things.</p>	<p>Insects Investigation 1, Part 1, pp. 8-15 Investigation 3, Part 3, pp. 21-26 Science Stories, pp. 42-45 New Plants Investigation 1, Part 3, pp. 23-30 Investigation 2, Part 2, pp. 8-19</p>

<p>3. Observe and explain that animals eat plants and /or other animals for food.</p> <p>4. Recognize that animals (including humans) and plants are living things that grow, reproduce, and need food, air, and water.</p> <p>5. Identify the external features that local plants and animals have (such as found in schoolyards or in city neighborhoods) that enable them to survive in their environment.</p>	<p>Plants and Animals Investigation 1, Part 3, pp. 63-72 Investigation 2, Parts 1-3, pp. 87-108</p> <p>Insects and Plants Investigation 2, Part 3, pp. 145-151 Investigation 3, Part 3, pp. 145-151 Science Resources, pp. 20-25</p> <p>Insects Investigation 3, Part 2, pp. 12-20 Investigation 4, Part 2, pp. 14-18 Science Stories, p. 6</p> <p>New Plants Science Stories, pp. 26-27, 32-33, 35, 36-38, 40-43</p> <p>Plants and Animals Investigation 3, Part 2, pp. 128-134 Science Resources, pp. 21-23, 29-30, 32-33, 35-36, 39, 41-42, 44-45, 47-50</p> <p>Insects and Plants Investigation 3, Part 2, pp. 134-144 Investigation 4, Part 2, pp. 170-174 Science Resources, p. 6</p> <p>New Plants Investigation 1, Parts 2-3, pp. 13-30 Science Stories, pp. 3-7</p> <p>Insects Investigation 1, Parts 1-3, pp. 8-25 Investigation 5, Parts 1-3, pp. 10-24 Science Stories, pp.16-33</p> <p>Plants and Animals Investigation 1, Part 2, pp. 47-57 Science Resources, pp. 3-7, 21-24</p> <p>Insects and Plants Investigation 1, Part 1, pp. 52-61 Investigation 2, Part 2, pp. 95-104 Investigation 3, Part 2, pp. 134-144</p> <p>Insects Investigation 2, Parts 1-3, pp. 8-24 Investigation 5, Parts 1-3, pp. 10-24 Investigation 6, Parts 1-3, pp. 8-22 Science Stories, pp. 8-15</p> <p>New Plants Investigation 1, Parts 1-3, pp. 8-29 Science Stories, pp. 3-7, 40-43</p> <p>Plants and Animals Investigation 1, Parts 1-2, pp. 47-62 Science Resources, pp. 3-7, 47-50</p> <p>Insects and Plants Investigation 1, Parts 1-3, pp. 52-75 Investigation 3, Parts 1-3, pp. 129-151 Investigation 5, Parts 1-3, pp. 206-225 Science Resources, pp. 26-33</p>
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Grade Two

Scientific Thinking and Inquiry

2.1 Broad Concept: Scientific progress is made by asking questions and conducting careful investigations. As a basis for understanding this concept and to address the content in this grade, students should develop their own questions perform investigations. Students:

Standard	FOSS
1. Describe objects as accurately as possible and compare observations with those made and reported by others.	<p>Solids and Liquids Investigation 4, Parts 1-2, pp. 7-22</p> <p>Pebbles, Sand and Silt Investigation 4, Part 1, pp. 8-14</p> <p>New Plants Investigation 2, Part 3, pp. 20-28</p> <p>Air and Weather Investigation 1, Part 3, pp. 17-20</p> <p>Plants and Animals Investigation 1, Part 3, pp. 63-72</p>
2. Make new observations when there is disagreement among observers or among successive observations.	FOSS is an inquiry-based program and as such provides ample opportunity to address this standard through its investigations.
3. Demonstrate the ability to work with a team, but still reach and communicate one's own conclusions about findings.	FOSS investigations involve students working in cooperative groups but encouraging independent thinking.
4. Use tools, such as thermometers, magnifiers, rulers or balances to investigate, observe, measure, design, and build things.	<p>Air and Weather Investigation 2, Part 2, pp. 14-19</p> <p>Insects Investigation 2, Parts 1-3, pp. 8-24</p> <p>Pebbles, Sand and Silt Investigation 1, Parts 1-3, pp. 8-21</p> <p>Insects and Plants Investigation 1, Parts 1-3, pp. 52-75 Investigation 3, Parts 1-3, pp. 129-151</p>
5. Measure objects in standard units and include units in reports measurements with simple calculations (e.g., 3 cm + 3 cm = 6 cm).	<p>Air and Weather Investigation 2, Parts 2, 4, pp. 14-19, 24-27</p> <p>Solids and Liquids Investigation 1, Math Extension, p. 27</p>
6. Draw pictures and write brief coherent descriptions that correctly portray key features of an object.	<p>Air and Weather Investigation 1. Parts 2-3, pp. 13-20</p> <p>Pebbles, Sand and Silt Investigation 1, Part 2, pp. 13-17</p> <p>Insects Investigation 1, Part 1, pp. 8-15 Investigation 2, Part 1, pp. 8-13</p> <p>Insects and Plants Investigation 1, Part 1, pp. 52-61 Investigation 3, Part 1, pp. 129-133</p>
7. Recognize and explain that people are more likely to believe ideas when they are supported by observations.	FOSS is an inquiry-based program and as such provides ample opportunity to address this standard through its investigations.

<p>8. Explain that some events can be predicted with near certainty, such as a sunrise and sunset, and some cannot, such as storms.</p>	<p>FOSS provides the opportunity to address this standard. See for example: Air and Weather Investigation 4, Parts 1,3, pp. 8-11, 19-24 New Plants Investigation 2, Parts 1-2, pp. 8-19 Plants and Animals Investigation 1, Parts 1-2, pp. 47-62</p>
<p>9. Explain that sometimes a person can make general discoveries about a group of objects or organisms, such as insects, plants, or rocks, by studying just a few of them, even though the group may vary in details. Understand that this is not inconsistent with the existence of biological variation.</p>	<p>FOSS provides the opportunity to address this standard. See for example: Pebbles, Sand and Silt Investigation 4, Parts 1-3, pp. 8-25 Insects Investigation 5, Parts 1-3, pp. 10-24 New Plants Investigation 4, Parts 1-2, pp. 7-19 Plants and Animals Investigation 3, Parts 1-2, pp. 120-134 Insects and Plants Investigation 1, Parts 1-3, pp. 52-75 Investigation 5, Parts 1-3, pp. 206-225</p>
<p>10. Make simple line and bar graphs (e.g., track daily changes in outdoor air temperature).</p>	<p>Air and Weather Investigation 4, Part 1, pp. 8-13 Investigation 2, Science Extension, p. 31 Solids and Liquids Investigation 3, Math Extension, p. 28</p>

Scientific and Technology

2.2 Broad Concept: Although each of the human enterprises of science and technology has a character and history of its own, each is dependent on and reinforces the other. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Give examples of how our lives would be different without such technologies as automobiles, computers, and electric motors.</p>	<p>FOSS provides the opportunity to address this standard. See for example: New Plants Science Stories, pp. 16-21 Pebbles, Sand and Silt Science Stories, pp. 16-18 Plants and Animals Science Resources, pp. 9-14</p>

Earth Science

2.3 Broad Concept: Weather can be observed, measured, and described. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Explain how weather patterns occur continually on Earth.</p>	<p>Air and Weather Investigation 2, Part 1, pp. 8-13 Investigation 4, Parts 1-2, pp. 8-18 Science Stories, pp. 7-13, 18-23</p>
<p>2. Explain that air temperature, humidity, wind speed and direction, and precipitation make up the weather in a</p>	<p>Air and Weather Investigation 2, Parts 2, 4, pp. 14-19, 24-27 Investigation 3, Parts 2, 4, pp. 12-16, 22-27</p>

particular place and time.	Science Stories, pp. 7-13
3. Investigate and compare weather changes from day to day and place to place.	Air and Weather Investigation 2, Part 1, pp. 8-13 Investigation 4, Part 1, pp. 8-11
4. Describe and chart that the temperature and amounts of rain or snow vary in the same months in each place every year.	Air and Weather Investigation 4, Parts 1-2, pp. 8-18
5. Explain the difference between weather and climate.	FOSS provides the opportunity to address this standard. See for example: Air and Weather Investigation 4, Parts 1-2, pp. 8-18 Science Stories, pp. 7-13, 18-23
6. Describe the differences among the various forms of precipitation (rain, snow, sleet, and hail).	FOSS provides the opportunity to address this standard. See for example: Air and Weather Investigation 2, Part 4, pp. 24-27 Science Stories, pp. 7-13
7. Cite specific examples of how human beings protect themselves from adverse weather conditions through different means,	Air and Weather Science Stories, pp. 13, 17 FOSS Web, Activity: What's the Weather

2.4 Broad Concept: The Earth's resources can be conserved. As a basis for understanding this concept, students:

Standard	FOSS
1. Recognize and explain how certain materials- such as recycled paper, cans, and certain types of plastic containers- can be used again.	New Plants Investigation 1, p. 29 Insects and Plants Investigation 2, Part 3, p. 113
2. Explain how discarded products can contribute to the problem of waste disposal and how recycling and reuse can help solve this problem.	

Physical Science

2.5 Broad Concept: Materials come in different states, including solids, liquids, and gases. As a basis for understanding this concept, students:

Standard	FOSS
1. Recognize that solids have a definite shape; liquids and gases take the shape of their containers.	Solids and Liquids Investigation 1, Part 1, pp. 8-16 Investigation 2, Parts 1-2, pp. 10-21 Science Stories, pp. 4-12 Air and Weather Investigation 1, Part 6, pp. 34-38 Science Stories, p. 4
2. Recognize that materials can be manipulated to change some of their properties (e.g., cooling or heating).	Solids and Liquids Investigation 4, Parts 1-2, pp. 7-22 Investigation 2, Science Extension, p. 31 Investigation 4, Science Extension, p. 29

<p>3. Investigate and explain that water, like many other substances, can be a liquid, a solid, or a gas, and it transform from one state to another.</p> <p>4. Explain how water can be transformed from one state to another by adding or taking away heat energy.</p> <p>5. Describe when water is frozen into ice and the ice is allowed to melt, the amount of water id the same as it was at the beginning.</p> <p>6. Investigate and explain how water left in an open container seems to disappear into the air (evaporation), but water in a small, closed container does not disappear.</p>	<p>Science Stories, pp. 14-17 FOSS Web, Activity: Change It!</p> <p>Solids and Liquids Investigation 1, Part 1, pp. 8-13 Investigation 2, Science Extension, p. 21 Investigation 4, Science Extension, p. 29 Science Stories, p. 16 FOSS Web, Activity: Change It!</p> <p>Solids and Liquids Investigation 4, Science Extension, p. 29 Science Stories, pp. 14-17 FOSS Web, Activity: Change It!</p> <p>Solids and Liquids Investigation 4, Science Extension, p. 29</p> <p>Solids and Liquids Investigation 2, Science Extension, p. 31</p>
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Life Science

2.6 Broad Concept: Plants and animals have structures that serve different functions in growth, survival, and reproduction. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Observe and identify the visible, external features of plants and animals and describe how these features help them live in different environments.</p> <p>2. Observe and cite examples of how some animals and plants change their appearance as the seasons change.</p>	<p>New Plants Investigation 1, Part 3, pp. 23-30 Investigation 4, Parts 1-2, pp. 7-19 Science Stories, pp. 8-11, 23-24, 26-43</p> <p>Insects Investigation 5, Parts 1-3, pp 10-24 Investigation 6, Parts 1-3, pp. 8-22 Science Stories, pp. 8-13</p> <p>Plants and Animals Investigation 3, Parts 1-3, pp. 120-140 Investigation 4, Parts 1-2, pp. 151-163 Science Resources, pp. 3-7, 28-50</p> <p>Insects and Plants Investigation 1, Parts 1-3, pp. 52-75 Investigation 2, Part 3, pp. 105-115 Investigation 5, Parts 1-3, pp. 206-225 Science Resources, pp. 15-18, 26-33</p> <p>Air and Weather Science Stories, pp. 22-23</p> <p>Plants and Animals Science Resources, p. 37</p> <p>New Plants Science Stories, p. 31</p>

2.7 Broad Concept: Living things depend on one another and their environment for survival. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Observe and describe how animals may use plants, or even other animals, for shelter and nesting.</p> <p>2. Explain that food for almost all kinds of animals can be traced back through a food web back to green plants.</p> <p>3. Observe and explain that plants and animals both need to take in water, animals need to take in food, and green plants need light.</p> <p>4. Recognize and explain that materials in nature, such as grass, twigs, sticks, and leaves, can be recycled and used again, sometimes, in different forms, as birds do in making nests.</p> <p>5. Observe and describe how the local environment (water, dry land) supports a wide variety of plants and animals, some unique to the Chesapeake Bay.</p>	<p>Insects Science Stories, p. 30</p> <p>New Plants Science Stories, pp. 23, 27, 30, 32-33, 36, 39</p> <p>Plants and Animals Science Resources, pp. 24, 29, 36, 42</p> <p>Insects and Plants Science Resources, p. 52</p> <p>Insects Investigation 1, Part 1, pp. 8-15 Investigation 3, Part 2, pp. 12-20 Science Stories, pp. 3-7</p> <p>New Plants Investigation 1, Part 2, pp. 13-22 Investigation 2, Part 2, pp. 15-19</p> <p>Plants and Animals Investigation 1, Part 2, pp. 47-57 Science Resources, pp. 3-7, 21-24</p> <p>Insects and Plants Investigation 1, Part 1, pp. 52-61 Investigation 2, Part 2, pp. 95-104 Investigation 3, Part 2, pp. 134-144</p> <p>Insects Investigation 3, Part 2, pp. 12-20</p> <p>New Plants Science Stories, pp. 27, 32, 36</p> <p>Plants and Animals Science Resources, pp. 24, 27, 33, 36, 38, 42</p> <p>Insects and Plants Investigation 3, Part 2, pp. 134-144</p> <p>FOSS provides the opportunity to address this standard. See for example:</p> <p>Insects Investigation 3, Parts 1-3, pp. 8-26 Investigation 6, Parts 1-3, pp. 8-22 Science Stories, pp. 3-35 FOSS Web, Activity: Insect Hunt</p> <p>New Plants Investigation 2, Part 1, pp. 8-14 Science Stories, pp. 22-39</p> <p>Plants and Animals Investigation 1, Part 1, pp. 47-57 Science Resources, pp. 22-25, 28-45</p> <p>Insects and Plants Investigation 3, Parts 1-3, pp. 129-151 Investigation 5, Parts 1-3, pp. 206-225 Science Resources, pp. 3-33</p>

