



FOSS Full Option Science System
(FOSS™)
K-8

Correlation to

**Massachusetts
Science and Technology
Curriculum Framework**



Massachusetts Science and Technology Curriculum Framework Correlation to Full Option Science System

The following is a correlation of the grades PreK-2, 3-5 and 6-8 portions of the Massachusetts Science and Technology Curriculum Framework to Full Option Science System. This correlation shows representative examples of investigations and activities from the FOSS program which address the Science and Technology Content Standards. A citation does not include all of the investigations or activities from FOSS that might address a particular standard.

Where possible, the examples listed for Grades PreK-2 and 3-5 sections of the Strands 1-3 correlation include the suggested technology extensions.

The examples of FOSS investigations cited below for Grades 6-8 are from FOSS modules developed for grades 5-6 and from the FOSS Middle School modules developed for Grades 6-8.

Strand 1: Earth and Space Science

Earth and Space Science Grades PreK-2 Learning Standards

Earth's Materials

LEARNING STANDARDS Grades PreK-2:	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
1. Recognize that water, rocks, soil, and living organisms are found on the earth's surface.	<u>Trees</u> , Investigation 1, Part 1 <u>Trees FOSS Science Stories</u>	Pages 7-14 Pages 3-13
	<u>Pebbles, Sand and Silt</u> , Investigation 4, Part 2 <u>Pebbles, Sand and Silt FOSS Science Stories</u>	Pages 15-18 Pages 20-22
2. Understand that air is a mixture of gases that is all around us and that wind is moving air.	<u>Air and Weather</u> , Investigation 1, Parts 1-6 Investigation 3, Parts 1-5 <u>Air and Weather FOSS Science Stories</u>	Pages 8-40 Pages 8-36 Pages 3-6

Weather

LEARNING STANDARDS Grades PreK-2:	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
3. Describe the weather changes from day to day and over the seasons.	<u>Air and Weather</u> , Investigation 2, Parts 1-4 Investigation 4, Part 1-2	Pages 8-32 Pages 8-18

The Sun as a Source of Light and Heat

LEARNING STANDARDS Grades PreK-2:	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
4. Recognize that the sun supplies heat and light to the Earth and is necessary for life.	<u>Trees</u> Investigation 1, Parts 2, 8	Pages 15-19, 35-37
	<u>Air and Weather</u> , Investigation 4, Part 2	Pages 12-18

Periodic Phenomena

LEARNING STANDARDS Grades PreK-2:	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
5. Identify some events around us that have repeating patterns, including the seasons of the year, day and night.	<u>Air and Weather</u> , Investigation 4, Parts 1-3 <u>Air and Weather FOSS Science Stories</u>	Pages 8-27 Pages 18-23

Earth and Space Sciences Grades 3-5 Learning Standards

Rocks and Their Properties

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
1. Give a simple explanation of what a mineral is and some examples, e.g., quartz, mica.	<u>Earth Materials</u> , Investigation 1, Parts 2-3 Investigation 2, Parts 1-2 Investigation 3, Parts 1-2 <u>Earth Materials FOSS</u> <u>Science Stories</u>	Pages 16-29 Pages 8-21 Pages 8-19 <i>Pages 12-15</i>
2. Identify the physical properties of minerals (hardness, color, luster, cleavage, and streak), and explain how minerals can be tested for these different physical properties.	<u>Earth Materials</u> Investigation 2, Parts 1-2 Investigation 3, Parts 1-2 <u>Earth Materials FOSS</u> <u>Science Stories</u>	Pages 8-21 Pages 8-19 <i>Pages 12-15, 30-33</i>
3. Identify the three categories of rocks (metamorphic, igneous, and sedimentary) based on how they are formed, and explain the natural and physical processes that create these rocks.	<u>Earth Materials</u> , Investigation 4, Parts 1-2 <u>Earth Materials FOSS</u> <u>Science Stories</u>	Pages 8-20 <i>Pages 1-4, 5-7, 34</i>

Soil

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
4. Explain and give examples of the ways in which soil is formed (the weathering of rock by water and wind and from the decomposition of plant and animal remains).	<u>Water</u> , Investigation 4, Part 1 <i>Note: this standard is also addressed in the FOSS Grades 1-2 module <u>Pebbles, Sand and Silt</u>.</i>	Pages 8-13
5. Recognize and discuss the different properties of soil, including color, texture (size of particles), the ability to retain water, and the ability to support the growth of plants.	<u>Water</u> , Investigation 4, Part 1 <i>Note: this standard is also addressed in the FOSS Grades 1-2 module <u>Pebbles, Sand and Silt</u>.</i>	Pages 8-13

Weather

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
6. Explain how air temperature, moisture, wind speed and direction, and	<u>Water FOSS Science</u> <u>Stories</u>	<i>Pages 8-9, 12, 14-16</i>

precipitation make up the weather in a particular place and time.	<u>Water Planet, Investigation 4, Parts 2-3</u> <u>Water Planet FOSS Science Stories</u> <i>Note: this standard is addressed very thoroughly in the FOSS Grades 1-2 module <u>Air and Weather</u> and also in the FOSS Middle School Module <u>Weather and Water</u>.</i>	Pages 198-211 <i>Pages 71-92</i>
7. Distinguish among the various forms of precipitation (rain, snow, sleet, and hail), making connections to the weather in a particular place and time.	<u>Water FOSS Science Stories</u> <u>Water Planet FOSS Science Stories</u> <i>Note: this standard is addressed very thoroughly in the FOSS Grades 1-2 module <u>Air and Weather</u> and also in the FOSS Middle School Module <u>Weather and Water</u>.</i>	<i>Pages 1-2, 12</i> <i>Pages 69, 90</i>
8. Describe how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation.	<u>Water Planet, Investigation 4, Part 3</u> <u>Water Planet FOSS Science Stories</u> <u>Solar Energy FOSS Science Stories</u>	Pages 204-211 <i>Pages 76-79</i> <i>Pages 2, 22-25</i>
9. Differentiate between weather and climate.	<u>Solar Energy FOSS Science Stories</u>	<i>Pages 16-17</i>

The Water Cycle

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
10. Describe how water on earth cycles in different forms and in different locations, including underground and in the atmosphere.	<u>Water, Investigation 3, Parts 1-4</u> <u>Investigation 4, Part 1</u> <u>Water FOSS Science Stories</u> <u>Water Planet, Investigation 4, Part 1</u> <u>Water Planet FOSS Science Stories</u> <u>Solar Energy FOSS Science Stories</u>	Pages 8-26 Pages 8-13 <i>Pages 1-2, 4-9, 12-17</i> Pages 184-197 <i>Pages 67-70</i> <i>Pages 22-25</i>
11. Give examples of how the cycling of water, both in and out of the atmosphere, has an effect on climate.	<u>Water FOSS Science Stories</u> <u>Solar Energy FOSS Science Stories</u>	<i>Pages 12-16,22</i> <i>Pages 22-28</i>

	<p><u>Water Planet FOSS Science Stories</u></p> <p><i>Note: this standard is addressed very thoroughly in the FOSS Grades 1-2 module <u>Air and Weather</u> and also in the FOSS Middle School Module <u>Weather and Water</u>.</i></p>	Pages 67-70
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Earth's History

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
12. Give examples of how the surface of the earth changes due to slow processes such as erosion and weathering, and rapid processes such as landslides, volcanic eruptions, and earthquakes.	<u>Water FOSS Science Stories</u>	Pages 22-23
	<u>Landforms</u> , Investigation 2, Parts 1-2	Pages 8-22
	<u>Landforms</u> , Investigation 3, Parts 1-3	Pages 8-24
	<u>Landforms FOSS Science Stories</u>	Pages 13-32

The Earth in the Solar System

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
13. Recognize that the earth is part of a system called the "solar system" that includes the sun (a star), planets, and many moons. The earth is the third planet from the sun in our solar system.	<u>Water Planet</u> , Investigation 1, Part 1	Pages 50-58
	<u>Water Planet FOSS Science Stories</u>	Pages 2-13
	<u>Models and Designs FOSS Science Stories</u>	Pages 5-9
	<u>Solar Energy FOSS Science Stories</u>	Pages 40-44
	<u>Sun, Moon and Stars</u> Investigation 3, Part 2	Pages 126-130
14. Recognize that the earth revolves around (orbits) the sun in a year's time and that the earth rotates on its axis once approximately every 24 hours. Make connections between the rotation of the earth and day/night, and the apparent movement of the sun, moon and stars across the sky.	<u>Sun, Moon and Stars</u> <u>FOSS Science Resources</u>	Pages 16-17
	<u>Models and Designs FOSS Science Stories</u>	Pages 5-10
	<u>Solar Energy FOSS Science Stories</u>	Pages 1-5, 40-44
	<u>Sun, Moon and Stars</u> Investigation 1, Parts 1-2	Pages 42-64
	<u>Sun, Moon and Stars</u> <u>FOSS Science Resources</u>	Pages 1-8
	<i>Note: this standard is addressed thoroughly in the FOSS Middle School module <u>Planetary Science</u>.</i>	

<p>15. Describe the changes that occur in the observable shape of the moon over the course of a month.</p>	<p><u>Sun, Moon and Stars</u> Investigation 2, Parts 1-2 <u><i>Sun, Moon and Stars</i></u> <u><i>FOSS Science Resources</i></u></p> <p><i>Note: this standard is addressed in the FOSS Grades 1-2 Module <u>Air and Weather</u> and in more detail in the FOSS Middle School Module <u>Planetary Science</u>.</i></p>	<p>Pages 79-100 <i>Pages 22-32</i></p>
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Earth and Space Sciences Grades 6-8 Learning Standards

Note: The FOSS modules referenced with page numbers in the Grades 6-8 section are those developed in the original FOSS program for grades 5 and 6 as well as the eight FOSS Middle School modules currently available. Eventually there will be nine FOSS Middle School Modules: Planetary Science, Human Brain and Senses, Earth History, Electronics, Diversity of Life, Weather and Water, Populations and Ecosystems, Chemical Interactions, and Force and Motion. FOSS Middle School Modules in late stages of field-testing (likely to be available within the next few years) will be referenced in italics as their correlation seems appropriate.