<p>6. Cite examples of how animals and plants sometimes cause changes in their surroundings, while some of these changes are easy to see, some are very small and hard to recognize, even though they can be very important.</p> <p>7. Recognize that there is a vast world of living things, called <i>microorganisms</i>, too small to see with the unaided eye.</p> <p>8. Recognize that most microorganisms so not cause disease and many are beneficial (e.g., yeasts, bacteria of the soil).</p>	<p>Pebbles, Sand, and Silt Science Stories, p. 22</p> <p>New Plants Science Stories, pp. 11, 30, 35</p> <p>Plants and Animals Science Resources, pp. 29, 36, 41</p>
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2.8 Broad Concept: Many different plants and animals inhabit the Earth. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Recognize and explain that living things are found almost everywhere in the world in habitats such as the oceans, rivers, rain forests, mountain ranges, arctic tundra, farms, cities, and other environments. Recognize that some habitats are extreme, such as the very deepest parts of the ocean or inside hot springs.</p>	<p>New Plants Science Stories, pp. 22-39</p> <p>Plants and Animals Science Resources, pp. 28-45</p>
<p>2. Recognize that the numbers and types of living things can vary greatly from place to place.</p>	<p>New Plants Science Stories, pp. 22-39</p> <p>Plants and Animals Science Resources, pp. 28-45</p> <p>Insects and Plants Science Resources, pp. 3-7, 26-29, 47-55</p> <p>Insects Science Stories, pp. 3-11, 25-33</p>
<p>3. Give examples of the many kinds of organisms that lived in the past that are now extinct (have died out) and explain how these organisms were similar to, and others very different from, organisms that are alive today.</p>	<p>Pebbles, Sand and Silt Science Stories, pp. 26-31</p>
<p>4. Describe that plants and animals in our city have habitats that are essential to their survival. For instance, the schoolyard is a habitat that provides the basic needs for a variety of plants and animals.</p>	<p>FOSS provides the opportunity to address this standard. See for example:</p> <p>Insects Investigation 2, Parts 1-3, pp. 8-24 Investigation 3, Parts 1-3, pp 8-26 Investigation 5, Parts 1-3, pp. 10-24 Investigation 6, Parts 1-2, pp. 8-17</p> <p>Insects and Plants Investigation 1, Parts 1-3, pp. 52-75 Investigation 3, Parts 1-3, pp. 129-151 Investigation 5, Parts 1-3, pp. 206-225</p>

2.9 Broad Concept: humans have predicable life cycles. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Recognize and discuss that people are more like one another than they are like other animals. Each type of animal is more like its relatives (family) than it is like the animals of other types (or families).</p>	<p>FOSS provides the opportunity to address this standard. See for example: Insects Science Stories, pp. 36-37, 42-46 Insects and Plants Science Resources, pp. 20-22, 37-55</p>
<p>2. Explain that humans, like all living things, reproduce offspring of their own kind.</p>	
<p>3. Observe that and describe how offspring are very much, but never exactly, like their parents and like other offspring of the same parents.</p>	<p>Insects Investigation 3, Parts 1-3, pp. 8-26 Science Stories, pp. 36-37, 42-46 Insects and Plants Investigation 3, Parts 1-3, pp. 129-151 Science Resources, pp. 37-55</p>
<p>4. Recognize that people have a wide but not unlimited range of external features, such as differences in their size, shape, and color of hair, skin, and eyes.</p>	<p>Insects Science Stories, p. 42 Insects and Plants Science Resources, p. 20</p>

Grade Three

Scientific Thinking and Inquiry

3.1 Broad Concept: Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept and to address the content in this grade, students should develop their own questions perform investigations. Students:

Standard	FOSS
1. Recognize and explain that when a scientific investigation is repeated, carefully and under the same conditions, a similar (but not necessarily identical) result is expected.	FOSS is an inquiry-based program and as such provides ample opportunity to address this standard through its investigations.
2. Participate in different types of guided scientific investigations (related to content in this grade), such as observing objects and events and collecting specimens for analysis, including longer-term investigations that take place over several days, weeks, or months.	<p>Structures of Life Investigation 3, Part 4, pp. 24-30</p> <p>Water Investigation 3, Parts 1-4, pp. 8-26</p> <p>Physics of Sound Investigation 2, Parts 1-3, pp. 8-24</p> <p>Sun, Moon and Stars Investigation 1, Part 2, pp. 56-64</p> <p>Magnetism and Electricity Investigation 4, Parts 1-3, pp. 8-22</p>
3. Keep and report records of investigations and observations using tools, such as journals, charts, graphs, and computers.	<p>Magnetism and Electricity Investigation 4, Parts 2-3, pp. 14-22</p> <p>Measurement Investigation 4, Part 2, pp. 14-17</p> <p>Earth Materials Investigation 2, Parts 1-2, pp. 8-21</p> <p>Human Body Investigation 4, Parts 1-3, p. 8-24</p> <p>Matter and Energy Investigation 3, Part 2, pp. 151-160</p>
4. Discuss the results of investigations and consider the explanation of others.	<p>FOSS provides the opportunity to address this standard. See for example:</p> <p>Water Investigation 4, Parts 1-2, pp. 8-18</p> <p>Ideas and Inventions Investigation 2, Part 2, pp. 16-19</p> <p>Matter and Energy Investigation 3, Part 2, pp. 151-160</p> <p>Earth Materials Investigation 3, Parts 1-2, pp. 8-19</p>
5. Demonstrate the ability to work cooperatively while respecting the ideas of others and communicating one's own conclusions about findings.	Students work in cooperative groups and have the opportunity express their own thoughts.
6. Measure and mix dry and liquid materials in prescribed amounts, following reasonable safety precautions.	<p>Earth Materials Investigation 3, Part 1, pp. 8-13</p>

<p>7. Keep a notebook that describes ongoing observations and that is still understandable weeks or months later.</p> <p>8. Appropriately use simple tools-such as clamps, rulers, scissors, and hand lenses, as well as other technology (e.g., calculators and computers) to help solve problems.</p> <p>9. Make sketches and write descriptions to aid in explaining procedures or ideas.</p> <p>10. Ask, “How do you know?” in appropriate situations, and attempt reasonable answers when others ask the same question.</p> <p>11. Explain that one way to make sense of something is to think of how it compares to something more familiar (e.g., vibrations of an object in air as a tuning fork, a pluck string of a stringed instrument, human vocal cords).</p>	<p>FOSS encourages the use of notebooks. See for example: Earth Materials Investigation 1, Part 1, pp. 8-15</p> <p>Magnetism and Electricity Investigation 1, Part 3, pp. 23-29</p> <p>Water Investigation 4, Parts 1-2, pp. 8-18</p> <p>Matter and Energy Investigation 3, Parts 2-3, pp. 139-160</p> <p>Earth Materials Investigation 1, Parts 1-3, pp. 8-29</p> <p>Measurement Investigation 2, Parts 2-3, pp. 14-24</p> <p>Earth Materials Investigation 1, Parts 2-3, pp. 16-29</p> <p>Ideas and Inventions Investigation 2, Parts 1-2, pp. 8-19</p> <p>Sun, Moon and Stars Investigation 2, Part 2, pp. 89-100</p> <p>Magnetism and Electricity Investigation 2, Parts 1-2, pp. 8-19</p> <p>Structures of Life Investigation 1, Parts 1-2, pp. 8-27</p> <p>FOSS is an inquiry-based program and as such provides ample opportunity to address this standard.</p> <p>Magnetism and Electricity Investigation 4, Part 1, pp. 8-13 Science Stories, pp. 10-11</p> <p>Physics of Sound Investigation 1, Part 3, pp. 21-29 Science Stories, pp. 6, 9</p> <p>Ideas and Inventions Science Stories, p. 9</p>
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Science and Technology

3.2 Broad Concept: Although each of these human enterprises of science and technology has a character and history of its own, each is dependent on and reinforces the other. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Define technology as the application of human ingenuity and skill to the solution of practical problems (e.g., typewriter, computer).</p> <p>2. Identify and demonstrate how an invention can be used in different ways, such as a radio or a cell phone that can be used to receive both information and entertainment.</p>	<p>FOSS provides the opportunity to address this standard in the many examples of technology found in the FOSS Science Stories and Resources.</p> <p>Ideas and Inventions Science Stories, pp. 2-3</p>

<p>3. Construct something to perform a task by using commonly available materials, such as paper, cardboard, wood, plastic, or metal, or by using existing objects.</p>	<p>Magnetism and Electricity Investigation 4, Part 1, pp. 8-13 Investigation 5, Parts 1-2, pp. 8-20 Ideas and Inventions Investigation 4, Part 2, pp. 14-17 Water Investigation 2, Part 1, pp. 8-13 Human Body Investigation 4, Part 1, pp. 8-16</p>
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Earth Science

3.3 Broad Concept: Objects in the sky move in regular and predictable patterns. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Observe and describe the apparent motion of the sun and moon over a time span of one day.</p>	<p>Sun, Moon and Stars Investigation 1, Parts 1-2, pp. 42-64 Investigation 2, Parts 1-2, pp. 79-100 Ideas and Inventions Science Stories, p. 33</p>
<p>2. Using a globe, demonstrate how the Earth rotates on its axis every 24 hours, producing the night-and –day cycle.</p>	<p>Sun, Moon and Stars Investigation 1, Part 2, pp. 42-64 Science Resources, p. 3</p>
<p>3. Observe and describe how there are more stars in the sky than anyone can easily count, but they are not spaced or spread evenly.</p>	<p>Sun, Moon and Stars Investigation 3, Part 2, pp. 126-130 Science Resources, pp. 15, 35, 39, 47</p>
<p>4. Observe and describe that the sun can be seen only in the daytime; the moon can be seen sometimes at night and sometimes during the day.</p>	<p>Sun, Moon and Stars Investigation 1, Parts 1-2, pp. 42-64 Investigation 2, Parts 1-2, pp. 79-100 Science Resources, pp. 1-3, 14 Ideas and inventions Science Stories, pp. 34-35</p>
<p>5. Observe and describe the changes that occur in the observable shape of the moon over the course of a month (i.e., the moon looks a little different every day, but looks the same again about every four weeks).</p>	<p>Sun, Moon and Stars Investigation 2, Parts 1-2, pp. 79-100 Science Resources, pp. 24-28, 30-32 Ideas and Inventions Science Stories, pp. 34-36</p>
<p>6. Demonstrate and describe that sunlight can be blocked to create shadows, and the direction and length of shadows vary at different times of the day.</p>	<p>Sun, Moon and Stars Investigation 1, Part 2, pp. 42-64 Ideas and inventions Science Stories, pp. 26-27</p>

Physical Science

3.4 Broad Concept: Energy takes many forms and has many sources. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Recognize that energy is needed to carry out almost any kind of change.</p>	<p>Magnetism and Electricity Investigation 2, Parts 1-2, pp. 8-19 Investigation 4, Part 1, pp. 8-13</p> <p>Matter and Energy Investigation 1, Parts 1-3, pp. 50-82 Investigation 2, Parts 1-2, pp. 93-114 Science Resources, pp. 1-21, 24-28, 34-36</p> <p>Water Investigation 2, Part 3, pp. 19-24 Investigation 3, Part 2, pp. 12-16</p>
<p>2. Describe basic forms of energy, including mechanical (kinetic and potential), light, sound, heat, chemical, nuclear, and electrical.</p>	<p>Physics of Sound Investigation 1, Part 3, pp. 21-29 Science Stories, pp. 6, 22-28</p> <p>Matter and Energy Investigation 1, Parts 1-3, pp. 50-82 Investigation 2, Parts 1-2, pp. 93-114 Science Resources, pp. 1-21, 24-28, 34-36</p> <p>Magnetism and Electricity Investigation 2, Parts 1-2, pp. 8-19 Science Stories, pp. 7-13</p>
<p>3. Recognize that energy can be transformed from one form to another.</p>	<p>Matter and Energy Investigation 1, Parts 1-3, pp. 50-82 Science Resources, pp. 8-13</p> <p>Magnetism and Electricity Investigation 2, Parts 1-2, pp. 8-19 Investigation 4, Parts 1-3, pp. 8-22 Science Stories, pp. 28-31</p> <p>Physics of Sound Science Stories, pp. 22-25, 35</p>
<p>4. Describe how people use electricity or the chemical energy from burning fuels, such as wood, oil, coal, or natural gas, to obtain heat energy for doing tasks, such as cooking their food and warming their houses.</p>	<p>Magnetism and Electricity Investigation 2, Part 1, pp. 8-13 Science Stories, p. 33 FOSS Web, Movie: How a Light Bulb Works</p> <p>Matter and Energy Science Resources, pp. 1-3, 8-13</p> <p>Physics of Sound Science Stories, pp. 23-25</p>
<p>5. Investigate and describe how moving air and water (carriers of kinetic energy, the energy of motion) can be used to run machines like windmills and waterwheels.</p>	<p>Water Investigation 4, Part 2, pp. 14-18 Science Stories, p. 23 FOSS Web, Movie: Grist Mill</p>
<p>6. Demonstrate that things that make sound do so by vibrating objects, such as vocal cords and musical instruments. Describe that the sound travels as a vibration through the air.</p>	<p>Physics of Sound Investigation 1, Part 3, pp. 21-29 Investigation 3, Part 1, pp. 8-14 Science Stories, pp. 6, 9</p>

Life Science

3.5 Broad Concept: Plants and animals can be classified according to the physical characteristics that they share. As a basis for understanding this concept, students:

Standard	FOSS
<ol style="list-style-type: none"> 1. Demonstrate that a great variety of living things can be sorted into groups in many ways using various properties, such as how they look, where they live, and how they act, in order to decide which things belong to which group. 2. Explain that characteristics used for classification depend on the purpose of the grouping. 	<p>Human Body Science Stories, p. 11</p> <p>Structures of Life Science Stories, pp. 17, 41-42</p>

3.6 Broad Concept: Plants and animals have predictable life cycles. As a basis for understanding this concept, students:

Standard	FOSS
<ol style="list-style-type: none"> 1. Recognize that plants and animals go through predictable life cycles that include birth, growth, development, reproduction, and death. 2. Describe the life cycle of some living things, such as the frog and butterfly, including how they go through striking changes of body shape and function as they go through metamorphosis. 3. Compare and contrast how life cycles vary for different living things. 	<p>Structures of Life Science Stories, pp. 20-21 FOSS Web, Activity: Life Cycles</p> <p>Structures of Life FOSS Web, Activity: Life Cycles</p> <p>Structures of Life Science Stories, pp. 20-21 FOSS Web, Activity: Life Cycles</p>

3.7 Broad Concept: Humans have a variety of mechanisms to stay healthy. As a basis for understanding this concept, students:

Standard	FOSS
<ol style="list-style-type: none"> 1. Explain that people need water, food, air, waste removal, and a particular range of temperatures, just as other animals do, although different animals can tolerate very different ranges of temperature and other features of their surroundings. 2. Explain that eating a variety of healthful foods and getting enough exercise and rest help people stay healthy. 3. Explain that some things people take into their bodies from the environment can hurt them, and give examples of such things. 4. Recognize the food provides energy as well as materials for growth, maintenance, and repair of body parts. 	<p>Structures of Life Science Stories, pp. 22-34</p> <p>Human Body Science Stories, pp. 25-26</p> <p>Human Body Science Stories, p. 25</p> <p>Physics of Sound Science Stories, pp. 24-25</p>

<p>5. Recognize that vitamins and minerals are substances required by the body in small amounts to synthesize essential substances and carry out essential processes.</p> <p>6. Describe how, as a person matures, the amounts and kinds of food and exercise need by the body change.</p>	<p>Human Body Science Stories, p. 25</p>
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Grade Four

Scientific Thinking and Inquiry

4.1 Broad Concept: Scientific progress is made by asking questions and conducting careful investigations. As a basis for understanding this concept and to address the content in this grade, students should develop their own questions perform investigations. Students:

Standard	FOSS
1. Recognize and describe how results of similar scientific investigations may turn out differently due to inconsistencies in methods, materials, or observations, or the limitations of the tools used.	FOSS is an inquiry-based program and as such provides ample opportunity to address this standard through its investigations.
2. Explain that clear communication is an essential part of the process of scientific inquiry because it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and allow scientists to stay informed about scientific discoveries around the world.	FOSS is an inquiry-based program and as such provides ample opportunity to address this standard.
3. Use numerical data to describe and compare objects and events.	<p>Magnetism and Electricity Investigation 4, Parts 2-3, pp. 14-22</p> <p>Water Investigation 4, Part 1, pp. 8-13</p> <p>Matter and Energy Investigation 3, Part 2, pp. 139-150</p> <p>Measurement Investigation 3, Part 3, pp. 18-21</p> <p>Human Body Investigation 4, Part 3, pp. 20-24</p>
4. Write descriptions of investigations by using observations as support for explanations.	<p>FOSS provides the opportunity to address this standard. See examples below:</p> <p>Magnetism and Electricity Investigation 4, Part 3, pp. 21-25</p> <p>Water Investigation 4, Part 2, pp. 14-18</p> <p>Matter and Energy Investigation 3, Part 2, pp. 139-150</p> <p>Measurement Investigation 3, Part 3, pp. 18-21</p> <p>Physics of Sound Investigation 4, Part 4, pp. 24-28</p>
5. Support statements with ideas and data found in print and electronic media, identify and evaluate the sources used, and expect others to do the same.	<p>Many of the grade 3-4 FOSS modules includes an investigation that is student selected including investigative and research topics. This standard would be encouraged. See for example:</p> <p>Water Investigation 4, Part 4, pp. 24-28</p> <p>Human Body Investigation 4, Part 4, pp. 25-29</p>

<p>6. Identify better reasons for believing something rather than citing comments such as “Everybody knows that,” “I just know”, or “Because they say”, and discount such reasons when given by others.</p> <p>7. Explain how scientific thinking can be distorted by strong feelings, and explain why and when it is appropriate or necessary to separate emotions from reasoning process.</p>	<p>FOSS is an inquiry-based program and as such provides ample opportunity to address this standard through its investigations.</p> <p>FOSS is an inquiry-based program and as such provides ample opportunity to address this standard.</p>
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Science and Technology

4.2 Broad Concept: Although each of the human enterprises of science and technology has a character and history of its own, each is dependent on and reinforces the other. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Demonstrate how scientific tools, such as microscopes, telescopes, and cameras, can be used to gather accurate information for making scientific comparisons of objects and events.</p>	<p>Earth Materials Investigation 1, Parts 1-3, pp. 8-29</p> <p>Ideas and Inventions Science Stories, p. 38</p> <p>Matter and Energy Investigation 3, Part 2, pp. 139-150 Investigation 4, Part 1, pp. 174-180</p> <p>Sun, Moon and Stars Science Resources, pp. 40-43</p> <p>Measurement Investigation 2, Parts 2-3, pp. 14-24 Investigation 3, Parts 1-3, pp. 14-21 Investigation 4, Parts 1-2, p. 8-17</p> <p>Water Investigation 4, Part 1, pp. 8-13</p>
<p>2. Discuss and give examples of how technologies, such as computers and medical X-rays, have improved the lives of people.</p>	<p>Human Body Science Stories, pp. 5-7</p> <p>Ideas and Inventions Science Stories, 1-3, 9-10, 18, 22</p> <p>Magnetism and Electricity Science Stories, pp. 28-33</p> <p>Physics of Sound Science Stories, pp. 32-35</p>
<p>3. Describe how human beings have made tools and machines, such as X-ray cameras, microscopes, satellites, and computers to observe and do things that they could not otherwise sense or do at all, or as quickly or efficiently.</p>	<p>Ideas and Inventions Science Stories, pp. 22, 38</p> <p>Sun, Moon and Stars Science Resources, pp. 40-43</p> <p>Human Body Science Stories, pp. 5-7</p> <p>Magnetism and Electricity Science Stories, pp. 34-36</p> <p>Measurement Science Stories, pp. 22-23</p> <p>Physics of Sound Science Stories, pp. 32-35</p>

<p>4. Make simple and safe electrical circuits with battery and various plugs, sockets, and terminals.</p>	<p>Magnetism and Electricity Investigation 2, Parts 1-4, pp. 8-29 Investigation 3, Parts 1-3, pp. 10-26 Investigation 4, Part 1, pp. 8-13</p> <p>Matter and Energy Investigation 1, Parts 1, 3, pp. 50-67, 71-82</p>
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Earth Science

4.3 Broad Concept: Waves, wind, water, and ice shape and reshape the Earth's land surface..
As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Explain how waves, wind, water, and glacial ice shape and reshape Earth's land surface by eroding rock and soil in some areas and depositing them in other areas.</p>	<p>Earth Materials Science Stories, pp. 1-7</p>
<p>2. Explain how the surface of the earth changes over various time scales due to processes, such as erosion and weathering, landslides, volcanic eruptions, earthquakes, and mountain building.</p>	<p>Earth Materials Science Stories, pp. 1-7</p>

4.4 Broad Concept: The properties of rocks and minerals reflect the processes that formed them. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Define a mineral as a naturally occurring, crystalline inorganic solid substance. Recognize that each mineral has its own characteristic properties (e.g., quartz, mica).</p>	<p>Earth Materials Investigation 2, Part 1, pp. 8-13 Science Stories, pp. 30-33</p>
<p>2. Describe the physical properties of minerals, including hardness, color, luster, cleavage, and streak, and recognize that one mineral can be distinguished from another by use of a simplified key.</p>	<p>Earth Materials Investigation 2, Parts 1-2, pp. 8-21 Investigation 4, Part 1, pp. 8-13 Science Stories, pp. 30-33 FOSS Web, Activity: Moh's Drill</p>
<p>3. Recognize and describe that most rock is composed of different combinations of one or more minerals.</p>	<p>Earth Materials Investigation 1, Part 2, pp. 16-23 Investigation 4, Part 1, pp. 8-13 Science Stories, p. 30</p>
<p>4. Explain how weathering breaks rocks up into smaller pieces. Recognize that these pieces may be many sizes and shapes, from jagged boulders to smooth grains of sand and even smaller.</p>	
<p>5. Describe the different layers of the Earth, including the crust, mantle, and core.</p>	
<p>6. Define the three categories of rock</p>	<p>Earth Materials</p>

<p>(metamorphic, igneous, and sedimentary) based on how they are formed from older rocks.</p> <p>7. Explain how soil is made partly from rock weathered by water and wind, and partly from decomposition of plant and animal remains, and that it contains many living organisms.</p> <p>8. Describe the different properties of soil, including its color, texture (size of particles), and ability to retain water and support growth of plants.</p>	<p>Science Stories, pp. 34-37 FOSS Web, Activity: Rock Data Base</p>
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Physical Science

4.5 Broad Concept: Energy and matter have multiple forms and can be changed from one form to another. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Explain that energy comes from the sun in the form of visible light and other radiation we cannot see without special instruments, but some of what we cannot see we can feel as heating (infrared radiation), and some can cause sunburn (ultraviolet radiation).</p>	<p>Physics of Sound Science Stories, p. 22</p>
<p>2. Investigate and describe how light travels through empty space or a transparent medium in a straight line until it strikes an object, and if the object is transparent, the light will bend (refract) at the interface.</p>	<p>Matter and Energy Investigation 2, Part 1, pp. 93-102 Science Resources, pp. 22-27 Ideas and Inventions Science Stories, pp. 28-31</p>
<p>3. Explain when light strikes a surface, it can be reflected, scattered, refracted, and/or absorbed.</p>	<p>Matter and Energy Investigation 2, Parts 1-2, pp. 93-114 Science Resources, pp. 22-36 Ideas and Inventions Investigation 4, Parts 1-2, pp. 8-17 Science Stories, pp. 28-31</p>
<p>4. Observe and explain that when one object rubs against another (such as one's hands rubbing together) the kinetic energy (energy of motion) is transformed into heat energy.</p>	
<p>5. Recognize that heat energy can be absorbed or given off by both living and nonliving things.</p>	<p>Physics of Sound Science Stories, pp. 22-25 Matter and Energy Science Resources, pp. 18-19</p>
<p>6. Explain that energy in fossil fuels comes originally from the energy of sunlight used by plants that grew a long time ago.</p>	<p>Physics of Sound Science Stories, pp. 22-24 Matter and Energy Science Resources, pp. 2-3, 9-13, 18-19</p>

4.6 Broad Concept: Electricity and magnetism are related phenomena that have many useful applications in everyday life. As a basis for understanding this concept, students:

Standard	FOSS
1. Recognize that some materials are electrical conductors and others are electrical insulators.	Magnetism and Electricity Investigation 2, Part 3, pp. 20-25
2. Demonstrate that magnets attract objects made of iron and a few other substances (called magnetic materials), but they do not attract objects made of most other substances.	Magnetism and Electricity Investigation 1, Part 1, pp. 8-17
3. Investigate and describe that a magnet does not have to touch an object made of magnetic material to exert a force on it.	Magnetism and Electricity Investigation 1, Parts 2-3, pp. 18-29 Science Stories, pp. 5-9
4. Describe that magnets have poles; unlike poles of two magnets attract each other while like poles repel.	Magnetism and Electricity Science Stories, pp. 6-9
5. Explain how an electrically charged object does not have to touch another object to exert a force - called the electrostatic force – on it.	Magnetism and Electricity Science Stories, pp. 10-11
6. Recognize that there are two types of electrical charge: positive and negative.	Magnetism and Electricity Science Stories, pp. 10-11
7. Explain that if two electrically charged objects are near each other, each will exert an attractive or repulsive force on the other. Describe that like charges repel each other and unlike charges attract each other.	Magnetism and Electricity Science Stories, pp. 10-11
8. In spite of some similarities, explain how the electrostatic force and the magnetic force are not the same thing.	FOSS provides the opportunity to address this standard. See for example; Magnetism and Electricity Science Stories, pp. 5-11
9. Explain that electric current can flow only if there is a complete closed loop of conducting material (called a circuit) for it to flow through. Know that a switch is a device for opening and closing a circuit.	Magnetism and Electricity Investigation 2, Parts 1-4, pp. 8-29 Investigation 3, Parts 1-3, pp. 10-26
10. Explain how electrical energy can be used to produce light, heat energy, motion (kinetic energy), or sound energy.	Magnetism and Electricity Investigation 2, Parts 1-2, pp. 8-19 Science Stories, p. 33 FOSS Web, Movie: How a Light Bulb Works Matter and Energy Investigation 1, Parts 1-3, pp. 50-82 Science Resources, pp. 6-7, 14

Life Science

4.7 Broad Concept: All organisms need energy and matter to live and grow. As a basis for understanding this concept, students:

Standard	FOSS
1. Explain that organisms interact with one another in various ways, such as providing food, pollination, and seed dispersal.	Structures of Life Science Stories, pp. 3, 18, 23-24, 27-29, 35-36, 43
2. Observe and recognize that some source of energy is needed for all organisms to stay alive and grow.	Structures of Life Investigation 2, Part 2, pp. 14-17 Science Stories, p. 43
3. Describe how energy derived from the sun is used by green plants to produce chemical energy in the form of sugars (photosynthesis) and this energy is transferred along a food chain from producers (plants) to consumers to decomposers.	Structures of Life Science Stories, p. 43
4. Observe and explain that most plants produce far more seeds than actually grow into new plants.	Structures of Life Investigation 1, Part 1, pp. 8-17
5. Describe the structures in plants (leaves, roots, flowers, stem, bark, wood) that are responsible for food production, support, water transport, growth, and protection.	Structures of Life Investigation 2, Parts 1, 3, pp. 8-14, 18-22 Science Stories, pp. 1-2
6. Describe the many beneficial attributes of plants, including trees, in improving and sustaining an urban environment.	Structures of Life Science Stories, pp. 4-5
7. Explain how in all environments, organisms grow, die, and decay, as new organisms are produced by the older ones.	
8. Recognize that there are many kinds, and vast numbers, of living things too small to see with the naked eye called <i>microorganisms</i> , but they can be easily seen with the aid of various kinds of microscopes.	
9. Explain how dead plants and animals are the food source for many microorganisms.	
10. Investigate the Chesapeake Bay watershed and wetlands, and describe how they support a wide variety of plant and animal life that interact with other living and non living things.	Local Objective

4.8 Broad Concept: Humans have a variety of mechanisms to combat disease. As a basis for understanding this concept, students:

Standard	FOSS
<ol style="list-style-type: none"> 1. Describe that human beings have body systems very similar to those of other animals, especially other mammals (warm-blooded vertebrate animals that have, in the female, milk secreting organs for feed the young). 2. Explain that some diseases are caused by germs (harmful microorganisms such as some bacteria and viruses) and some are not, and those caused by microorganisms may be spread to other people. 3. Explain that disease-bearing microorganisms, called <i>pathogens</i>, can enter the body and interfere with the proper function of various parts of the body. 4. Recognize that there are beneficial microorganisms, such as normal intestinal flora. 5. Explain that washing hands with soap and water reduces the number of pathogens that can get into the body or that can be passed on to other people. 6. Describe the body's defenses against pathogens, including tears, saliva, skin, some types of white blood cells, stomach secretions, and an internal system of chemical testing. 7. Explain that a healthy body can fight most invasive pathogens; however, some interfere with the body's defenses. 8. Identify diseases that human beings can usually catch only once because their bodies build up an immunity to them. 9. Recognize that vaccines can prevent some diseases so that people do not catch them at all. 	<p>Human Body Investigation 1, Parts 1-3, pp. 8-25 Science Stories, pp. 1-4, 9, 11, 28-29</p>

Grade Five

Scientific Thinking and Inquiry

5.1 Broad Concept: Scientific progress is made by asking questions and conducting careful investigations. As a basis for understanding this concept and to address the content in this grade, students should develop their own questions perform investigations. Students:

Standard	FOSS
1. Recognize and describe how results of similar scientific investigations may turn out differently because of inconsistencies in methods, materials, or observations, or because of the precision of the instruments used.	FOSS is an inquiry-based program and as such provides ample opportunity to address this standard through its investigations.
2. Evaluate the validity of claims based on the amount and quality of the evidence cited.	FOSS is an inquiry-based program and as such provides ample opportunity to address this standard through its investigations.
3. Keep a notebook to record observations and be able to distinguish inferences from actual observations.	FOSS encourages keeping a notebook and provides the opportunity to do so. See for example: Solar Energy Investigation 1, Part 1, pp. 8-13 Variables Investigation 1, Part 1, pp. 8-15 Food and Nutrition Investigation 1, Part 1, pp. 8-15
4. Write instructions that others can follow to carry out an investigation.	FOSS provides the opportunity to address this standard. See for example: Environments Investigation 2, Parts 3-4, pp. 22-30 Solar Energy Investigation 4, Part 4, pp. 29-33 Mixtures and Solutions Investigation 4, Part 4, pp. 25-28
5. Read and follow step-by-step instructions when learning new investigations.	FOSS provides the opportunity to address this standard. See for example: Mixtures and Solutions Investigation 3, Part 2, pp. 15-20 Investigation 4, Part 1, pp. 8-15 Variables Investigation 2, Part 1, pp. 8-13 Investigation 4, Parts 1-2, pp. 8-17 Living Systems Investigation 2, Part 1, pp. 85-98
6. Identify the controlled variable and at least one independent variable in a scientific investigation, when appropriate.	Variables Investigation 3, Parts 2-3, pp. 14-19 Investigation 4, Part 3, pp. 18-23 Environments Investigation 2, Parts 2-4, pp. 16-30 Investigation 5, Part 1, pp. 8-13 Water Planet Investigation 3, Part 1, pp. 125-135

<p>7. Explain that predictions can be based on what is known about the past, assuming that conditions are similar.</p> <p>8. Realize and explain why predictions may be more accurate if they are based on large collections of similar events for statistical accuracy.</p> <p>9. Determine area and volume of rectangular shapes from linear dimensions, using the expressions $A = l \times w$ and $V = l \times w \times h$.</p> <p>10. Understand how plotting data on a number line helps in seeing where the data lie, including the outliers.</p> <p>11. Explain the distortion inherent in using only a portion of the data collected to describe the whole. Understand that it is sometimes acceptable to discard data.</p>	<p>Solar Energy Investigation 3, Parts 1-2, pp. 8-23</p> <p>FOSS is an inquiry-based program and as such provides ample opportunity to address this standard.</p> <p>FOSS is an inquiry-based program and as such provides ample opportunity to address this standard.</p> <p>FOSS provides the opportunity to address this standard See for example: Variables Investigation 1, Part 2, pp. 16-22 Investigation 3, Part 4, pp. 24-27 Water Planet Investigation 3, Part 1, pp. 125-135 Solar Energy Investigation 2, Part 2, pp. 16-24 Levers and Pulleys Investigation 1, Parts 2-3, pp. 18-28</p> <p>FOSS is an inquiry-based program and as such provides ample opportunity to address this standard.</p>
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Science and Technology

5.2 Broad Concept: Although each of the human enterprises of science and technology has a character of its own, each is dependent on and reinforces the other. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving.</p> <p>2. Give examples of advances in technology that have positively and /or negatively affected society.</p>	<p>Mixtures and Solutions Science Stories, pp. 26-27 Models and Designs Science Stories, p. 9</p> <p>Mixtures and Solutions Science Stories, pp. 43-45 Variables Science Stories, pp. 18-20 Solar Energy Science Stories, pp. 25-29 Models and Designs Science Stories, pp. 25-27, 31-36</p>

<p>3. Give examples of materials not present in nature that have become available because of science and technology, such as cloth, metal alloys, plastic, ceramics, and concrete.</p>	<p>Food and Nutrition Science Stories, pp. 13, 22 Mixtures and Solutions Science Stories, pp. 8, 41, 45</p>
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Earth Science

5.3 Broad Concept: The solar system consists of planets and other bodies that orbit the sun in predictable paths. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Describe the Earth as part of a system called the <i>solar system</i>, which includes the sun (a star), planets, comets, asteroids, and many moons.</p>	<p>Models and Designs Science Stories, pp. 6-7 Solar Energy Science Stories, pp. 40-43</p>
<p>2. Recognize that the Earth is the third planet from the sun on our solar system.</p>	<p>Models and Designs Science Stories, pp. 6-7 Solar Energy Science Stories, pp. 40-43</p>
<p>3. Demonstrate how the Earth orbits the sun in a year's time, and Earth rotates on its axis about once every 24 hours.</p>	
<p>4. Describe that, like all planets and stars, the Earth is approximately spherical in shape.</p>	<p>Solar Energy Science Stories, p. 41</p>
<p>5. Explain that the alternation between day and night and the apparent movement of the sun, moon, and stars across the sky depend on the rotation of the Earth on its axis.</p>	
<p>6. Observe how telescopes are used both to magnify images of distant objects in the sky, including the moon and the planets, and to gather enough light from very dim objects to make them visible.</p>	<p>Models and Designs Science Stories, p. 9</p>
<p>7. Observe and describe that stars vary in size, but they are so far away that they look like points of light.</p>	
<p>8. Observe stars and identify ones that are unusually bright, and others that have unusual colors, such as red or blue.</p>	

5.4 Broad Concept: Water on Earth moves from the ocean to the land through the process of evaporation and condensation. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Investigate and describe that when liquid water evaporates, it turns into a gas (vapor) mixed into the air, and can</p>	<p>Solar Energy Science Stories, pp. 22-24</p>

<p>condense and reappear as a liquid when cooled or as a solid (ice) if cooled below the freezing point.</p> <p>2. Explain how water moves in air masses from one place to another in the form of clouds, fog, or as invisible water vapor, and falls to the Earth as rain, hail, sleet, or snow.</p> <p>3. Describe that clouds are made of tiny droplets of water or ice crystals.</p> <p>4. Explain that the air around us is matter and has weight (a force) and exerts pressure; explain that air pressure varies a little from place to place and from time to time.</p> <p>5. Describe that winds blow from areas of higher pressure to areas of lower pressure.</p> <p>6. Explain how global patterns, such as the jet stream and ocean currents, influence local weather and climate in ways that can be measured in terms of temperature, pressure, wind direction and speed, and amounts of precipitation.</p> <p>7. Explain that water on Earth cycles through different forms and in different locations (e.g., underground water and vapor in the atmosphere).</p> <p>8. Using maps and globes, recognize that the earth's oceans are all connected as one body of water that covers about three-quarters of the Earth's surface.</p>	<p>Solar Energy Science Stories, p. 25</p> <p>Solar Energy Science Stories, pp. 23-24</p> <p>Solar Energy Science Stories, pp. 18-20 FOSS Web, Movie: Weather: High and Low Pressure</p> <p>Solar Energy Science Stories, p. 23 FOSS Web, Movie: Wind</p> <p>Solar Energy Science Stories, pp. 22-24</p> <p>Solar Energy Science Stories, pp. 22-24</p>
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Physical Science

5.5 Broad Concept: Energy and matter have multiple forms and can be changed from one form to another. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Recognize that all matter is made up of small particles called atoms, which are too small to see with our eyes; describe how atoms may combine to form molecules or crystalline solids (compounds).</p>	<p>Mixtures and Solutions Science Stories, pp. 4, 25-28</p>
<p>2. Recognize that there are more than 100 different kinds of atoms (each called an element) which are displayed on the periodic table of elements.</p>	<p>Mixtures and Solutions Science Stories, pp. 3-6, 32-36</p>

<p>3. Explain that all matter is made up of an element, a compound, or a mixture of elements and compounds.</p> <p>4. Investigate and describe that heating and cooling causes changes in the properties of substances. For example, liquid water can turn into steam by boiling, and liquid water can turn into ice by freezing.</p> <p>5. Explain that many kinds of chemical changes occur faster at higher temperatures.</p> <p>6. Explain that when a warm object and a cool one are placed in contact, heat flows from the warmer object to the cooler one until they are at the same temperature. Know that heat transfer can also occur at a distance by radiation.</p> <p>7. Investigate and describe how some materials conduct heat much better than others, and poor conductors (insulators) can be used to reduce heat loss or gain.</p>	<p>Mixtures and Solutions Science Stories, pp. 3-6, 25-28</p> <p>Mixtures and Solutions Investigation 4, Science Extension, p. 31 Solar Energy Science Stories, pp. 23-24</p> <p>Mixtures and Solutions Investigation 4, Science Extension, p. 31</p> <p>Solar Energy Investigation 4, Part 3, pp. 24-28</p>
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5.6 Broad Concept: Unbalance forces cause changes in velocity. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Explain that objects can move with a very wide range of speeds, with some moving very slowly and some moving too quickly for people to see them.</p> <p>2. Demonstrate that if the forces acting on object are balanced so that the net force is zero, the object will remain at rest if it is initially at rest or will maintain a constant speed and direction if it is initially moving.</p> <p>3. Investigate and describe that unbalanced forces cause changes in the speed and /or direction of motion of an object (acceleration).</p> <p>4. Describe that, for an object moving in a straight line, acceleration, a, is the change in velocity, v, divided by the</p>	<p>Variables Science Stories, pp. 18-20, 32-33</p> <p>Levers and Pulleys Investigation 1, Part 2, pp. 18-23 Investigation 3, Part 1, pp. 8-15 Models and Designs Science Stories, pp. 48-49</p> <p>Levers and Pulleys Investigation 1, Parts 2-3, pp. 18-28 Investigation 3, Parts 1-2, pp. 8-20 Variables Investigation 3, Parts 1-3, pp. 8-23 Investigation 4, Parts 1-3, pp. 8-23 Models and Designs Investigation 3, Parts 1-2, p. 8-19 Science Stories, pp. 37-40</p> <p>Models and Designs Science Stories, p. 53</p>

<p>time, t, that change takes ($a = v/t$).</p> <p>5. Investigate and describe that the greater the net force, F, applied to a body, the greater its acceleration, a. Describe that the greater the mass, m, of an object, the smaller the acceleration produced by a given force.</p> <p>6. Demonstrate and explain that things on or near the Earth are pulled toward Earth's center by the gravitational force that Earth exerts on them.</p>	<p>Variables Investigation 3, Parts 1-3, pp. 8-23 Investigation 4, Parts 2-3, pp. 12-23</p> <p>Models and Designs Investigation 3, Part 1, pp. 8-12 Science Stories, pp. 40-41</p> <p>Variables Investigation 1, Parts 1-3, pp. 8-27</p>
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Life Science

5.7 Broad Concept: All living things are composed of cells, from just one to many quadrillions, whose details usually are visible only through a microscope. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Observe and describe that some organisms consist of a single cell that need an environment that can supply food, water, sometimes oxygen, and a way to dispose of waste. (Some single-celled organisms are anaerobes.)</p>	<p>Environments Science Stories, pp. 28, 43-45</p> <p>Food and Nutrition Science Stories, p. 41</p>
<p>2. Observe and explain that some organisms are made of a collection of similar cells that benefit from cooperating.</p>	<p>Environments Science Stories, pp. 41-43</p>
<p>3. Explain that in complex organisms such as humans, cells can have a very wide variety of forms and perform very different roles (e.g., nerve cells, muscle cells, and fat cells).</p>	<p>Environments Science Stories, pp. 41-43</p>

5.8 Broad Concept: Many characteristics of an organism are inherited from the parents, but others result from the influence of the environment. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Explain why there must be a reliable way to transfer information from one generation to the next in order for offspring to resemble their parents.</p>	<p>Environments Science Stories, pp. 47-48</p>
<p>2. List some characteristics of plants and animals that are fully inherited (e.g., form of flower, shape of leaves) and others that are affected by the climate or environmental conditions (e.g., browning of leaves from too much sun, language spoken).</p>	<p>Environments Science Stories, pp. 47-48</p>