Mapping the Earth

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
1. Recognize, interpret, and be able to create models of the earth's common physical features in various mapping representations, including contour maps.	<u>Landforms</u> , Investigation 1, Parts 1-3 Investigation 2, Parts 1-2 Investigation 4, Parts 1-3 <u>Landforms FOSS Science Stories</u>	Pages 8-24 Pages 8-22 Pages 8-24 <i>Pages 33-36</i>
	<u>Earth History</u> , Investigation 3, Parts 1-3 Investigation 4, Part 3 <u>Earth History Resources student book</u>	Pages 88-107 Pages 138-146 <i>Pages 100-105</i>

Earth's Structure

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
2. Describe the layers of the solid earth, incl. the lithosphere, the hot convecting mantle, and the dense metallic core.	<u>Landforms FOSS Science Stories</u>	<i>Pages 27-34</i>
	<u>Earth History Resources student book</u>	<i>Pages 100-105</i>

Heat Transfer in the Earth System

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
3. Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through the earth's system.	<u>Solar Energy</u> Investigation 2, Parts 1-2 Investigation 4, Parts 1-3	Pages 8-24 Pages 8-28
	WWW.FOSSWEB.com <u>Solar Energy</u>	Movie Clips, How Weather Occurs
	<u>Water Planet</u> , Investigation 3, Parts 1-2 <u>Water Planet FOSS Science Stories</u>	Pages 125-144 <i>Pages 42-51</i>
	<u>Weather and Water</u> Investigation 4, Parts 1-2 Investigation 5, Parts 1-3 <u>Weather and Water Resources student book</u>	Pages 121-139 Pages 152-174 <i>Pages 22-26, 32-33</i>

<p>4. Explain the relationship among the energy provided by the sun, the global patterns of atmospheric movement, and the temperature differences among water, land, and atmosphere.</p>	<p><u>Solar Energy</u> Investigation 2, Parts 1-2 Investigation 3, Parts 1-2 <u>Solar Energy FOSS Science Stories</u></p> <p><u>Water Planet</u>, Investigation 3, Part 2 <u>Water Planet FOSS Science Stories</u></p> <p><u>Weather and Water</u> Investigation 3, Parts 1-3 Investigation 9, Part 3 <u>Weather and Water Resources</u> student book</p>	<p>Pages 8-24 Pages 8-23</p> <p><i>Pages 1-3,16-17, 22-25</i></p> <p>Pages 136-144 <i>Pages 46-51</i></p> <p>Pages 93-110 Pages 311-314</p> <p><i>Pages 22-24</i></p>
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Earth's History

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
<p>5. Describe how movement of the earth's crustal plates causes both slow changes in the earth's surface (e.g. formation of mountains and ocean basins), and rapid ones (e.g. volcanic eruptions and earthquakes).</p>	<p><u>Landforms FOSS Science Stories</u></p> <p><u>Earth History Resources</u> student book</p>	<p><i>Pages 22-25, 30-32</i></p> <p><i>Pages 100-105</i></p>
<p>6. Describe and give examples of ways in which the earth's surface is built up and torn down by natural processes, including deposition of sediments, rock formation, erosion, and weathering.</p>	<p><u>Landforms</u>, Investigation 2, Parts 1-2 <u>Landforms FOSS Science Stories</u></p> <p><u>Earth History</u>, Investigation 4, Parts 1-6 Investigation 8, Parts 1-3 <u>Earth History Resources</u> student book</p>	<p>Pages 8-22 and <i>Pages 15-21,28-29</i></p> <p>Pages 113-163 Pages 266-269</p> <p><i>Pages 64-75-78, 81-83</i></p>
<p>7. Explain and give ex. of how physical evidence, such as fossils and surface features of glaciation, supports theories that earth has evolved over geologic time.</p>	<p><u>Earth History</u>, Investigation 7, Parts 1-2 <u>Earth History Resources</u> student book</p>	<p>Pages 227-244</p> <p><i>Pages 76-88,95-97</i></p>

Earth and Space

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
<p>8. Recognize that gravity is a force that pulls all things on and near the earth toward the center of the earth. Gravity plays a major role in the formation of planets, stars and solar system and in</p>	<p><u>Models and Designs FOSS Science Stories</u></p> <p><u>Solar Energy FOSS Science Stories</u></p> <p><u>Water Planet</u>, Investigation 1, Part 2</p>	<p><i>Pages 5-10</i></p> <p><i>Pages 40-44</i></p> <p>Pages 59-66</p>

determining their motions.	<u>Water Planet FOSS Science Stories</u> <u>Force and Motion</u> , Investigation 7 Parts 1-3 <u>Force and Motion Resources</u> student book <u>Planetary Science</u> Investigation 3, Parts 1-2 Investigation 5, Part 7 Investigation 8, Parts 3-4 Investigation 10, Parts 1-3 <u>Planetary Science Resources</u> student book	<i>Pages 16-17</i> <i>Pages 256-271</i> <i>Pages 62-69</i> <i>Pages 89-98</i> <i>Pages 180-182</i> <i>Pages 260-271</i> <i>Pages 312-324</i> <i>Pages 35,69-70,74-100</i>
9. Describe lunar and solar eclipses, the observed moon phases, and tides. Relate them to the relative positions of the earth, moon, and sun.	<u>Solar Energy FOSS Science Stories</u> <u>Planetary Science</u> , Investigation 3, Parts 1-2 Investigation 9, Parts 1-4	<i>Pages 14</i> <i>Pages 89-98</i> <i>Pages 283-302</i>
10. Compare and contrast properties and conditions of objects in the solar system (i.e., sun, planets, and moons) to those on Earth (i.e., gravitational force, distance from the sun, speed, movement, temperature, and atmospheric conditions).	<u>Solar Energy FOSS Science Stories</u> <u>Planetary Science</u> , Investigation 7, Parts 2-5 Investigation 10, Parts 1-3 <u>Planetary Science Resources</u> student book	<i>Pages 1-5, 40-44</i> <i>Pages 222-237</i> <i>Pages 312-323</i> <i>Pages 78-95</i>
11. Explain how the tilt of the earth and its revolution around the sun result in an uneven heating of the earth, which in turn causes the seasons.	<u>Water and Weather</u> Investigation 3, Parts 1-3 <u>Water and Weather Resources</u> student book	<i>Pages 93-110</i> <i>Pages 17-19</i>
12. Recognize that the universe contains many billions of galaxies, and that each galaxy contains many billions of stars.	<u>Planetary Science</u> , Investigation 10, Parts 1-3 <u>Planetary Science Resources</u> student book	<i>Pages 312-323</i> <i>Pages 80-100</i>

Strand 2: Life Science (Biology)

Life Science Grades PreK-2 Learning Standards

Characteristics of Living Things

LEARNING STANDARDS Grades PreK-2:	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
1. Recognize that animals (including humans) and plants are living things that grow, reproduce, and need food, air, and water.	<u>Trees</u> , Investigation 1, Part 2	Page 15-19
	<u>Insects</u> , Investigation 1, Part 1	Pages 8-15
	<u>New Plants</u> , Investigation 3, Parts 1-3 <u>New Plants FOSS Science Stories</u>	Pages 8-26 Pages 3-7
	<u>Plants and Animals</u> Investigation 1-4, all parts <u>Plants and Animals FOSS Science Resources</u> <u>Video: How Plants Get Food</u> <u>Insects and Plants</u> Investigation 1-5, all parts <u>Insects and Plants FOSS Science Resources</u>	Pages 3-12, 16-45 Pages 15-18, 37-55
2. Differentiate between living and nonliving things. Group both living things and nonliving things according to the characteristics that they share.	<u>Animals Two by Two</u> , Investigation 4, Parts 1-4	Pages 4-23
	<u>Trees</u> , Investigation 2, Parts 1-6	Pages 8-28
	<u>New Plants</u> , Investigation 2, Parts 1-2	Pages 8-19
	<u>Insects</u> , Investigation 6, Parts 1-3 <u>Insects FOSS Science Stories</u>	Pages 8-22 Pages 12-15
	<u>Plants and Animals</u> Investigation 1, Parts 1-2	Pages 47-62

Life Cycles

LEARNING STANDARDS Grades PreK-2:	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
3. Recognize that plants and animals have life cycles, and that life cycles vary for different living things.	<u>New Plants</u> , Investigation 1, Parts 1-3	Pages 8-30
	<u>Insects</u> – ALL investigations. See for example: Investigation 4, Parts 1-5 <u>Insects FOSS Science Stories</u>	Pages 8-32 Pages 16-21

	<u>Plants and Animals</u> <u>Plants and Animals FOSS</u> <u>Science Resources</u> <u>Insects and Plants</u> Investigation 1-5, all parts <u>Insects and Plants FOSS</u> <u>Science Resources</u>	Pages 9-12 Pages 37-55
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Heredity

LEARNING STANDARDS Grades PreK-2:	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
4. Describe ways in which many plants and animals closely resemble their parents in observed appearance.	<u>New Plants,</u> Investigation 1, Parts 1-3 <u>Insects,</u> Investigation 3, Parts 1-3 <u>Insects FOSS Science</u> <u>Stories</u> <u>Insects and Plants</u> Investigation 3, Part 3 <u>Insects and Plants FOSS</u> <u>Science Resources</u>	Pages 8-32 fast plants Pages 8-28 Milkweed bugs Pages 16-33 Pages 145-151 Pages 8-9, 20-24, 42, 48-55

Evolution and Biodiversity

LEARNING STANDARDS Grades PreK-2:	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
5. Recognize that fossils provide us with information about living things that inhabited the earth years ago.	<i>This standard is addressed in readings from the Grades 5-6 module <u>Models and Designs</u> and in investigations and readings from the FOSS Middle School module <u>Earth History</u>.</i>	

Living Things and Their Environment

LEARNING STANDARDS Grades PreK-2:	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
6. Recognize that people and other animals interact with the environment through their senses of sight, hearing, touch, smell and taste.	<u>Animals Two by Two,</u> Investigation 1, Parts 2-4 <u>Fabric,</u> Investigation 1, Parts 1-2 <u>Paper,</u> Investigation 3, Parts 1-4 <u>Insects,</u> Investigation 6, Parts 1-3 <u>Plants and Animals</u> Investigation 3, Parts 1-2 <u>Plants and Animals FOSS</u> <u>Science Resources</u>	Pages 17-29 Pages 8-15 Pages 8-25 Pages 8-22 Pages 120-140 Pages 29-33, 36-42, 44-45

	<u>Insects and Plants</u> Investigation 1, Parts 1-3 Investigation 3, Parts 1-3 Investigation 5, Parts 1-3	Pages 52-75 Pages 129-151 Pages 206-225
7. Recognize changes in appearance that animals and plants go through as the seasons change.	<u>Trees,</u> Investigation 3, Parts 1-9 <u><i>Air and Weather FOSS</i></u> <u><i>Science Stories</i></u> <u>Plants and Animals</u> <u><i>Plants and Animals FOSS</i></u> <u><i>Science Resources</i></u>	Pages 8-38 <i>Pages 18-23</i> <i>Pages 31-33</i>
8. Identify ways in which an organism's habitat provides for its basic needs (plants require air, water, nutrients, and light; animals require food, water, air and shelter).	<u>Animals Two by Two,</u> Investigation 1, Parts 1-3 <u>New Plants,</u> Investigation 1, Parts 1-3 <u><i>New Plants FOSS Science</i></u> <u><i>Stories</i></u> <u>Insects,</u> Investigation 3, Parts 1-3 <u><i>Insects FOSS Science</i></u> <u><i>Stories</i></u> <u>Plants and Animals</u> Investigation 1, Part 1 Investigation 3, Parts 1-2 <u><i>Plants and Animals FOSS</i></u> <u><i>Science Resources</i></u> <u><i>Video: How Plants Live in</i></u> <u><i>Different Places</i></u> <u>Insects and Plants</u> Investigation 3, Parts 1-3 <u><i>Insects and Plants FOSS</i></u> <u><i>Science Resources</i></u>	Pages 10-25 Pages 8-30 <i>Pages 3-7, 22-30</i> Pages 8-26 <i>Pages 8-11, 16-20</i> Pages 47-57 Pages 120-134 <i>Pages 3-7, 21-24, 38-45</i> Pages 129-151 <i>Pages 6-7</i>

Life Science Grades 3-5 Learning Standards

Characteristics of Plants and Animals

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
1. Classify plants and animals according to the physical characteristics that they share.	<u>Structures of Life</u> , Investigation 4, Part 2 <u>Structures of Life FOSS</u> <u>Science Stories</u>	Pages 14-19 <i>Pages 2, 26-27</i>
	<u>Human Body</u> Investigation 1, Part 3 Investigation 2, Part 4	Pages 21-25 Pages 23-25
	<u>Environments</u> , Investigation 1, Parts 1-2 Investigation 2, Parts 1-3 <u>Environments FOSS</u> <u>Science Stories</u>	Pages 8-19 Pages 8-25 <i>Pages 18-22</i>
	<u>Living Systems</u> , Investigation 2, Part 2 <u>Living Systems FOSS</u> <u>Science Stories</u>	Pages 99-106 <i>Pages 21-22, 24-25</i>

Plant and Animal Structures and Functions

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
2. Identify the structures in plants (leaves, roots, flowers, stem, bark, wood) that are responsible for food production, support, water transport, reproduction, growth, and protection.	<u>Structures of Life</u> , Investigation 1, Part 3 Investigation 2, Parts 1-3 <u>Structures of Life FOSS</u> <u>Science Stories</u>	Pages 28-33 Pages 8-24 <i>Pages 1-3, 10-11, 22-34</i>
	<u>Environments</u> , Investigation 3, Parts 1-3 Investigation 6, Parts 1-3 <i>Note: bark and wood are addressed in the <u>Trees</u> module, designed for Kindergarten.</i> <u>Living Systems</u> , Investigation 2, Part 1 <u>Living Systems FOSS</u> <u>Science Stories</u>	Pages 8-24 Pages 8-24 Pages 85-98 <i>Pages 16-20</i>
	<u>Structures of Life</u> , Investigation 2, Part 3 <u>Structures of Life FOSS</u> <u>Science Stories</u>	Pages 18-22 <i>Pages 2, 20-21, 40</i>
3. Recognize that plants and animals go through predictable life cycles that include birth, growth, development, reproduction, and death.	<u>Environments</u> , Investigation 5, Parts 1-3 <u>Environments FOSS</u> <u>Science Stories</u>	Pages 8-24 <i>Pages 18-19, 21, 22</i>

4. Describe the major stages that characterize the life cycle of the frog and butterfly as they go through metamorphosis.	<i>This standard is addressed for butterflies in the Grades 1-2 module <u>Insects</u>.</i>	
5. Differentiate between observed characteristics of plants and animals that are fully inherited (e.g., color of flower, shape of leaves, color of eyes, number of appendages) and characteristics that are affected by the climate or environment (e.g., browning of leaves due to too much sun, language spoken).	<p><u>Structures of Life</u>, Investigation 1, Part 1 <u>Structures of Life FOSS Science Stories</u></p> <p><u>Ideas and Inventions</u>, Investigation 2, Parts 1-2 <u>Ideas and Inventions FOSS Science Stories</u></p> <p><u>Human Body</u>, Investigation 4, Parts 1-3 <u>Human Body FOSS Science Stories</u></p> <p><u>Environments</u>, Investigation 1, Parts 1-2 Investigation 3, Parts 1-3 Investigation 5, Parts 1-3 <u>Environments FOSS Science Stories</u></p>	<p>Pages 8-17 <i>Pages 6-9,10-11</i></p> <p>Pages 8-28 <i>Pages 15-16</i></p> <p>Pages 8-24 <i>Pages 25-27</i></p> <p>Pages 8-19 Pages 8-22 Pages 8-22 <i>Pages 23-26,49-52</i></p>

Adaptations of Living Things

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
6. Give examples of how inherited characteristics may change over time as adaptations to changes in the environment that enable organisms to survive, e.g., shape of beak or feet, placement of eyes on head, length of neck, shape of teeth, color.	<p><u>Environments</u>, Investigation 5, Parts 1-3 <u>Environments FOSS Science Stories</u></p> <p><i>Note: this standard is addressed very thoroughly in the FOSS Middle School module <u>Populations and Ecosystems inv. 8 and 9</u>.</i></p>	<p>Pages 8-22 <i>Pages 22-35, 42</i></p>
7. Give examples of how changes in the environment (drought, cold) have caused some plants and animals to die or move to new locations (migration).	<p><u>Environments</u>, Investigation 3, Parts 1-3 <u>Environments FOSS Science Stories</u></p>	<p>Pages 8-22 <i>Pages 42, 43-45, 49-52</i></p>
8. Describe how organisms meet some of their needs in an environment by using behaviors (patterns of activities) in response to information (stimuli) received from the environment. Recognize that some animal	<p><u>Human Body</u>, Investigation 4, Parts 1-2</p> <p><u>Environments</u>, Investigation 2, Parts 2-4 <u>Environments FOSS Science Stories</u></p>	<p>Pages 8-20</p> <p>Pages 16-30 <i>Pages 1-17</i></p>

behaviors are instinctive (e.g., turtles burying their eggs), and others are learned (e.g. humans building fires for warmth, chimpanzees learning how to use tools).		
9. Recognize plant behaviors, such as the way seedlings' stems grow toward light and their roots grow downward in response to gravity. Recognize that many plants and animals can survive harsh environments because of seasonal behaviors e.g., in winter, some trees shed leaves, some animals hibernate, others migrate.	<u>Structures of Life</u> Investigation 2, Parts 1-3 <u>Structures of Life FOSS</u> <u>Science Stories</u> <u>Environments,</u> Investigation 5, Parts 1-3 <u>Environments FOSS</u> <u>Science Stories</u>	Pages 8-22 Page 22-34 Pages 8-22 Pages 1-17
10. Give examples of how organisms can cause changes in their environment to ensure survival. Explain how some of these changes may affect the ecosystem.	<u>Structures of Life FOSS</u> <u>Science Stories</u> <u>Environments FOSS</u> <u>Science Stories</u>	Pages 35-36 Pages 27-44