5.9 Broad Concept: Adaptations in physical structure or behavior may improve an organism's chance for survival. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Explain that in any particular environment, some kinds of plants and animals survive well, some do not survive as well, and some cannot survive at all.</p>	<p>Environments Investigation 1, Parts 1-2, pp. 8-19 Investigation 3, Parts 1-3, pp. 8-22 Investigation 6, Parts 1-2, pp. 8-17 Science Stories, pp. 9-17, 49-52</p>
<p>2. Identify organisms that are not native to the Washington, DC, area and how they undergo changes to increase their chance of survival in the area.</p>	<p>Local Objective</p>
<p>3. Explain how organisms can cause changes in their environment to ensure survival, and how these changes may affect the ecosystem (the living and nonliving components of the environment).</p>	<p>Environments Science Stories, pp. 35-36, 43-44</p>
<p>4. Explain that organisms fit enough to survive in a particular environment will typically produce offspring fit enough to survive and reproduce in that particular environment. Over time, these inherited characteristics are carried as the predominant forms (e.g., adaptations such as shape of beak, length of neck, shape of teeth).</p>	
<p>5. Explain how changes in an organism's habitat are sometimes beneficial and sometimes harmful, and how changes in the environment (drought, cold) have caused some plants and animals to die, migrate, or become extinct.</p>	<p>Environments Investigation 3, Parts 1-3, pp. 8-22 Investigation 6, Parts 1-2, pp. 8-17 Science Stories, pp. 35-36, 49-52</p>
<p>6. Explain that many plants and animals can survive harsh environments because of seasonal behaviors (e.g., in winter, some trees shed leaves, some animals hibernate).</p>	<p>Environments Science Stories, pp. 12-17</p>
<p>7. Recognize that some behaviors are instinctive (e.g., turtles burying their eggs, human infants crying when hungry) and others learned (e.g., a wolf's hunting skills, humans' ability to build fires for warmth).</p>	<p>Environments Science Stories, pp. 3-4, 6, 11-16</p>
<p>8. Describe well-defined behaviors, such as the way seedlings' stems grow toward light and their roots grow downward in response to gravity.</p>	<p>Environments Science Stories, pp. 3-4, 6, 11, 13, 15-16</p>
<p>9. Examine the information that fossils provide us about living things that</p>	<p>Models and Designs Science Stories, pp. 11-16</p>

<p>inhabited the Earth in the distant past, and describe how they can be compared both with the one another and with living organisms according to their similarities and differences.</p> <p>10. Recognize and describe how artifacts and preserved remains provide some evidence of the physical characteristics and possible behaviors of human beings and their ancestors who lived long ago.</p>	
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Grade Six

Scientific Thinking and Inquiry

6.1 Broad Concept: Scientific progress is made by asking questions and conducting careful investigations. As a basis for understanding this concept and to address the content in this grade, students should develop their own questions perform investigations. Students:

Standard	FOSS
<p>1. Give examples of different ways scientists investigate natural phenomena, and identify processes all use, such as collection of relevant evidence, the use of reasoning, the development and testing of hypotheses, and the use and construction of theory to make sense of the evidence.</p>	<p>FOSS provides the opportunity to address this standard. See for example: Variables Science Stories, pp. 1-6 Models and Designs Science Stories, pp. 13-16 Living Systems Investigation 2, Part 1, pp. 80-85 Food and Nutrition Science Stories, pp. 24-25, 34-35 Populations and Ecosystems Resources, pp. 46-50</p>
<p>2. Plan and conduct simple investigations based on student-developed questions that pertain to the content under study and write instructions others can follow in carrying out the investigations.</p>	<p>FOSS provides the opportunity to address this standard. See for example: Environments Investigation 2, Part 4, pp. 26-30 Variables Investigation 4, Part 3, pp. 18-23 Solar Energy Investigation 4, Part 4, pp. 29-33 Water Planet Investigation 2, Parts 2-3, pp. 86-100 Diversity of Life Investigation 8, Part 2, pp. 244-252</p>
<p>3. Identify dependent and independent variables in those investigations that have controls. If no controls are used, explain why.</p>	<p>Variables Investigation 4, Part 3, pp. 18-23 Environments Investigation 2, Part 4, pp. 26-30 Investigation 5, Part 1, pp. 8-13 Water Planet Investigation 23, Part 1, pp. 125-135 Diversity of Life Investigation 8, Part 2, pp. 244-252 Force and Motion Investigation 2, Part 3, pp. 89-99 Planetary Science Investigation 5, Parts 2-3, pp. 158-167</p>
<p>4. Recognize and explain that hypotheses are valuable even if they turn out to be not true, but that many investigations are not hypothesis-driven.</p>	<p>FOSS is an inquiry-based program and as such provides ample opportunity to address this standard through its investigations. See also: Variables Science Stories, pp. 1-3</p>
<p>5. Write a report of an investigation that includes the problem to be solve, the</p>	<p>FOSS provides the opportunity to address this standard. See for example:</p>

<p>methods employed, the tests conducted, the data collected or evidence examined, and the conclusions drawn.</p> <p>6. Locate information in reference books, back issues of newspapers and magazines, CD-ROMS, and online databases.</p> <p>7. Draw conclusions based on scientific evidence, and indicate whether information is needed to support a specific conclusion or to discriminate among several possible conclusions.</p> <p>8. Record and organize information in simple tables and graphs, and identify relationships they reveal. Use tables and graphs as examples of evidence for explanations when writing essays or writing about lab work, fieldwork, etc. Read simple tables and graphs produced by others, and describe in words what they show.</p> <p>9. Read a topographic map and a geologic map for evidence on the maps.</p> <p>10. Construct and interpret a simple map.</p>	<p>Variables Investigation 4, Part 3, pp. 18-23</p> <p>Environments Investigation 2, Part 4, pp. 26-30</p> <p>Water Planet Investigation 3, Part 1, pp. 125-135</p> <p>Diversity of Life Investigation 8, Part 2, pp. 244-252</p> <p>FOSS provides the opportunity to address this standard. See for example:</p> <p>Mixtures and Solutions Investigation 4, Part 4, pp. 25-28</p> <p>Landforms Investigation 2, Social Studies Extension, p. 24</p> <p>Environments Investigation 6, Language Extension, p. 23</p> <p>Living Systems Science Resources, pp. 52-53</p> <p>Populations and Ecosystems Investigation 7, pp. 210-215</p> <p>Living Systems Investigation 3, Part 3, pp. 136-141</p> <p>Planetary Science Investigation 5, Parts 2-3, pp. 158-167</p> <p>Chemical Interactions Investigation 7, Part 4, pp. 222-228</p> <p>Weather and Water Investigation 4, Part 1, pp. 121-130</p> <p>Diversity of Life Investigation 8, Part 2, pp. 244-252</p> <p>Solar Energy Investigation 2, Part 2, pp. 8-15</p> <p>Variables Investigation 3, Part 4, pp. 24-27</p> <p>Water Planet Investigation 3, Part 1, pp. 125-135</p> <p>Levers and Pulleys Investigation 1, Parts 2-3, pp. 18-28</p> <p>Weather and Water Investigation 4, Part 1, pp. 121-130</p> <p>Force and Motion Investigation 1, Part 3, pp. 89-99</p> <p>Landforms Investigation 5, Parts 1-3, pp. 8-26</p> <p>Landforms Investigation 1, Part 3, pp. 20-24 Investigation 4, Parts 1-3, pp. 8-24</p>
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Scientific and Technology

6.2 Broad Concept: Although each of the human enterprises of science and technology has a character and history of its own, each is dependent on and reinforces the other. As a basis for understanding this concept, students:

Standard	FOSS
<ol style="list-style-type: none"> 1. Explain that computers have become invaluable in science because they speed up and extend people's ability to collect, store, compile, and analyze data; prepare research reports; and share data and ideas with investigators all over the world. 2. Explain that technology is essential to science for such purposes as measurement, data collection, graphing and storage, computation, communication and assessment of information, and access to outer space and other remote locations. 	<p>FOSS provides the opportunity to address this standard. Use of computers is encouraged.</p> <p>FOSS provides the opportunity to address this standard. Technology examples are found in Science Stories and Middle School Resources.</p>

The Solar System

6.3 Broad Concept: Astronomy and planetary exploration reveal the structure and scale of the solar system. As a basis for understanding this concept, students:

Standard	FOSS
<ol style="list-style-type: none"> 1. Recognize that the solar system consists of the Earth, moon, sun, eight generally recognized other planets that orbit the sun and their satellites, and smaller objects, such as asteroids and comets. 2. Describe how the planets move around the sun in elliptical orbits, and explain how the near coplanarity of the orbits, along with the principle of conservation of momentum, is evidence essential to our understanding of how the solar system was originally formed. 3. Explain that the moon is Earth's only natural satellite, but several of the other planets have natural satellites as well. Understand Earth also has many artificial satellites and that all of those satellites, artificial and natural, are in elliptical orbits around their primaries. 	<p>Water Planet Investigation 1, Part 1, pp. 50-58 Science Resources, pp. 1-13</p> <p>Solar Energy Science Stories, pp. 40-43</p> <p>Model and Designs Science Stories, pp. 6-7</p> <p>Planetary Science Investigation 10, Part 2, pp. 318-322 Resources, pp. 84-89 CD, Notebook: Solar System</p> <p>Planetary Science Resources, pp. 84-85</p> <p>Water Planet Science Resources, pp. 4-11</p> <p>Solar Energy Science Stories, pp. 40-43</p> <p>Planetary Science Investigation 4, Part 1, pp. 120-125 Investigation 10, Part 2, pp. 318-322 Resources, pp. 85-89</p>

<p>4. Explain that large numbers of chunks of rock and ice (asteroids and comets), much smaller than planets, orbit the sun.</p> <p>5. Describe, as seen from Earth, how planets change their position relative to the background of stars.</p> <p>6. Construct models or drawings to explain that the seasons are caused by the tilt of the earth's axis relative to the plane of its orbit and its revolution around the sun. Explain how this results in uneven heating of the various parts of Earth's surface that varies over the course of the year.</p> <p>7. Describe that as spring turns into summer at a particular place on earth, the days grow longer and the sun moves higher in the sky, resulting in more intense heating. In fall and winter, the opposite occurs. Explain how this variation in heating results in the seasons.</p> <p>8. Recognize and describe the sun as a midsize star located near the edge of a disk-shaped galaxy of stars called the <i>Milky Way</i>. Recognize that the universe contains many billions of galaxies, and each galaxy contains billions of stars.</p> <p>9. Recognize that the sun-to-Earth distance is such that it takes about eight minutes for light from the sun to reach Earth. Know that the next nearest star is many thousands of times farther from earth, and its light takes about four years to reach Earth.</p> <p>10. Explain that gravity is a force of attraction that every mass in the universe exerts on every other mass, and everything on or near anywhere near earth is attracted toward and attracts Earth's center by a gravitational force.</p> <p>11. Describe that the sun's gravitational attraction holds Earth and the other planets in their orbits, just as the</p>	<p>Solar Energy Science Stories, pp. 40, 43</p> <p>Water Planet Science Resources, pp. 8, 13</p> <p>Planetary Science Resources, pp. 87-89. 101-13</p> <p>Planetary Science Investigation 10, Part 1, pp. 312-317</p> <p>Weather and Water Investigation 3, Part 2-3, pp. 97-110 Resources, pp. 12-19 CD, Cycles: Seasons</p> <p>Weather and Water Investigation 3, Parts 2-3, pp. 97-110 Resources, pp. 12-19</p> <p>Solar Energy Science Stories, p. 40</p> <p>Planetary Science Resources, pp. 84-85, 100 CD, Notebook: Sun</p> <p>Models and Designs Science Stories, pp. 40-41</p> <p>Solar Energy Science Stories, pp. 43-44</p> <p>Force and Motion Investigation 7, Part 1, pp. 256-261 Resources, pp. 62-66</p> <p>Planetary Science Resources p. 70</p> <p>Water Planet Investigation 1, Part 2, pp. 59-66 Science Resources, pp. 16-17</p>
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planets' gravitational attraction keeps their moons in orbit around them.	Solar Energy Science Stories, pp. 43-44 Planetary Science Resources, p. 84 Force and Motion Resources, pp. 67-69
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Heat (Thermal Energy)

6.4 Broad Concept: The transfer of energy through radiation and convection currents affects many phenomena on the Earth's surface. As a basis for understanding this concept, students:

Standard	FOSS
1. Explain the meaning of radiation, convection, and conduction (three mechanisms by which heat is transferred to, through, and out of the Earth's system).	Water Planet Investigation 3, Parts 1-2, pp. 125-144 Science Resources, pp. 42-51 Weather and Water Investigation 4, Part 2, pp. 131-139 Investigation 5, Parts 2-3, pp. 163-174 Resources, pp. 22-26, 32-33 Video; Conduction through Metals
2. Describe that the heat from the sun falls on Earth unevenly because of its spherical shape. Describe that regions close to the equator receive more concentrated solar energy than those closer to the poles.	Water Planet Science Resources, p. 45 Weather and Water Investigation 3, Parts 2-3, pp. 97-110 Resources, pp. 17-19
3. Observe and explain how uneven heating sets up convective cells in the atmosphere and oceans that distribute heat away from the equator.	Water Planet Investigation 3, Part 2, pp. 136-144 Science Resources, pp. 46-51 Solar Energy Science Stories, pp. 22-24 Weather and Water Resources, pp. 32-33, 53-55
4. Explain that much of the heat from the sun is absorbed by the land and oceans and then is released into the atmosphere.	Water Planet Investigation 3, Parts 1-2, pp. 125-144 Science Resources, pp. 42-51 Solar Energy Science Stories, pp. 22-24 Weather and Water Resources pp. 33, 53-55
5. Recognize that, compared to other substances such as rock and soil, a given mass of water requires a greater input or output of heat energy to change its temperature by a given amount.	Water Planet Investigation 3, Part 1, pp. 125-135 Science Resources, p. 43
6. Describe why ocean temperatures, therefore, tend to vary seasonally less than land areas and why coastal areas tend to have cooler summers and warmer winters than inland areas at a similar distance from the poles.	Water Planet Science Resources, p. 79 Solar Energy Science Stories, p. 24 Weather and Water Resources, pp. 54-55