Energy and Living Things

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
11. Describe how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within a food chain from producers (plants) to consumers and decomposers.	<u>Structures of Life,</u> Investigation 2, Parts 1-3 <u>Structures of Life FOSS</u> <u>Science Stories</u> <u>Environments,</u> Investigation 2, Part 4 <u>Environments FOSS</u> <u>Science Stories</u> <u>Food and Nutrition FOSS</u> <u>Science Stories</u> <u>Living Systems,</u> Investigation 3, Parts 1-2 <u>Living Systems FOSS</u> <u>Science Stories</u>	Pages 8-24 Pages 4-5,12-16, 43 Pages 26-30 Pages 18-22, 27-35, 38-41 Pages 41-43 Pages 118-125 Pages 31-36, 47-48

Life Sciences Grades 6-8 Learning Standards

The FOSS modules referenced with page numbers in the Grades 6-8 section are those developed in the original FOSS program for grades 5 and 6 as well as the eight FOSS Middle School modules currently available. Eventually there will be nine FOSS Middle School Courses: Planetary Science, Human Brain and Senses, Earth History, Electronics, Diversity of Life, Weather and Water, Populations and Ecosystems, Chemical Interactions, and Force and Motion. FOSS Middle School Modules in late stages of field-testing (likely to be available within the next few years) will be referenced in italics as their correlation seems appropriate.

Classification of Organisms

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
1. Classify organisms into the currently recognized kingdoms according to characteristics that they share. Be familiar with organisms from each kingdom.	<u>Living Systems</u> , Investigation 1, Part 1 <i>Living Systems FOSS Science Stories</i>	Pages 51-57 <i>Pages 1-3</i>
	<u>Diversity of Life</u> Investigation 3, Part 2 Investigation 4, Parts 1-2 Investigation 10, Parts 1-3 <u><i>Diversity of Life Resources student book</i></u>	Pages 108-115 Pages 133-141 Pages 302-321 <i>Pages 17, 24-30, 65-70</i>

Cells and Systems

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
2. Recognize that all organisms are composed of cells, and that many organisms are single-celled (unicellular), e.g., bacteria, yeast. In these single-celled organisms, one cell must carry out all the basic functions of life.	<u><i>Food and Nutrition FOSS Science Stories</i></u>	<i>Pages 41-43</i>
	<u>Diversity of Life</u> Investigation 3, Parts 1-3 Investigation 4, Parts 1-2 Investigation 10, Parts 1-3 <u><i>Diversity of Life Resources student book</i></u> <u>Diversity of Life CD-ROM</u>	Pages 102-122 Pages 133-141 Pages 302-321 <i>Pages 8, 9, 24-30</i> "Ribbon of Life"
3. Compare and contrast plant and animal cells, including major organelles (cell membrane, cell wall, nucleus, cytoplasm, chloroplasts, mitochondria, vacuoles).	<u>Diversity of Life</u> Investigation 3, Parts 1-3 Investigation 4, Parts 1-2	Pages 102-122 Pages 133-141
	<u><i>Diversity of Life Resources student book</i></u> <u>Diversity of Life CD-ROM</u>	<i>Pages 24-26, 27-30, 37</i> "Ribbon of Life"
4. Recognize that within cells, many of the basic functions of organisms (e.g., extracting energy from food and getting rid of waste) are carried out. The way in which cells function is similar in all living organisms.	<u><i>Food and Nutrition FOSS Science Stories</i></u>	<i>Pages 41-43</i>
	<u>Diversity of Life</u> Investigation 3, Parts 2-3 Investigation 4, Part 2 <u>Diversity of Life CD-ROM</u> <u><i>Diversity of Life Resources student book</i></u>	Pages 108-122 Pages 137-139 "Ribbon of Life" <i>Pages 21-30, 35-38</i>

Systems in Living Things

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
5. Describe the hierarchical organization of multicellular organisms from cells to tissues to organs to systems to organisms.	<p><u>Living Systems</u>, Investigation 1, Parts 1-3 <i>Living Systems FOSS Science Stories</i></p> <p><u>Diversity of Life</u> Investigation 4, Part 2 <u>Diversity of Life</u> CD-ROM</p> <p><u>Human Brain and Senses</u>, Investigation 8, Parts 1-2 <i>Human Brain and Senses Resources</i> student book</p>	<p>Pages 51-70</p> <p><i>Pages 1-13</i></p> <p>Pages 137 – 139 “Ribbon of Life”</p> <p>Pages 240-253 <i>Pages 29-30, 36-38, 45-46, 57-79</i></p>
6. Identify the general functions of the major systems of the human body (digestion, respiration, reproduction, circulation, excretion, protection from disease, and movement, control and coordination) and describe ways that these systems interact with each other.	<p><u>Food and Nutrition FOSS Science Stories</u></p> <p><u>Human Brain and Senses</u> Investigation 2, Parts 1-3 Investigation 7, Parts 1-3 Investigation 8, Parts 1-2 <i>Human Brain and Senses Resources</i> student book</p> <p><u>Living Systems</u>, Investigation 1, Parts 1-3 <i>Living Systems FOSS Science Stories</i></p> <p><i>Note: skeletal and muscular systems are addressed thoroughly in the FOSS Grade 3-4 module <u>Human Body</u>.</i></p>	<p><i>Pages 6-9, 15-20, 44-50</i></p> <p>Pages 67-84 Pages 210-230 Pages 240-252</p> <p><i>Pages 29-30, 43-46, 57-79</i></p> <p>Pages 51-70</p> <p><i>Pages 2-13</i></p>

Reproduction and Heredity

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
7. Recognize that every organism requires a set of instructions that specifies its traits. These instructions are stored in the organism’s chromosomes. Heredity is the passage of these instructions from one generation to another.	<p><u>Models and Designs FOSS Science Stories</u></p> <p><u>Populations and Ecosystems</u> Investigation 9, Parts 1-4 <i>Populations and Ecosystems Resources</i> student book</p>	<p><i>Pages 4</i></p> <p>Pages 262-291</p> <p><i>Pages 46-63</i></p>
8. Recognize that hereditary information is contained in genes located in the chromosomes of each cell. A human cell contains about 30,000 different genes on 23 different chromosomes.	<p><u>Populations and Ecosystems</u> Investigation 9, Parts 1-4 <i>Populations and Ecosystems Resources</i> student book</p>	<p>Pages 262-291</p> <p><i>Pages 46-63</i></p>

9. Compare sexual reproduction (offspring inherit half of their genes from each parent) with asexual reproduction (offspring is an identical copy of the parent's cell).	<u>Diversity of Life Resources</u> student book	Pages 26,40-45,53-54, 61-62
	<u>Populations and Ecosystems Resources</u> student book	Pages 52-54

Evolution and Biodiversity

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
10. Give examples of ways in which genetic variation and environmental factors are causes of evolution and the diversity of organisms.	<u>Environments FOSS Science Stories</u>	Pages 9-17, 49-52
	<u>Diversity of Life Resources</u> <u>Earth History Resources</u>	Pages 28-30,35-39,60-64 Pages 64-67
	<u>Populations and Ecosystems</u> Investigation 8, Parts 1-2 Investigation 10, Parts 1-3	Pages 228-244 Pages 293-317
	<u>Populations and Ecosystems Resources</u> student book	Pages 31-45, 58-61
11. Recognize that evidence drawn from geology, fossils, and comparative anatomy provide the basis for the theory of evolution.	<u>Models and Designs FOSS Science Stories</u>	Pages 11-16
	<u>Diversity of Life Resources</u> <u>Earth History Resources</u>	Pages 27-30, 66-70 Pages 37-41,68-71,73-88
	<u>Populations and Ecosystems</u> Investigation 8, Parts 1-2 Investigation 10, Parts 1-3	Pages 228-244 Pages 293-317
	<u>Populations and Ecosystems Resources</u> student book	Pages 42-45, 58-61
12. Relate the extinction of species to a mismatch of adaptation and the environment.	<u>Populations and Ecosystems</u> Investigation 8, Parts 1-2 Investigation 10, Parts 1-3	Pages 228-244 Pages 293-317
	<u>Populations and Ecosystems Resources</u> student book	Pages 22-23, 42-45, 58-61

Living Things and Their Environment

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
13. Give examples of ways in which organisms interact and have different functions within an ecosystem that enable the ecosystem to survive.	<u>Environments</u> Investigation 2, Part 4 Investigation 4, Parts 1-3	Pages 26-32 Pages 8-22
	<u>Environments FOSS Science Stories</u>	Pages 1-8,9-17,27-35,38-45, 53-55
	<u>Diversity of Life</u> Investigation 7, Part 2 <u>Diversity of Life Resources</u>	Pages 224-229 Pages 40-50
	<u>Populations and Ecosystems</u> Investigation 3, Parts 1-3 Investigation 4, Parts 1-2 Investigation 7, Part 1	Pages 90-107 Pages 119-129 Pages 210-218
	<u>Populations and Ecosystems</u>	

	<u>Resources</u> student book	Pages 6-7, 14-31
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Energy and Living Things

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
14. Explain the roles and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.	<u>Environments</u> , Investigation 4, Part 3 <u>Environments FOSS Science Stories</u> <u>Diversity of Life Resources</u> <u>Populations and Ecosystems</u> Investigation 3, Parts 1-3 Investigation 4, Parts 1-2 Investigation 5, Parts 1-4 Investigation 7, Part 1 <u>Populations and Ecosystems Resources</u> student book	Pages 19-22 <i>Pages 6,28,39-41,43-44</i> <i>Pages 36-39</i> Pages 90-107 Pages 119-129 Pages 142-170 Pages 210-218 <i>Pages 14-24, 64-68</i>
15. Explain how dead plants and animals are broken down by other living organisms and how this process contributes to the system as a whole.	<u>Environments FOSS Science Stories</u> <u>Diversity of Life</u> Investigation 10, Parts 1-3 <u>Diversity of Life Resources</u> <u>Populations and Ecosystems</u> Investigation 3, Part 3 Investigation 4, Parts 1-2 Investigation 5, Parts 1-4 <u>Populations and Ecosystems Resources</u> student book	<i>Pages 38-41</i> Pages 302-321 <i>Pages 65-70</i> Pages 104-108 Pages 142-170 Pages 119-130 <i>Pages 14-24, 64-68</i>
16. Recognize that producers (plants that contain chlorophyll) use the energy from sunlight to make sugars from carbon dioxide and water through a process called photosynthesis. This food can be used immediately, stored for later use, or used by other organisms.	<u>Living Systems</u> , Investigation 3, Parts 1-2 <u>Living Systems FOSS Science Stories</u> <u>Environments</u> Investigation 4, Part 3 <u>Environments FOSS Science Stories</u> <u>Food and Nutrition FOSS Science Stories</u> <u>Solar Energy FOSS Science Stories</u> , <u>Diversity of Life Resources</u> <u>Populations and Ecosystems</u> Investigation 5, Parts 1-4 <u>Populations and Ecosystems Resources</u> student book	Pages 118-135 <i>Page 31-36, 47-48</i> Pages 19-22 <i>Pages 39-41</i> <i>Pages 41-43</i> Page 1 <i>Pages 36-39</i> Pages 119-130 <i>Pages 14-24</i>

Changes in Ecosystems over Time

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
17. Identify ways in which ecosystems have changed throughout geologic time in response to physical conditions, interactions among organisms, and the actions of humans. Describe how changes may be catastrophes such as volcanic eruptions or ice storms.	<p><u>Environments,</u> Investigation 3, Parts 1-3 Investigation 5, Parts 1-3 <u>Environments FOSS Science Stories</u></p> <p><u>Earth History Resources</u></p> <p><u>Populations and Ecosystems</u> Investigation 6, Parts 1-3 <u>Populations and Ecosystems Resources student book</u></p>	<p>Pages 8-22 Pages 8-22</p> <p><i>Pages 39-42, 43-45, 49-52</i></p> <p><i>Pages 64-67, 81-86, 100-105</i></p> <p>Pages 179-198</p> <p><i>Pages 25-31</i></p>
18. Recognize that biological evolution accounts for the diversity of species developed through gradual processes over many generations.	<p><u>Diversity of Life Resources</u> <i>Note: the <u>Diversity of Life</u> module introduces students to the vast diversity of species that exist on earth. Information about biological evolution is found mostly in the <u>Scientific and Historical Background of the teacher guide</u>.</i></p> <p><u>Populations and Ecosystems</u> Investigation 8, Parts 1-2 Investigation 10, Parts 1-3</p>	<p><i>Pages 31-39, 60-64</i></p> <p>Pages 228-244 Pages 293-317</p>

Strand 3: Physical Sciences (Chemistry and Physics)

Physical Sciences Grades PreK-2 Learning Standards

Observable Properties of Objects

LEARNING STANDARDS Grades PreK-2:	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
1. Sort objects by observable properties such as size, shape, color, weight, and texture.	<u>Wood and Paper</u> Investigation 1, Parts 1-2 Investigation 3, Parts 1-3	Pages 8-19 Pages 8-21
	<u>Solids and Liquids</u> , Investigation 1, Parts 1-2 Investigation 2, Parts 1-3 Investigation 3, Parts 1-4 <u>Solids and Liquids FOSS</u> <u>Science Stories</u>	Pages 8-20 Pages 10-32 Pages 8-27 <i>Pages 8-13</i>

States of Matter

LEARNING STANDARDS Grades PreK-2:	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
2. Identify objects and materials as solid, liquid, or gas. Recognize that solids have a definite shape and that liquids and gases take the shape of their container.	<u>Wood and Paper</u> Investigation 1, Parts 3-5 <u>Solids and Liquids</u> , Investigation 1, Part 1-2 Investigation 2, Parts 1-3 <u>Solids and Liquids FOSS</u> <u>Science Stories</u>	Pages 20-32 Pages 8-20 Pages 10-27 <i>Pages 3-13</i>
	<u>Air and Weather</u> Investigation 1, Parts 1-6 <u>Air and Weather FOSS</u> <u>Science Stories</u>	Pages 8-38 <i>Pages 3-6</i>

Position and Motion of Objects

LEARNING STANDARDS Grades PreK-2:	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
3. Describe the various ways that things can move, such as in a straight line, zigzag, back-and-forth, round-and-round, fast, and slow.	<u>Balance and Motion</u> , Investigation 2, Parts 1-3 Investigation 3, Parts 1-3 <u>Balance and Motion FOSS</u> <u>Science Stories</u>	Pages 8-25 Pages 6-26 <i>Pages 21-32</i>
	<u>Solids and Liquids</u> , Investigation 2, Parts 1-3	Pages 10-27
4. Demonstrate that the way to change the motion of an object is to apply a force (give it a push or pull). The greater the force, the greater the change in the motion of the object	<u>Air and Weather</u> Investigation 1, Parts 4-6 <u>Balance and Motion</u> , Investigation 2, Parts 1-2 <u>Balance and Motion FOSS</u> <u>Science Stories</u>	Pages 21-38 Pages 8-19 <i>Pages 10-17</i>
	<u>Balance and Motion</u> , Investigation 1, Parts 1-4 <u>Balance and Motion FOSS</u> <u>Science Stories</u>	Pages 8-28 <i>Pages 3-9</i>

The Physical Sciences Grades 3-5 Learning Standards

Properties of Objects and Materials

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
1. Differentiate between properties of objects (e.g., size, shape, weight) and properties of materials (e.g., color, texture, hardness).	<u>Structures of Life</u> , Investigation 1, Part 1	Pages 8-17
	<u>Water Planet</u> , Investigation 3, Part 1	Pages 125-135
	<u>Earth Materials</u> , Investigation 1, Parts 1-3 Investigation 2, Parts 1-2 Investigation 3, Parts 1-2 Investigation 4, Part 1	Pages 8-28 Pages 8-21 Pages 8-19 Pages 8-13
	<u>Ideas and Inventions</u> , Investigation 3, Parts 1-3 <u>Ideas and Inventions FOSS</u> <u>Science Stories</u>	Pages 8-24 Pages 19-20
	<u>Magnetism and Electricity</u> Investigation 1 Parts 1-2 Investigation 2, Part 3	Pages 8-23 Pages 20-25
	<u>Mixtures and Solutions</u> Investigation 1 Part 1 <u>Mixtures and Solutions FOSS</u> <u>Science Stories</u>	Pages 8-15 Pages 1-6
	<u>Solar Energy</u> Investigation 3 Parts 1-2 Investigation 4 Parts 1-4	Pages 8-23 Pages 8-33

States of Matter

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
2. Compare and contrast solids, liquids, and gases based on the basic properties of each of these states of matter.	<u>Earth Materials</u> , Investigation 1, Parts 1-3	Pages 8-29
	<u>Matter and Energy</u> , Investigation 3, Part 1 <u>Matter and Energy FOSS</u> <u>Science Stories</u>	Pages 129-138 Pages 39-43
	<u>Water</u> , Investigation 2, Parts 1-3 Investigation 3, Parts 1-4	Pages 8-24 Pages 8-26
	<u>Mixtures and Solutions</u> Investigation 1, Parts 1-4 Investigation 4, Parts 1-3	Pages 8-29 Pages 8-24
	<i>Note: because this is such a focus of <u>Solids and Liquids</u> (a Grade 1-2 FOSS module),</i>	

	<i>FOSS investigations in Grades 3-5 modules reinforce rather than introduce this standard.</i>	
3. Describe how water can be changed from one state to another by adding or taking away heat.	<u>Water</u> , Investigation 3, Parts 1-4 <u>Matter and Energy</u> , Investigation 4, Part 2 <u>Matter and Energy FOSS Science Stories</u> <u>Water Planet</u> , Investigation 2, Parts 1-4 <u>Water Planet FOSS Science Stories</u>	Pages 8-26 Page 181-192 Pages 54-59 Pages 80-116 Pages 28-30, 33-37