Weather and Climate

6.5 Broad Concept: Weather (in the short run) and climate (in the long run) involve the transfer of energy in and out of the atmosphere. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Explain how different regions receive different amounts of solar heating because of their latitude, clouds, surface water, ice, and other variables. Understand that this results in large-scale convective air flow and weather patterns.</p>	<p>Water Planet Investigation 3, Part 2, pp. 136-144 Science Resources, pp. 42-51 Solar Energy Science Stories, pp. 22-23 Weather and Water Investigation 3, Parts 2-3, pp. 97-110 Resources, pp. 17-19, 33, 53-55</p>
<p>2. Recognize and describe that the currents in the air and ocean distribute heat energy.</p>	<p>Water Planet Investigation 3, Part 2, pp. 136-144 Science Resources, pp. 46-51 Solar Energy Science Stories, pp. 22-24 Weather and Water Resources, pp. 32-33, 53-55</p>
<p>3. Explain that a great deal of energy is absorbed when water evaporates and is released when it condenses. Illustrate that this cycling of water and heat in and out of the atmosphere plays a critical role in climatic patterns.</p>	<p>Water Planet Investigation 4, Part 1, pp. 184-187 Science Resources, pp. 67-76 Solar Energy Science Stories, pp. 22-24 Weather and Water Investigation 7, Parts 1-2, pp. 232-243 Investigation 9, Part 1, pp. 311-314 CD, Cycles: Water Cycle CD, Climatic Factors: Climate Regions</p>
<p>4. Explain how mountain ranges and other major geographical features affect climate (e.g., mountains produce rain shadows, land masses interrupt ocean currents).</p>	<p>Water Planet Science Resources, pp. 76-79 Weather and Water CD, Climatic Factors: Weather and Landforms</p>
<p>5. Describe how climates may have changed abruptly in the past as a result of changes in earth's crust, such as gas and dust from volcanic eruptions or impacts of meteorites, asteroids, and comets from space.</p>	<p>Planetary Science Resources, pp. 67-68</p>
<p>6. Describe how the earth's atmosphere exerts a pressure that decreases with distance above sea level and, at every point, is the same in all directions.</p>	<p>Solar Energy Resources, pp. 18-20 Water Planet Investigation 3, Part 3, pp. 145-157 Science Resources, pp. 52-57 Weather and Water Investigation 8, Parts 1-2, pp. 258-270 Resources, pp. 48-52</p>

Resources

6.6 Broad Concept: Sources of materials differ in amounts, distribution, usefulness, and the time required for their formation. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Explain that fresh water is limited in supply and uneven in distribution; describe why it is essential for life as we know it and also for most human activities, including industrial processes.</p>	<p>Water Planet Investigation 4, Part 4, pp. 212-216 Science Resources, pp. 63-66 Weather and Water Resources, pp. 45-47</p>
<p>2. Recognize that fresh water is a resource that can be depleted or polluted, making it unavailable or unsuitable for humans.</p>	<p>Water Planet Investigation 4, Part 4, pp. 212-216 Science Resources, pp. 63-66 Weather and Water Resources, pp. 45-47</p>
<p>3. Recognize that the Earth's resources for humans, such as fresh water, air, arable soil, and trees, are finite.</p>	<p>Water Planet Investigation 4, Part 4, pp. 212-216 Science Resources, pp. 63-66 Mixtures and Solutions Science Stories, pp. 21-22 Weather and Water Resources, pp. 45-47</p>
<p>4. Explain that the atmosphere and the oceans have a limited capacity to absorb wastes and recycle materials naturally.</p>	
<p>5. Investigate and describe how pollutants can affect weather and the atmosphere.</p>	<p>Mixtures and Solutions Science Stories, pp. 21-22 Weather and Water Resources, pp. 63-65</p>
<p>6. Explain that recycling, reuse, and the development of substitutes can reduce the rate of depletion of many minerals.</p>	<p>Electronics Resources, pp. 18-21</p>
<p>7. Describe that most rainwater that falls in Washington, DC, will eventually drain into Chesapeake Bay.</p>	<p>Local Objective</p>
<p>8. Explain the important role of the water cycle within a watershed.</p>	<p>FOSS provides the opportunity to address this standard See for example: Water Planet Investigation 4, Part 1, pp. 184-197 Science Resources, pp. 67-70 Solar Energy Science Stories, pp. 22-24 Weather and Water Investigation 7, Parts 1-2, pp. 232-243 CD, Cycles: Water Cycle</p>

The Rock Cycle

6.7 Broad Concept: Rock materials are continuously recycled in the rock cycle. As a basis for understanding this concept, students:

Standard	FOSS
1. Recognize minerals are naturally occurring crystalline solids with definite chemical compositions, and identify common minerals using a key to their diagnostic properties.	
2. Examine and recognize most rocks are made of one or more minerals.	<p>Earth History Resources, pp. 96-97</p>
3. Describe how igneous rocks are formed when older rocks are melted and then re-crystallized. Understand they may be cooled deep in the Earth or at the surface as part of volcanic systems.	<p>Earth History Investigation 8, Part 1, pp. 254-258 Resources, pp. 93-97 CD, Geology Lab: Formation of Metamorphic, Sedimentary and Igneous Rocks</p>
4. Explain how metamorphic rocks are formed when older rocks are heated (short of melting) and/or subjected to increased pressure.	<p>Earth History Investigation 8, Part 1, pp. 254-258 Resources, pp. 93-97 CD, Geology Lab: Formation of Metamorphic, Sedimentary and Igneous Rocks</p>
5. Describe how sedimentary rocks are formed when older rocks are subjected to weathering in to sediments, and those sediments are eroded, transported, deposited, then compacted and cemented.	<p>Earth History Investigation 4, Parts 5-6, pp. 150-162 Investigation 5, Part 3, pp. 183-187 Resources, pp. 93-97 CD, Geology Lab: Formation of Metamorphic, Sedimentary and Igneous Rocks</p>
6. Observe and describe common igneous, metamorphic, and sedimentary rocks, including granite, obsidian, pumice (igneous); slate, schist, marble (metamorphic); sandstone, shale, and limestone (sedimentary).	<p>Earth History Investigation 8, Part 1, pp. 254-258 Resources, pp. 42-46 CD, Geology Lab: Rock Data Base</p>

Plate Tectonics

6.8 Broad Concept: Plate tectonics explain important features of the Earth's surface and major geologic events. As a basis for understanding this concept, students:

Standard	FOSS
1. Describe the solid lithosphere of Earth, including both the continents and the ocean basins, and how it is broken into several plates that ride on a denser, hot, and gradually deformable layer in the mantle called the <i>asthenosphere</i> (weak sphere).	<p>Landforms Science Stories, pp. 22-24 Earth History Resources, pp. 100-102</p>
2. Explain why the Earth has a hot interior.	<p>Landforms Science Stories, pp. 22-23</p>

<p>3. Explain how lithosphere plates move very slowly, pressing against one another in some places, pulling apart in other places, and sliding past one another in others.</p> <p>4. Compare and contrast oceanic plates and continental plates.</p> <p>5. Explain the process in which push against one another; one of them may be dense enough to sink under the other, a process called <i>subduction</i>. Explain that oceanic lithosphere may sink under continental or oceanic lithosphere, but continental lithosphere does not subduct.</p> <p>6. Describe that subducting plates may partially melt and form magma, which rises to the surface as lava to feed volcanoes and form volcanic mountain chains associated with deep-sea trenches.</p> <p>7. Explain when plates push against each other and neither is dense enough to subduct (both continental), the plates will crumble and fold and form large mountain chains.</p> <p>8. Explain that earthquakes are sudden motions along breaks in the crust called <i>faults</i>, and volcanoes/fissures are locations where magma reaches the surface as lava.</p> <p>9. Describe how earthquakes and volcanoes often, but not always, occur along the boundaries between plates.</p> <p>10. Describe that under the ocean basins, molten rock may well up between separating plates to create new ocean floor.</p> <p>11. Explain how volcanic activity along the ocean floor may form undersea mountains, which can grow above the ocean's surface to become islands (e.g., the Hawaiian islands).</p> <p>12. Explain how physical evidence, such as fossils and surface features of glaciation, supports detailed</p>	<p>Earth History Resources, pp. 100-102</p> <p>Landforms Science Stories, pp. 22-23</p> <p>Earth History Resources, pp. 100-103</p> <p>Landforms Science Stories, pp. 22-23</p> <p>Earth History Resources, pp. 102-103</p> <p>Landforms Science Stories, pp. 23-24</p> <p>Earth History Resources, pp. 102-103</p> <p>Landforms Science Stories, pp. 22-23</p> <p>Earth History Resources, pp. 102-103</p> <p>Landforms Science Stories, pp. 23-25</p> <p>Earth History Resources, pp. 104</p> <p>Landforms Science Stories, pp. 23-25</p> <p>Landforms Science Stories, p. 23</p> <p>Earth History Resources, pp. 102-103</p> <p>Landforms Science Stories, pp. 23-25</p> <p>Landforms Science Stories, pp. 24-29, 37-42</p> <p>Models and Designs</p>
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explanations of how Earth's surface has evolved over geologic time.	Science Stories, pp. 11-13 Earth History Resources, pp. 103-105
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Earth and Life History

6.9 Broad Concept: Evidence from rocks allows us to understand the evolution of life on Earth. As a basis for understanding this concept, students:

Standard	FOSS
1. Explain how the Earth's surface is built up and broken down by natural processes, including deposition of sediments, rock formation, erosion, and weathering.	Landforms Science Stories, pp. 25-29 Earth History Investigation 4, Parts 3-4, pp. 138-149 Investigation 5, Parts 3-4, pp. 183-193 Resources, pp. 36, 81-82, 103-105 Video: Weathering and Erosion
2. Describe that the history of life on Earth has been disrupted by major catastrophic events, such as major volcanic eruptions or the impact of asteroids.	Planetary Science Resources, pp. 67-68
3. Explain that although weather rock is the basic component of soil, the composition and texture of soil and its fertility and resistance to erosion are greatly influenced by plant roots and debris, bacteria, fungi, worms, insects, and other organisms.	
4. Explain how thousands of layers of rock confirm the long history of the changing surface of Earth.	Models and Designs Science Stories, pp. 11-13 Earth History Investigation 5, Part 4, pp. 188-193 Investigation 6, Part 4, pp. 220-224 Investigation 7, Part 1, pp. 234-242 Resources, pp. 73-77, 102-105 CD, Time Room
5. Illustrate and describe that remains of changing life forms are found in successive layers, although the youngest layers are not always found on the top because of folding, breaking, and uplifting of layers.	Models and Designs Science Stories, pp. 11-13 Earth History Investigation 7, Parts 1-2, pp. 234-243 Resources, pp. 73-77, 83-86
6. Recognize that evidence from geologic layers and radioactive dating indicates that Earth is approximately 4.6 billion years old and life on this planet has existed for more than 3 billion years.	Models and Designs Science Stories, pp. 11-12 Earth History Investigation 6, Part 2, pp. 209-214 Resources, p. 87
7. Observe and explain that fossils provide evidence of how life and environmental conditions have changed.	Models and Designs Science Stories, pp. 11-13 Earth History Investigation 7, Parts 1-2, pp. 234-243 Resources, pp. 73-75, 81-87 CD, Time Room

Grade Seven

Scientific Thinking and Inquiry

7.1 Broad Concept: Scientific progress is made by asking questions and conducting careful investigations. As a basis for understanding this concept and to address the content in this grade, students should develop their own questions perform investigations. Students:

Standard	FOSS
1. Explain that when similar investigations give different results, further studies may help to show whether the differences are significant.	FOSS is an inquiry-based program and as such provides ample opportunity to address this standard through its investigations.
2. Explain why it is important to keep honest, clear, and accurate records.	FOSS is an inquiry-based program and as such provides ample opportunity to address this standard.
3. Explain why research involving human subjects requires that potential subjects be fully informed about the risks and benefits associated with the research and that they have the right to refuse to participate.	
4. Recognize testable hypotheses in investigations that pertain to the content under study, and write instructions that others can follow in carrying out the investigation.	FOSS is an inquiry-based program and as such provides ample opportunity to address this standard through its investigations. See for example: Diversity of Life Investigation 6, Part 1, pp. 186-192 Investigation 8, Part 2, pp. 244-252 Investigation 9, Part 2, pp. 278-285 Force and Motion Investigation 2, Part 3, pp. 89-99
5. Communicate the steps and results from an investigation in written reports and verbal presentations.	Diversity of Life Investigation 8, Part 2, pp. 244-252 Investigation 9, Part 2, pp. 278-285 Planetary Science Investigation 5, Parts 2-3, pp. 158-167 Weather and Water Investigation 4, Part 1, pp. 121-130
6. Incorporate circle charts, bar and line graphs, diagrams, scatter plots, and symbols into writing, such as lab or research reports, to serve as visual displays of evidence for claims and/or conclusions.	Electronics Investigation 6, Part 3, pp. 195-200 Force and Motion Investigation 1, Part 2, pp. 57-62 Investigation 3, Part 2, pp. 119-125 Weather and Water Investigation 3, Part 1, pp. 93-96 Investigation 4, Part 1, pp. 121-130
7. Recognize whether evidence is consistent with a proposed explanation. Know that different explanations can be given for the same evidence, and that partial evidence	FOSS is an inquiry-based program and as such provides ample opportunity to address this standard.

<p>may be exploited for reasons other than truth seeking.</p> <p>8. Question claims based on vague attributes or on authority, such as “leading doctors say”, or based on statements made by celebrities or others outside the area of their particular expertise.</p>	<p>FOSS is an inquiry-based program and as such provides ample opportunity to address this standard.</p>
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Science and Technology

7.2 Broad Concept: Although each of the human enterprises of science and technology has a character and history of its own, each is dependent on and reinforces the other. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Explain types of technology that are developed and in use, such as in agriculture, manufacturing, sanitation, medicine, warfare, transportation, information processing, and communication.</p>	<p>Planetary Science Resources, pp. 90-93</p> <p>Human Brain and Senses Resources, p. 49</p> <p>Electronics Resources, pp. 34-36</p> <p>Weather and Water Resources, pp. 43-44</p>
<p>2. Know how technologies having to do with food production, sanitation, and disease prevention have dramatically changed how people live and work, and have resulted in changes in factors that affect the growth of human populations.</p>	<p>Human Brain and Senses Resources, p. 49</p>

Biological Classification

7.3 Broad Concept: Similarities are used to classify organisms because they may be used to infer the degree of relatedness among organisms. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Recognize and describe that a key distinction among organisms is between autotrophs, such as green plants (which use energy from sunlight to make their own food), and heterotrophs, such as animals and fungi (which consume other organisms as food and harvest energy from them).</p>	<p>Diversity of Life Resources, pp. 36-37</p> <p>Populations and Ecosystems Resources, pp. 14-16, 17-18</p>
<p>2. Recognize and describe that biological classifications are based on how organisms are related: Organisms are classified into a hierarchy of groups and subgroups, with species as the most fundamental unit.</p>	<p>Diversity of Life Resources, pp. 17, 65-68 CD, Database</p>
<p>3. Recognize and describe the definition</p>	<p>Diversity of Life</p>

<p>of a species as a group or population of organisms closely resembling one another that can mate and breed to produce fertile offspring.</p> <p>4. Describe how similarities among organisms are found in external and internal anatomical features, including specific characteristics as the cellular level, such as the number of chromosomes.</p>	<p>Resources, p. 17</p> <p>Diversity of Life Investigation 9, Part 1, pp. 273-277 Resources, pp. 36-37</p> <p>Populations and Ecosystems Resources, pp. 62-63</p>
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Cell Biology

7.4 Broad Concept: All living things are composed of cells, from one to many quadrillions, whose details usually are visible only through a microscope. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Investigate and explain that all living things are composed of one or more cells, that cells are organisms' basic units of structure and function, and that cells come only from existing cells (Theodor Schwann's and Matthias Schleiden's cell theory).</p>	<p>Diversity of Life Investigation 3, Parts 1-2, pp. 102-115 Investigation 4, Parts 1-2, pp. 133-141 Resources, pp. 24-30</p>
<p>2. Describe that the way in which cells function is similar in all living organisms.</p>	<p>Diversity of Life Investigation 3, Parts 2-3, pp. 108-122 Investigation 4, Parts 1-2, pp. 133-141 Resources, pp. 24-30</p>
<p>3. Explain that in those cells that contain a nucleus (<i>eukaryotic</i> plant and animal cells), the nucleus is the main repository for genetic information.</p>	<p>Populations and Ecosystems Resources, pp. 49-52</p>
<p>4. Identify cells such as bacteria and blue-green algae as <i>prokaryotes</i>. Explain that prokaryotic cells differ from eukaryotic cells most prominently in that they don't have a membrane-bound nucleus. Know their genetic information is in a threadlike mass, often a very long loop of DNA.</p>	<p>Diversity of Life Resources, pp. 27-29 CD, Cells and the Ribbon of Life</p>
<p>5. Know intracellular bodies with specific functions are called <i>organelles</i>. Describe the important organelles among them, such as mitochondria, which liberate energy for the work that cells do, and chloroplasts, which capture sunlight energy for photosynthesis.</p>	<p>Diversity of Life Investigation 4, Part 2, pp. 137-141 Resources, pp. 27-30 CD, Cells and the Ribbon of Life</p>
<p>6. Describe that plant cells have</p>	<p>Diversity of Life</p>

<p>chloroplasts and a cellulose cell wall and that animal cells do not.</p> <p>7. Observe and explain that about two-thirds of the mass of a typical cell is accounted for by water and the water gives cells many of their properties.</p> <p>8. Describe how the most basic chemical functions of organisms, such as extracting energy from food and getting rid of wastes, are started or carried out completely within the cell.</p> <p>9. Explain how cells in multicellular organisms continually divide to make more cells for growth and repair, and how various organs and tissues function to serve the needs of cells for food, air, and waste removal.</p> <p>10. Recognize that many organisms are single-celled (e.g., bacteria, yeasts), and explain how this one cell must carry out all of the basic functions of life.</p> <p>11. Construct a chart and describe that multicellular organisms are organized hierarchically from cells to tissues to organs to organ systems to organisms.</p>	<p>Resources, p. 29</p> <p>Diversity of Life Resources, pp. 29-30</p> <p>Diversity of Life Investigation 4, Part 2, pp. 137-141 CD, Cells and the Ribbon of Life</p> <p>Diversity of Life Resources, p. 43 Populations and Ecosystems Resources, p. 53</p> <p>Diversity of Life Investigation 2, Parts 1-3, pp. 72-91 Resources, pp. 24-29</p> <p>Diversity of Life Investigation 4, Part 2, pp. 137-141 CD, Cells and the Ribbon of Life</p>
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Genetics

7.5 Broad Concept: Every organism requires information in the form of a set of instructions that specifies its traits. Those traits may be modified by environmental influences. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Describe that heredity is the passage of information for developing and maintaining the organism's body from one generation to another, and that genes are the basic units of heredity; genes are made of DNA, consisting of very long molecules located in the chromosomes of each cell.</p>	<p>Populations and Ecosystems Investigation 9, Parts 1-2, pp. 262-273 Resources, pp. 46-55</p>
<p>2. Explain how, in asexual reproduction, offspring are an almost identical copy of the mother cell.</p>	<p>Diversity of Life Resources, p. 26</p>
<p>3. Explain how, in sexual reproduction, a single reproductive cell from a female (female gamete, egg, or ovum) merges with a specialized cell from a male (male gamete or spermatozoon) to make a fertilized egg (zygote). This carries genetic information from both</p>	<p>Diversity of Life Resources, pp. 41-44 Populations and Ecosystems Investigation 7, Part 1, pp. 218-223 Resources, pp. 53-54</p>

<p>parental gametes and multiplies to form the complete organism.</p> <p>4. Recognize and describe that new varieties of cultivated plants, such as corn and apples, and domestic animals, such as dogs and horses, have resulted from selective breeding, over multiple generations, for particular traits.</p> <p>5. Explain how the use of genetic-engineering techniques can speed the process of creating new varieties and introduce characteristics not easily available by selective breeding, and can make possible more precise modifications involving the manipulation of just one or a few genes.</p>	<p>Populations and Ecosystems Resources, pp. 58-59</p>
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Biological Evolution

7.6 Broad Concept: Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Describe that biological variation (phenotype variation) is the raw material on which natural selection operates.</p>	<p>Populations and Ecosystems Investigation 10, Parts 1-3, pp. 302-317 Resources, pp. 59-61 Video: Voyage to the Galapagos</p>
<p>2. Explain how Darwin's research and that of his followers supported a concept of differential survival in terms of fitness (i.e., given the potential exponential increase of offspring and the only linear potential increase of resources, favorable variations that aid individual organisms in their survival in a given environment will confer on those organisms a greater reproductive success for that variety).</p>	<p>Populations and Ecosystems Investigation 10, Parts 1-3, pp. 302-317 Resources, pp. 59-61</p>
<p>3. Describe how biological evolution results primarily from the action of natural selection on the available variation in a population of organisms.</p>	<p>Populations and Ecosystems Investigation 10, Parts 1-3, pp. 302-317 Resources, pp. 59-61 Video: Voyage to the Galapagos</p>
<p>4. Explain how independent lines of evidence drawn from geology, fossils, comparative anatomy, and molecular biology provide the firm basis of evolutionary theory.</p>	<p>Populations and Ecosystems Resources, pp. 59-61</p>
<p>5. Using specific examples, explain that extinction of a species is a result of mismatch of adaptation and the environment.</p>	<p>Populations and Ecosystems Resources, p. 61</p>

<p>steps to keep them safe.</p> <p>9. Research and explain the contributions of key scientists that have studied infection by disease organisms (germs), including Anton van Leeuwenhoek, Louis Pasteur, Joseph Lister, Robert Koch, Dimitri Iwanowski, and Alexander Fleming.</p> <p>10. Explain how fundamental changes in health practices have resulted from the establishment of the germ theory of disease.</p>	
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Ecology

7.8 Broad Concept: organisms in ecosystems exchange energy and nutrients among themselves and the physical environment. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Recognize that in all environments, such as freshwater, marine, forest, desert, grassland, mountain, farms, cities, and others, organisms with similar needs and living strategies compete with one another for resources, including food, space, water, air, and shelter.</p>	<p>Populations and Ecosystems Investigation 3, Part 3, pp. 103-107 Investigation 4, Parts 1-2, pp. 119-121 Resources, pp. 8-13, 17-24, 25-28</p>
<p>2. Describe how two types of organisms may interact in a competitive or cooperative relationship, such as producer/consumer, predatory/prey, parasite/hosts, or symbionts.</p>	<p>Populations and Ecosystems Investigation 3, Part 3, pp. 103-107 Investigation 4, Parts 1-2, pp. 119-129 Investigation 5, Part 4, pp. 161-169 Resources, pp. 8-13, 17-29</p>
<p>3. Illustrate and explain how plants use energy from sunlight to make simple sugars, and more complex molecules, from carbon dioxide and water through a process called <i>photosynthesis</i>. Understand how this produces food that can be used immediately or stored for later use.</p>	<p>Populations and Ecosystems Investigation 5, Part 2, pp. 151-155 Resources, pp. 14-15 Diversity of Life Resources, pp. 36-37</p>
<p>4. Create a food web to explain how energy and matter are transferred between producers, primary consumers, and secondary consumers.</p>	<p>Populations and Ecosystems Investigation 4, Part 2, pp. 122-129 Investigation 5, Part 4, pp. 156-160 Resources, pp. 17-21</p>
<p>5. Describe how organisms that eat plants break down the plant structures to produce the materials and energy that they need to survive, and in turn, other organisms consume them.</p>	<p>Populations and Ecosystems Investigation 4, Part 2, pp. 122-129 Investigation 5, Part 4, pp. 161-169 Resources, pp. 17-20</p>
<p>6. Explain how dead plants and animals, broken down by other living organisms (especially microorganisms and fungi)</p>	<p>Populations and Ecosystems Investigation 4, Part 2, pp. 122-129 Resources, p. 18</p>

<p>contribute to the cycling of matter through the system as a whole.</p> <ol style="list-style-type: none"> 7. Describe how, as any population of organisms grows, it is held in check by one or more environmental constraints (e.g., deplete of food or nesting sites, increased numbers of predators or parasites). 8. Explain why in urban environments a species (mostly human beings) settles in dense concentrations. 9. Describe that all organisms, including the human species, are part of and depend on two main interconnected global food webs; the ocean food web and the land food web. 10. Recognize that entire species may prosper in spite of the poor survivability or bad fortune of individuals. 	<p>Populations and Ecosystems Investigation 6, Parts 1-3, pp. 179-197 Resources, pp. 22-24</p>
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Grade Eight

Scientific Thinking and Inquiry

8.1 Broad Concept: Scientific progress is made by asking questions and conducting careful investigations. As a basis for understanding this concept and to address the content in this grade, students should develop their own questions perform investigations. Students:

Standard	FOSS
1. Describe how scientific knowledge is subject to modification and refinement as new information challenges prevailing theories.	FOSS provides the opportunity to address this standard. See for example: Force and Motion Resources, pp. 50-52 Populations and Ecosystems Resources, pp. 46-55 Chemical Interaction Resources, pp. 69-72, 80-83
2. Test hypotheses that pertain to the content under study.	FOSS provides the opportunity to address this standard. See for example: Planetary Science Investigation 5, Parts 2-3, pp. 158-167 Weather and Water Investigation 4, Part 1, pp. 121-130 Chemical Interaction Investigation 7, Part 5, pp. 229-234 Force and Motion Investigation 7, Part 1, pp. 256-261
3. Describe how if more that one variable changes at the same time in an experiment, the outcome of the experiment may not be attributable to a change in any single variable.	FOSS provides the opportunity to address this standard. See for example: Planetary Science Investigation 5, Parts 2-3, pp. 158-167 Weather and Water Investigation 4, Part 1, pp. 121-130 Force and Motion Investigation 2, Part 3, pp. 89-99 Diversity of Life Investigation 8, Part 2, pp. 244-252
4. Explain why accuracy and openness in record keeping and replication are essential for maintaining an investors credibility with other scientists and society.	FOSS is an inquiry-based program and as such provides ample opportunity to address this standard.
5. Write clear step-by-step instructions (procedural summaries) for conducting investigations.	Diversity of Life Investigation 6, Part 1, pp. 186-192 Investigation 8, Part 2, pp. 244-252 Investigation 9, Part 2, pp. 278-285
6. Participate in group discussion on scientific topics by restating or summarizing accurately what others have said, asking for clarification or elaboration, and expressing alternative positions.	FOSS provides the opportunity to address this standard through the class discussions associated with each investigation.