Forms of Energy

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
4. Identify the basic forms of energy (light, sound, heat, electrical, and magnetic). Recognize that energy is the ability to cause motion or create change.	<u>Ideas and Inventions</u> , Investigation 4, Parts 1-3 <u>Ideas and Inventions FOSS Science Stories</u> <u>Physics of Sound</u> , (entire module) ex. Investigation 3, Parts 1-2 <u>Physics of Sound FOSS Science Stories</u> <u>Magnetism and Electricity</u> , Investigation 1, Parts 1-4 Investigation 2, Parts 1-2 <u>Magnetism and Electricity FOSS Science Stories</u> <u>Matter and Energy</u> , Investigation 1, Parts 1-3 <u>Matter and Energy FOSS Science Stories</u> <u>Solar Energy</u> Investigation 2, Parts 1-2 Investigation 3, Parts 1-2 <u>Solar Energy FOSS Science Stories</u>	Pages 8-21 Pages 23-25 Pages 8-24 Pages 6-14, 17-21 Pages 8-34 Pages 8-19 Pages 20-25 Pages 50-82 Pages 1-7 Pages 8-24 Pages 8-23 Pages 1-5, 12-13, 16-17, 22-32
5. Give examples of how energy can be transferred from one form to another.	<u>Magnetism and Electricity</u> , Investigation 5, Parts 1-2 <u>Physics of Sound</u> , (entire module) ex. Investigation 3, Parts 1-2 <u>Physics of Sound FOSS Science Stories</u> <u>Matter and Energy</u> , Investigation 1, Parts 2-3 <u>Matter and Energy FOSS Science Stories</u>	Pages 8-20 Pages 8-24 Pages 7-14, 17-20 Pages 63-82

	<u>Science Stories</u>	Pages 8-13
	<u>Water,</u> Investigation 4, Part 2 <u>Water FOSS Science Stories</u>	Pages 14-18 Pages 22-23
	<u>Solar Energy,</u> Investigation 3, Parts 1-2	Pages 8-23

Electrical Energy

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
6. Recognize that electricity in circuits requires a complete loop through which an electrical current can pass, and that electricity can produce light, heat and sound.	<u>Magnetism and Electricity</u> Investigation 2, Parts 1-2 Investigation 3, Parts 1-3 Investigation 4, Parts 1-2 Investigation 5, Parts 1-2 <u>Magnetism and Electricity</u> <u>FOSS Science Stories</u>	Pages 8-19 Pages 8-26 Pages 8-18 Pages 8-20 Pages 10-30
	<u>Matter and Energy,</u> Investigation 1, Parts, 1, 3	Pages 50-62, 71-82
7. Identify and classify objects and materials that conduct electricity and objects and materials that are insulators of electricity.	<u>Magnetism and Electricity</u> Investigation 2, Part 3 <u>Magnetism and Electricity</u> <u>FOSS Science Stories</u>	Pages 20-25 Pages 12-16
8. Explain how electromagnets can be made, and give examples of how they can be used.	<u>Magnetism and Electricity</u> Investigation 4, Parts 1-3 Investigation 5, Parts 1-2 <u>Magnetism and Electricity</u> <u>FOSS Science Stories</u>	Pages 8-22 Pages 8-20 Pages 20-23, 26-29

Magnetic Energy

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
9. Recognize that magnets have poles that repel and attract each other.	<u>Magnetism and Electricity,</u> Investigation 1, Parts 1-4 <u>Magnetism and Electricity</u> <u>FOSS Science Stories</u>	Pages 8-34 Pages 5-6
10. Identify and classify objects and materials that a magnet will attract and objects and materials that a magnet will not attract.	<u>Magnetism and Electricity,</u> Investigation 1, Parts 1-4 <u>Magnetism and Electricity</u> <u>FOSS Science Stories</u>	Pages 8-34 Pages 1-4, 5-6

Sound Energy

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
11. Recognize that sound is produced by vibrating objects and requires a medium through which to travel. Relate the rate of vibration to	<u>Physics of Sound,</u> Investigation 1, Part 3 Investigation 2, Parts 1-3 Investigation 3, Parts 1-2 <u>Physics of Sound FOSS</u>	Pages 21-29 Pages 8-24 Pages 8-19

the pitch of the sound.	<u>Science Stories</u>	Pages 9-20,30
	Matter and Energy, Investigation 1, Part 3	Pages 71-82

Light Energy

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
12. Recognize that light travels in a straight line until it strikes an object or travels from one medium to another, and that light can be reflected, refracted, and absorbed.	<u>Ideas and Inventions,</u> Investigation 4, Parts 1-3	Pages 8-21
	<u>Ideas and Inventions FOSS</u> <u>Science Stories</u>	Pages 23-27
	<u>Matter and Energy,</u> Investigation 2, Parts 1-2	Pages 93-114
	<u>Matter and Energy FOSS</u> <u>Science Stories</u>	Pages 24-36
	<i>Note: these ideas are also explored in detail in the FOSS Middle School module <u>Human Brain and Senses.</u></i>	

Physical Sciences

Grades 6-8 Learning Standards

The FOSS modules referenced with page numbers in the Grades 6-8 section are those developed in the original FOSS program for grades 5 and 6 as well as the eight FOSS Middle School modules currently available. Eventually there will be nine FOSS Middle School Courses: Planetary Science, Human Brain and Senses, Earth History, Electronics, Diversity of Life, Weather and Water, Populations and Ecosystems, Chemical Interactions, and Force and Motion. FOSS Middle School Modules in late stages of field-testing (likely to be available within the next few years) will be referenced in italics as their correlation seems appropriate.

Properties of Matter

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
1. Differentiate between weight and mass, recognizing that weight is the amount of gravitational pull on an object.	<u>Levers and Pulleys</u> Investigation 1, Parts 1-3	Pages 8-28
	<u>Mixtures and Solutions</u> Investigation 2, Parts 1-4	Pages 8-28
	<u>Force and Motion</u> Investigation 7 Part 1	Pages 256-261
	<u>Planetary Science</u> Investigation 5, Part 3	Pages 164-167
2. Differentiate between volume and mass. Define density.	<u>Mixtures and Solutions</u> , Investigation 1, Part 2 Investigation 2, Parts 1-4	Pages 16-20 Pages 8-28
	<u>Food and Nutrition</u> , Investigation 2, Parts 1-3	Pages 8-25
	<u>Planetary Science</u> Investigation 8, Parts 3-4	Pages 260-270
	<u>Weather and Water</u> Investigation 5, Part 1 <i><u>Weather and Water</u></i> <i>Resources student book</i>	Pages 152-162 <i>Pages 27-31</i>
	<i>Note: volume and mass are also defined and studied in great detail in the Grades 3-4 module <u>Measurement</u>.</i>	
3. Recognize that the measurement of volume and mass requires understanding of the sensitivity of measurement tools (e.g. rulers, graduated cylinders, balances) and knowledge and appropriate use of digits.	<u>Mixtures and Solutions</u> , Investigation 2, Parts 1-4 <u>Variables</u> Investigation 2, Parts 1-3 <i><u>Variables FOSS Science Stories</u></i>	Pages 8-28 Pages 8-27 Pages 10-14
	<u>Food and Nutrition</u> , Investigation 1, Part 1 Investigation 2, Parts 1-3	Pages 8-15 Pages 8-25
	<u>Living Systems</u> , Investigation 2, Part 1 Investigation 3, Parts 2-3	Pages 85-98 Pages 126-141

	<u>Planetary Science</u> Investigation 8, Parts 3-4 <u>Weather and Water</u> Investigation 5, Part 1	Pages 260-270 Pages 152-162
4. Explain and give examples of how mass is conserved in a closed system.	<u>Mixtures and Solutions</u> Investigation 2, Parts 1-3 <u>Weather and Water</u> <i>Resources</i> student book <u>Chemical Interactions</u> <i>Resources</i> student book	Pages 8-25 Pages 45-47 Pages 63-67, 71

Elements, Compounds, and Mixtures

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
5. Recognize that there are more than 100 elements that combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.	<u>Mixtures and Solutions FOSS</u> <u>Science Stories</u> <u>Chemical Interactions</u> Investigation 2, Parts 1-2 <u>Chemical Interactions</u> <i>Resources</i> student book	Pages 3-6, 23-24, 32-42 Pages 70-80 Pages 3-13, 63-67, 73-77
6. Differentiate between an atom (the smallest unit of an element that maintains the characteristics of that element) and a molecule (the smallest unit of a compound that maintains the characteristics of that compound).	<u>Mixtures and Solutions</u> Investigation 1, Parts 1-4 <u>Mixtures and Solutions FOSS</u> <u>Science Stories</u> <u>Chemical Interactions</u> Investigation 9, Parts 1-4 Investigation 10, Parts 1-2 <u>Chemical Interactions</u> <i>Resources</i> student book <u>Video: Atoms and Molecules</u>	Pages 8-29 Pages 25-28 Pages 280-312 Pages 323-336 Pages 63-67
7. Give basic examples of elements and compounds.	<u>Mixtures and Solutions</u> Investigation 2, Parts 1-4 <u>Mixtures and Solutions FOSS</u> <u>Science Stories</u> <u>Chemical Interactions</u> Investigation 2, Parts 1-2 Investigation 9, Parts 1-4 Investigation 10, Parts 1-2 <u>Chemical Interactions</u> <i>Resources</i> student book	Pages 8-29 Pages 3-6, 7-8, 11-12, 25-28 Pages 70-80 Pages 280-312 Pages 323-336 Pages 3-13, 63-67, 73-77
8. Differentiate between mixtures and pure substances.	<u>Mixtures and Solutions</u> Investigation 1, Parts 1-4 (Note: the investigations and readings from the entire module reinforce the concept.) <u>Chemical Interactions</u> Investigation 1, Parts 1-2 Investigation 2, Parts 1-2 Investigation 8, Part 1 Investigation 9, Parts 1-4 <u>Chemical Interactions</u>	Pages 8-29 Pages 41-58 Pages 70-80 Pages 248-255 Pages 280-312

	<u>Resources student book</u>	Pages 1-13, 49-53, 63-67
9. Recognize that a substance (element or compound) has a melting point and a boiling point, both of which are independent of the amount of the sample.	<u>Chemical Interactions</u> Investigation 6 Investigation 7, Parts 1-4 <u>Chemical Interactions</u> <u>Resources student book</u>	Pages 178-187 Pages 204-228 Pages 44-48
10. Differentiate between physical changes and chemical changes.	<u>Mixtures and Solutions</u> Investigation 1, Parts 1-4 Investigation 4, Parts 1-3 <u>Mixtures and Solutions FOSS</u> <u>Science Stories</u> <u>Food and Nutrition</u> Investigation 2, Parts 1-3 <u>Earth History</u> Investigation 5, Parts 1-3 Investigation 8, Parts 1-2 <u>Earth History Resources</u> student book <u>Chemical Interactions</u> Investigation 1, Parts 1-2 Investigation 4, Parts 1-3 Investigation 5, Part 1 Investigation 7, Parts 1-5 Investigation 8, Parts 1-3 Investigation 9, Parts 1-4 Investigation 10, Parts 1-2 <u>Chemical Interactions</u> <u>Resources student book</u>	Pages 8-29 Pages 8-24 Pages 1-4, 23-28 Pages 8-25 Pages 175-187 Pages 254-265 Pages 81-82, 89-97 Pages 41-58 Pages 122-141 Pages 153-158 Pages 204-234 Pages 248-268 Pages 280-312 Pages 323-336 Pages 49-53, 63-67

Motion

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
11. Explain and give examples of how the motion of an object can be described by its position, direction of motion, and speed.	<u>Levers and Pulleys</u> , Investigation 3, Part 1-2 <u>Models and Designs</u> Investigation 3, Parts 1-3 and Math Extensions <u>Force and Motion</u> Investigations 1-5 <u>Force and Motion Resources</u> student book <u>Planetary Science</u> , Investigation 3, Part 4 Investigation 7, Parts 2-4 <u>Planetary Science Resources</u> student book	Pages 8-20 Pages 8-25 Pages 37-155 Pages 3-6, 17-19, 27-35 Pages 105-110 Pages 222-235 Pages 97-100
12. Graph and interpret distance vs. time graphs for	<u>Levers and Pulleys</u> , Investigation 1, Part 2 <u>Models and Designs</u>	Pages 18-23

constant speed.	Investigation 3, Parts 1-3 <u>Variables</u> Investigation 3, Part 4 <u>Force and Motion</u> Investigations 2-4 <u>Force and Motion Resources</u> student book	Pages 8-25, Math Ext. Page 31, Math Ext. Pages 67-155 <i>Pages 17-19, 27-35</i>
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Forms of Energy

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
13. Differentiate between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.	<u>Weather and Water Resources</u> student book	<i>Pages 22-26</i>

Heat Energy

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
14. Recognize that heat is a form of energy and that temperature change results from adding or taking away heat from a system.	<u>Solar Energy</u> , Investigation 2, Parts 1-2 Investigation 3, Parts 1-2 <u>Solar Energy FOSS Science Stories</u> , <u>Weather and Water</u> Investigation 4, Parts 1-2 <u>Weather and Water Resources</u> student book <u>Chemical Interactions</u> Investigation 5, Parts 1, 3 Investigation 6 Investigation 7, Parts 1-5 <u>Chemical Interactions Resources</u> student book	Pages 8-24 Pages 8-23 <i>Pages 1-5, 16-34</i> Pages 125-139 <i>Pages 22-26</i> Pages 153-158, 165-171 Pages 178-187 Pages 204-234 <i>Pages 32-48</i>
15. Explain the effect of heat on particle motion through a description of what happens to particles during a change of phase.	<u>Weather and Water Resources</u> student book <u>Chemical Interactions</u> Investigation 5, Part 2 Investigation 7, Parts 2-5 <u>Chemical Interactions Resources</u> student book <i>Video: Particles in Solid, Liquid and Gas</i>	<i>Pages 22-26</i> Pages 159-164 Pages 210-234 <i>Pages 18-27, 32-48</i>

<p>16. Give examples of how heat moves in predictable ways, moving from warmer objects to cooler ones until they reach equilibrium.</p>	<p><u>Solar Energy</u>, Investigation 2, Parts 1-2 Investigation 4, Parts 1-3 <u>Weather and Water</u> Investigation 4, Part 2 <i>Weather and Water</i> <i>Resources</i> student book <u>Chemical Interactions</u> Investigation 5, Part 1</p>	<p>Pages 8-24 Pages 8-33 Pages 132-139 <i>Pages 22-26</i> Pages 153-158</p>
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	<u>Fabric</u> Investigation 1, Parts 5-6	Pages 24-33
	<u>Solids and Liquids</u> , Investigation 1, Part 3 Extensions	Pages 21-24 Page 28
	<u>Balance and Motion</u> , Investigation 3, Part 3	Pages 19-25
	<u>Air and Weather</u> Investigation 2, Part 4	Pages 24-32
	<u>Pebbles, Sand, and Silt</u> , Investigation 3, Parts 3-5	Pages 16-32
	<u>Insects</u> , Investigation 6, Parts 1-2	Pages 8-17

2. Engineering Design

LEARNING STANDARDS Grades PreK-2:	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
2.1 Identify tools and simple machines used for a specific purpose e.g., ramp, wheel, pulley, lever.	<u>Wood</u> Investigation 2, Part 2 Investigation 4, Part 2 <u>Fabric</u> Investigation 1, Parts 5-6 <u>Fabric FOSS Science Stories</u> <u>Balance and Motion</u> , Investigation 3, Parts 1-3 <u>Balance and Motion FOSS</u> <u>Science Stories</u> <u>Air and Weather</u> Investigation 2, Part 4 <u>Pebbles, Sand, and Silt</u> , Investigation 2, Parts 1-2 <i>Note: levers and pulleys are addressed in the FOSS Grades 5-6 module <u>Levers and Pulleys</u>.</i>	Pages 12-14 Pages 12-18 Pages 23-33 Pages 14-15 Pages 6-25 Pages 14-17 Pages 24-27 Pages 8-17
2.2 Describe how human beings use parts of the body as tools (e.g., teeth for cutting, hands for grasping and catching), and compare their use with the ways in which animals use those parts of their bodies.	<u>New Plants FOSS Science Stories</u> <i>This standard is addressed in the FOSS Grades 3-4 module <u>Human Body</u>.</i>	Pages 40-43

Technology/Engineering Grades 3-5 Learning Standards

1. Materials and Tools

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
<p>1.1 Identify materials used to accomplish a design task based on a specific property, i.e., weight, strength, hardness, and flexibility.</p>	<p><i>Note: all of the FOSS Grades 3-6 modules conclude with a project entitled "Choose Your Own Investigation", many of which involve design and construction of objects related to the area of study. See also:</i></p> <p><u>Magnetism and Electricity</u> Investigation 4, Parts 1-3 <u>Ideas and Inventions</u>, Investigation 4, Parts 1-3 <u>Human Body</u>, Investigation 3 Parts 1-3 <u>Physics of Sound</u>, Investigation 4, Parts 1-2 <u>Water</u> Investigation 4, Part 2 <u>Models and Designs</u> Investigation 2, Parts 1-3 <u>Solar Energy</u>, Investigation 4, Parts 1-4</p>	<p>Pages 8-22</p> <p>Pages 8-21</p> <p>Pages 8-24</p> <p>Pages 6-20</p> <p>Pages 14-18</p> <p>Pages 8-24</p> <p>Pages 8-33</p>
<p>1.2 Identify and explain the appropriate materials and tools (e.g., hammer, screwdriver, pliers, tape measure, screws, nails, and other mechanical fasteners) to construct a given prototype safely.</p>	<p><i>Note: safety guidelines are provided in the Teacher Manual for ALL FOSS Investigations and also in Safety Posters included in each kit. Students construct structures in many FOSS modules. See for example:</i></p> <p><u>Magnetism and Electricity</u> Investigation 4, Parts 1-3 <u>Models and Designs</u> Investigation 2, Parts 1-3 <u>Solar Energy</u>, Investigation 4, Parts 1-4 <u>Human Body</u>, Investigation 3 Parts 1-3 <u>Ideas and Inventions</u>, Investigation 4, Parts 1-3 <u>Water</u> Investigation 4, Part 2</p>	<p>Pages 8-22</p> <p>Pages 8-24</p> <p>Pages 8-33</p> <p>Pages 8-24</p> <p>Pages 8-21</p> <p>Pages 14-18</p>

<p>1.3 Identify and explain the difference between simple and complex machines, e.g., hand can opener that includes multiple gears, wheel, wedge gear, and lever.</p>	<p><u>Water</u> Investigation 4, Part 2 <u>Levers and Pulleys</u> Investigation 2, Parts 1-4 <u>Levers and Pulleys FOSS</u> <u>Science Stories</u> Models and Designs Investigation 2, Parts 1-3 <u>Models and Designs</u> <u>FOSS Science Stories</u> <u>Variables FOSS Science</u> <u>Stories</u></p>	<p>Pages 14-18 Pages 8-25 Pages 1-32 Pages 8-24 Pages 21-24 Pages 8-9, 32-33</p>
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2. Engineering Design