<p>7. Use tables, charts, and graphs in making arguments and claims in presentations about lab work.</p> <p>8. Read analog and digital meters on instruments used to make direct measurements of length, volume, weight, elapsed time, rates, or temperatures, and choose appropriate units. Explain how to interpolate on analog scales.</p> <p>9. Explain why arguments may be invalid if based on very small samples of data, biased samples, or experiments in which there was no control sample.</p> <p>10. Identify and criticize the reasoning in arguments in which fact and opinion are intermingled or the conclusions do not follow logically from the evidence given, an analogy is not apt, no mention is made of whether the control group is very much like the experimental group, or all members of a group are implied to have nearly identical characteristics that differ from those of other groups.</p> <p>11. Describe the work of pioneers of physics and cosmology such as Nicolaus Copernicus, Galileo Galilei, Johannes Kepler. Isaac Newton, Hans Christian Oerstad and Andre-Marie Ampere, Dimitry Ivanovich Mendeleev. Albert Einstein, and Lise Meitner.</p> <p>12. Apply simple mathematical models to problems (e.g. formulas such as $F = ma$)</p>	<p>Force and Motion Investigation 1, Part 2, pp. 57-62 Investigation 3, Part 2, pp. 119-123</p> <p>Electronics Investigation 6, Part 3, pp. 195-200</p> <p>Chemical Interaction Investigation 7, Part 4, pp. 222-228</p> <p>Weather and Water Investigation 3, Part 1, pp. 93-96</p> <p>Electronics Investigation 3, Parts 1-3, pp. 119-132 Investigation 5, Parts 1-3, pp. 161-174</p> <p>Force and Motion Investigation 2, Part 3, pp. 89-99</p> <p>FOSS is an inquiry-based program and as such provides ample opportunity to address this standard.</p> <p>FOSS is an inquiry-based program and as such provides ample opportunity to address this standard.</p> <p>Force and Motion Resources, pp. 50-53, 62-66 Video: Galileo: On the Shoulders of Giants</p> <p>Force and Motion Investigation 1, Part 3, pp. 63-66 Investigation 2, Part 3, pp. 83-89 Investigation 7, Part 3, pp. 267-272</p> <p>Electronics Investigation 8, Part 4, pp. 265-271 Resources, pp. 16-17, 33</p>
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Structure of Matter

8.2 Broad Concept: Elements have distinct macroscopic properties and atomic structures. As a basis for understanding this concept, students:

Standard	FOSS
1. Explain that all matter is made of	Chemical Interactions

<p>atoms that are far too small to see directly through an optical microscope.</p> <ol style="list-style-type: none"> 2. Construct a model of an atom and know the atom is composed of protons, neutrons, and electrons. 3. Using a periodic chart, explain the atoms of any element are similar to each other, but they are different from atoms of other elements. Know that the atoms of a given isotope are identical to each other. 4. Diagram and describe how atoms may combine (bond) into molecules or into large crystalline arrays. 5. Know that there are more than 100 elements that combine in a multitude of ways to produce compounds that make up all the living and nonliving things in the universe. 6. Describe how elements can be classified based on similar properties, into categories, including highly reactive metals, less active metals, highly reactive nonmetals, less reactive nonmetals, and some almost completely nonreactive (noble) gases. 7. Understand how an ion is an atom or group of atoms (molecule) that has acquired an electric charge by losing or gaining one or more electrons. 8. Describe how atoms, molecules, or ions comprising an object are in constant individual motion, and explain how their average motional (kinetic) energy determines the temperature of the object, and how the strength of the forces between them determines the state of matter at that temperature. 9. Explain that the melting and boiling temperatures of a substance (element or compound) depend on pressure and are independent of the amount of the sample. (Some materials don't melt and others don't boil because they decompose as the temperature is raised; other materials don't have a sharp melting point because they are not homogeneous.) 10. Describe the contributions of scientists 	<p>Investigation 9, Part 1, pp. 280-287 Resources, pp. 63-67, 96 Video: Atoms and Molecules</p> <p>Chemical Interactions Resources, pp. 64-67, 73-74 Video: Atoms and Molecules</p> <p>Chemical Interactions Investigation 2, Parts 1-2, pp. 70-80 Resources, pp. 3-6, 10-12, 63-67, 73-77, 90-95</p> <p>Chemical Interactions Resources, pp. 6, 90-91</p> <p>Chemical Interactions Investigation 3, Parts 2-3, pp. 99-113 Investigation 4, Parts 1-3, pp. 122-141 Investigation 5, Parts 1-3, pp. 153-171 Investigation 7, Parts 1-5, PP. 204-234 Resources, pp. 14-15, 18-22, 24-27, 39-48 CD: Particles in Solid, Liquid and Gas</p> <p>Chemical Interactions</p>
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involved with the development of current atomic theory, including John Dalton, Marie and Pierre Curie, Joseph John Thomson, Albert Einstein, Max Plank, Ernest Rutherford, Niels Bohr, and Erwin Schroedinger.	Resources, pp. 7-8
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Reactions

8.3 Broad Concept: Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept, students:

Standard	FOSS
1. Discover and explain how elements and compounds (reactants) react with each other to form products with different properties.	Chemical Interactions Investigation 9, Parts 1-4, pp. 280-312 Investigation 10, Parts 1-2, pp. 323-326 Resources, pp. 63-68
2. Describe Antoine Lavoisier's work including the idea that when materials react with each other, many changes can take place, but that in every case the total amount of matter afterward is the same as before (Law of Conservation of Matter).	Chemical Interactions Resources, pp 69-72
3. Explain how the idea of atoms, as proposed by John Dalton, explains the conservation of matter: In chemical reactions, the number of atoms stays the same no matter how they are arranged, and the mass of atoms does not change significantly in chemical reactions, so their total mass stays the same.	Chemical Interactions Investigation 9, Part 1, pp. 280-287 Resources, pp. 63-68, 96
4. Investigate and explain how during endothermic chemical reactions heat energy is absorbed from the surroundings, and in exothermic reactions heat energy is released to the surroundings.	
5. Investigate and explain that reactions occur at different rates, slow to fast, and that reactions rates can be changed by changing the concentration of reactants, the temperature, the surface areas of solids, and by using a catalyst.	Chemical Interactions Investigation 10, Part 1, pp. 323-329
6. Recognize that solutions can be acidic, basic, or neutral, depending on the concentration of hydrogen ions in the solution. Understand that because this concentration can vary over a very large range, the logarithmic pH scale is used to describe how acidic or basic a solution is (each increase of one in the	

<p>pH scale is an increase of 10 times in concentration).</p> <p>7. Recognize that indicators of chemical changes include temperature change, the production of a gas, the production of a precipitate, or a color change.</p>	<p>Chemical Interactions Investigation 9, Parts 1-4, pp. 280-312 Investigation 10, Parts 1-2, pp. 323-326 Resources, pp. 63-68</p>
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Density and Buoyancy

8.4 Broad Concept: All objects experience a buoyant force when immersed in a fluid. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Demonstrate that the mass of an object is a measure of the quantity of matter it contains (measured in kg or g), and that its weight (measured in N) is the magnitude of the gravitational force exerted between earth and that much mass.</p>	<p>Force and Motion Investigation 7, Part 1, pp. 256-261</p>
<p>2. Know that density is mass per unit volume.</p>	<p>Weather and Water Investigation 5, Part 1, pp. 152-162 Resources, pp. 27-31</p>
<p>3. Investigate and explain that equal volumes of different substances usually have different masses and, therefore, different densities.</p>	<p>Planetary Science Investigation 8, Parts 3-4, pp. 260-270</p> <p>Weather and Water Investigation 5, Part 1, pp. 152-162 Resources, pp. 27-31</p>
<p>4. Determine and explain that the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid the object has displaced; this principle can be used to predict whether an object will float or sink in a given liquid.</p>	<p>Planetary Science Investigation 8, Parts 3-4, pp. 260-270</p>
<p>5. Determine the density of substances (regular and irregular solids, and liquids) from direct measurements of mass and volume, or volume by water displacement.</p>	<p>Weather and Water Investigation 5, Part 1, pp. 152-162 Planetary Science Investigation 8, Parts 3-4, pp. 260-270</p>

Conservation of Energy

8.5 Broad Concept: Energy and matter have multiple forms and can be changed from one form to another. As a basis for understanding this concept, students:

Standard	FOSS
<p>1. Explain how energy is the ability to do work and is measured in joules (J).</p>	
<p>2. Describe kinetic energy as the energy of motion (e.g., a rolling ball), and</p>	<p>FOSS provides the opportunity to address this standard. See for example:</p>

<p>potential energy as the energy of position or configuration (e.g., a raised object or a compressed spring).</p> <ol style="list-style-type: none"> 3. Investigate and explain how kinetic energy can be transformed into potential energy, and vice versa (e.g., in a bouncing ball). 4. Recognize and describe that energy is a property of many systems and can take the forms of mechanical motion, gravitational energy, the energy of electrostatic and magnetostatic fields, sound, heat, and light (electromagnetic energy). 5. Describe that energy may be stored as potential energy in many ways including chemical bonds and in the nucleus of atoms. 6. Explain that the sun emits energy in the form of light and other radiation, and only a tiny fraction of that energy is intercepted by the earth. 7. Know that the sun's radiation consists of a wide range of wavelengths, mainly visible light, infrared, and ultraviolet radiation. 8. Investigate and explain that heat energy is a common product of an energy transformation, such as in biological growth, the operation of machines, the operation of a light bulb, and the motion of people. 9. Explain how electrical energy can be generated using a variety of energy sources and can be transformed into almost any other form of energy, such as mechanical motion, light, sound, or heat. 10. Investigate and explain that in processes at the scale of atomic size or greater, energy cannot be created or destroyed but only changed from one form into another. 11. Compare and contrast how heat energy can be transferred through radiation, convection, or conduction. 	<p>Force and Motion Investigation 1, Part 1, pp. 47-56 Investigation 2, Part 3, pp. 89-99</p> <p>FOSS provides the opportunity to address this standard. See for example: Force and Motion Investigation 1, Part 1, pp. 47-56 Investigation 2, Part 3, pp. 89-99</p> <p>Electronics Investigation 1, Parts 1–3, pp. 55-70 Investigation 4, Parts 1-2, pp. 143-151</p> <p>Electronics Resources, p. 13 CD, Tech Manual: Current and Batteries</p> <p>Electronics Resources, p. 13 Weather and Water Resources, p. 53</p> <p>Populations and Ecosystems Investigation 5, Part 1, pp. 142-150 Electronics Investigation 1, Parts 1-3, pp. 55-70 Resources, pp. 1-2</p> <p>Electronics Resources, pp. 12-13 CD, Tech Manual: Static Electricity</p> <p>Weather and Water Investigation 4, Part 3, pp. 131-139 Investigation 5, Parts 2-3, pp. 163-174 Resources, pp. 22-26, 32-33 Video: Conduction through Metals</p>
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Electricity and Magnetism

8.6 Broad Concept: Electricity and magnetism are related phenomena that have many useful applications in everyday life. As a basis for understanding this concept, students:

Standard	FOSS
<ol style="list-style-type: none"> Investigate and explain that an object can be electrically charged either positively or negatively; objects with like charges repel each other, and objects with unlike charges attract each other. Explain that when an electric current flows why there is always a magnetic field associated with it. Describe the role that electromagnets play in electric motors, electric generators, and simple devices such as doorbells and earphones. Explain how electrical circuits provide means of transferring electrical energy from sources such as generators to devices in which heat, light, sound, and chemical changes are produced. Know that power is energy per unit of time, expressed in watts, W, and $1W = 1J/s$. explain that devices are rated according to their power capacity or consumption. 	<p>Electronics CD, Tech Manual: Static Electricity</p> <p>Electronics Investigation 1, Parts 1-3, pp.55-70 Investigation 4, Parts 1-2, pp. 143-151 Resources, pp. 1-2</p>

Forces

8.7 Broad Concept: When an object is subject to two or more forces at once, the effective force is the cumulative effect of all the forces. As a basis for understanding this concept, students:

Standard	FOSS
<ol style="list-style-type: none"> Recognize that a force has both magnitude and direction. Observe and explain that when the forces on an object are balanced (equal and opposite forces that add up to zero), the motion of the object does not change. Explain why an unbalanced force acting on an object changes the object's speed or direction of motion or 	<p>FOSS provides the opportunity to address this standard. See for example: Force and Motion Investigation 1, Part 1, pp. 47-56 Investigation 2, Part 3, pp. 89-99 Investigation 6, Parts 1-2, pp. 218-235 Resources, pp. 68-69</p> <p>FOSS provides the opportunity to address this standard. See for example: Force and Motion Investigation 1, Part 1, pp. 47-56 Investigation 6, Part 1, pp. 218-228</p> <p>Force and Motion Investigation 6, Parts 1-4, pp. 218-245 Investigation 7, Part 1, pp. 256-261</p>

both.	Resources, pp. 50-51 Multimedia: Force Bench
4. Explain that every object exerts an attractive gravitational force on every other object.	Force and Motion Investigation 7, Part 1, pp. 256-261 Resources, p. 68
5. Know that the greater the mass of an object, the more force is needed to change its motion.	Force and Motion Investigation 6, Parts 2-3, pp. 236-245 Investigation 7, Part 1, pp. 256-261 Investigation 8, Part 1, pp. 284-293
6. Explain that if the net force acting on an object always acts toward the same center as the object moves, the object's path is a curve about the force center. (Motion in a circular orbit is the simplest example of this concept.)	Force and Motion Resources, pp. 68-69
7. Graph and interpret distance versus time graphs for constant speed.	Force and Motion Investigation 1, Parts 2-3, pp. 57-66 Investigation 2, Part 3, pp. 89-99 Resources, pp. 19, 28-30

Waves

8.8 Broad Concept: Waves have characteristic properties that are common to all types of waves. As a basis for understanding this concept, students:

Standard	FOSS
1. Observe and explain how waves carry energy from one place to another.	Planetary Science Resources, p. 99
2. Explain how a mechanical wave is a disturbance that propagates through a medium.	
3. Explain how electromagnetic waves differ from mechanical waves in that they do not need a medium for propagation; nevertheless, they can be described by many of the same quantities: amplitude, wavelength, frequency (or period), and wave speed.	
4. Investigate and explain how sound in a fluid (e.g., air) is a longitudinal wave whose speed depends on the properties of the fluid in which it propagates.	
5. Investigate and explain how light waves, sound waves, and other waves move at different speeds in different materials.	Human Brain and Senses Resources, pp. 31-32
6. Demonstrate that vibrations in materials set up wave disturbances, such as sound and earthquake waves,	Planetary Science Resources, p. 99

<p>which spread away from the source.</p> <ol style="list-style-type: none">7. Recognize that human eyes respond to a narrow range of wavelengths of the electromagnetic spectrum (red through violet) called <i>visible light</i>.8. Summarize how something can be “seen” when light waves emitted or reflected by an object enter the eye, just as something can be heard when sound waves from an object enter the ear.9. Explain that waves obey the superposition principle: Many waves can pass through the same point at once, and the wave amplitude at the point is the sum of the amplitudes of the individual waves.	<p>Human Brain and Senses Resources, pp. 29-30, 65</p>
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