LEARNING STANDARDS Grades 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
<p>2.1. Identify a problem that reflects the need for shelter, storage, or convenience.</p>	<p><u>Ideas and Inventions</u>, Investigation 4, Parts 1-3 <u>Ideas and Inventions FOSS</u> <u>Science Stories</u> <u>Magnetism and Electricity</u> Investigation 5, Parts 1-3 <u>Water</u> Investigation 4, Part 2 <u>Models and Designs</u>, Investigations 3 and 4 <u>Models and Designs FOSS</u> <u>Science Stories</u> <u>Solar Energy</u>, Investigation 4, Parts 1-4 <u>Solar Energy FOSS Science</u> <u>Stories</u></p>	<p>Pages 8-21 Pages 1-30 Pages 8-24 Pages 14-18 Pages 8-23, 6-20 Pages 17-40 Pages 8-33 Pages 16-34</p>
<p>2.2. Describe different ways in which a problem can be represented, e.g., sketches, diagrams, graphic organizers, and lists.</p>	<p><u>Levers and Pulleys</u> Investigation 2, Parts 1-4 <u>Models and Designs</u>, Investigation 2, Parts 1-2 Investigation 3, Parts 1-3 <u>Models and Designs FOSS</u> <u>Science Stories</u> <u>Solar Energy</u>, Investigation 4, Parts 1-4 <u>Variables</u> Investigation 1, Parts 1-3</p>	<p>Pages 8-25 Pages 8-21 Pages 8-23 Pages 17-40 Pages 8-33 Pages 8-27</p>
<p>2.3. Identify relevant design features (e.g., size, shape, weight) for building a prototype of a solution to a given problem.</p>	<p><u>Ideas and Inventions</u>, Investigation 4, Parts 1-3 <u>Models and Designs</u>, Investigation 2, Parts 1-2 Investigation 3, Parts 1-3 <u>Solar Energy</u>, Investigation 4, Parts 1-4</p>	<p>Pages 8-21 Pages 8-21 Pages 8-23 Pages 8-33</p>
<p>2.4. Compare natural systems with mechanical systems that are designed to serve similar purposes, e.g., a bird's wings as compared to an airplane's wings.</p>	<p><u>Ideas and Inventions FOSS</u> <u>Science Stories</u> <u>Models and Designs FOSS</u> <u>Science Stories</u></p>	<p>Pages 9, 26 Pages 35-36</p>

Technology/Engineering

Grades 6-8 Learning Standards

The FOSS modules referenced with page numbers in the Grades 6-8 section are those developed in the original FOSS program for grades 5 and 6 as well as the eight FOSS Middle School modules currently available. Eventually there will be nine FOSS Middle School Courses: Planetary Science, Human Brain and Senses, Earth History, Electronics, Diversity of Life, Weather and Water, Populations and Ecosystems, Chemical Interactions, and Force and Motion. FOSS Middle School Modules in late stages of field-testing (likely to be available within the next few years) will be referenced in italics as their correlation seems appropriate.

1. Materials, Tools, and Machines

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
1.1 Given a design task, identify appropriate materials (e.g., wood, paper, plastic, aggregates, ceramics, metals, solvents, adhesives) based upon specific properties and characteristics (e.g., weight, strength, hardness, and flexibility).	<u>Models and Designs</u> Investigation 4, Parts 1-2 <u>Models and Designs FOSS</u> <u>Science Stories</u> <u>Solar Energy</u> Investigation 4, Parts 1-4 <u>Solar Energy FOSS Science</u> <u>Stories</u> <u>Human Brain and Senses</u> Investigation 3, Parts 1-3 <u>Electronics</u> Investigation 5, Part 3 <u>Force and Motion Resources</u> student book	Pages 6-15 <i>Pages 23-28, 44-47, 52-55</i> Pages 8-33 <i>Pages 16-17, 29-39</i> Pages 92-110 Pages 171-174 Pages 41-49
1.2 Identify and explain appropriate measuring tools, hand tools, and power tools used to hold, lift, carry, fasten, and separate, and explain their safe and proper use.	<u>Levers and Pulleys FOSS</u> <u>Science Stories</u> <u>Mixtures and Solutions</u> Investigation 1, Parts 1-4 Investigation 3, Parts 2-3 <u>Variables</u> , Investigation 2, Parts 1-3 Investigation 4, Parts 1-3 <u>Electronics</u> Investigation 2, Part 3	<i>Pages 1-27</i> Pages 8-29 Pages 15-24 Pages 8-28 Pages 8-23 Pages 99-103
1.3 Identify and explain the safe and proper use of measuring tools, hand tools, and machines (e.g., band saw, drill press, sanders, hammer, screwdriver, pliers, tape measure, screws, nails, and other mechanical fasteners) needed to construct a prototype of an engineering design.	<i>Note: safety guidelines are provided in the Teacher Manual for ALL FOSS Investigations and also in Safety Posters included in each kit. Students construct structures in many FOSS modules.</i> <i>See for example:</i> <u>Models and Designs</u> Investigation 4, Parts 1-2 <u>Variables</u> , Investigation 2, Parts 1-3 Investigation 4, Parts 1-3	Pages 6-15 Pages 8-28 Pages 8-23

2. Engineering Design

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
<p>2.1 Identify and explain the steps of the engineering design process, i.e. identify the need or the problem, research the problem, develop possible solutions, select the best possible solution(s), construct a prototype, test and evaluate, communicate the solution(s), and redesign.</p>	<p><u>Models and Designs</u> Investigation 2, Parts 1-2 Investigation 3, Parts 1-3 Investigation 4, Parts 1-3 <u>Solar Energy</u> Investigation 4, Parts 1-4 <u>Electronics</u> Investigation 9, Part 2 <u>Force and Motion Resources</u> student book <u>Human Brain and Senses</u> Investigation 9, Parts 1-2 <u>Planetary Science</u> Investigation 5, Parts 1-5</p>	<p>Pages 8-24 Pages 8-23 Pages 6-20 Pages 8-33 Pages 284-297 <i>Pages 41-49</i> Pages 264-275 Pages 154-174</p>
<p>2.2 Demonstrate methods of representing solutions to a design problem, e.g., sketches, orthographic projections, multiview drawings.</p>	<p><u>Environments</u> Investigation 1, Part 1 <u>Landforms</u> Investigation 3, Part 3 <u>Models and Designs</u> Investigation 2, Parts 1-2 Investigation 4, Parts 1-3 <u>Solar Energy</u> Investigation 4, Parts 1-4 <u>Variables FOSS Science Stories</u> <u>Electronics</u> Investigation 5, Parts 1-3 <u>Human Brain and Senses</u> Investigation 3, Part 3 <u>Planetary Science</u> Investigation 2, Parts 1-2</p>	<p>Pages 8-15 Pages 20-27 Pages 8-24 Pages 6-20 Pages 8-33 <i>Pages 18-20, 32-33</i> Pages 161-174 Pages 106-110 Pages 64-77</p>
<p>2.3 Describe and explain the purpose of a given prototype.</p>	<p><u>Models and Designs FOSS Science Stories</u> <u>Force and Motion Resources</u> student book <i>Note: this standard is not addressed in these specific terms, but students document their design process in lab notebooks and presentations both in classroom design experiences (such as the humdinger) and in end of module projects suggested for every Grade 5-6 FOSS Module.</i></p>	<p><i>Page 28</i> <i>Pages 41-49</i></p>
<p>2.4 Identify appropriate materials, tools, and machines needed to construct a prototype of a given engineering design.</p>	<p><u>Models and Designs</u> Investigation 2, Parts 1-2 Investigation 4, Parts 1-3 <u>Solar Energy</u> Investigation 4, Parts 1-4 <u>Force and Motion Resources</u> student book</p>	<p>Pages 8-24 Pages 6-20 Pages 8-33 <i>Pages 41-49</i></p>

2.5 Explain how such design features as size, weight, shape, function, and cost limitations would affect the construction of a given prototype.	<u>Models and Designs</u> Investigation 4, Parts 1-3 <u>Solar Energy</u> Investigation 4, Parts 1-4	Pages 6-20 Pages 8-36
2.6 Identify the five elements of a universal systems model: goal, inputs, processes, outputs, and feedback.	<u>Models and Designs FOSS</u> <u>Science Stories</u>	Pages 1-10 (discusses engineering and technology and even models and systems, but not the "universal system model")

3. Communication Technologies

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
3.1 Identify and explain the components of a communication system, i.e. source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.	<u>Electronics</u> , Investigation 4, Part 2 <u>Electronics Resources</u> student book <u>Planetary Science Resources</u> student book <u>Human Brain and Senses Resources</u> student book	Pages 149-152 Pages 34-36 Pages 74-77, 90-96 Pages 59-79
3.2 Identify and explain the appropriate tools, machines, and electronic devices (e.g. drawing tools, computer-aided design, and cameras) used to produce and/or reproduce design solutions (e.g., engineering drawings, prototypes, and reports).	<u>Force and Motions Resources</u> student book	Pages 41-49
3.3 Identify and compare communication technologies and systems, i.e. audio, visual, printed, and mass communication.	<u>Electronics</u> , Investigation 4, Part 2 <u>Electronics Resources</u> student book	Pages 149-152 Pages 34-36
3.4 Identify and explain how symbols and icons (e.g., international symbols and graphics) are used to communicate a message.	<u>Mixtures and Solutions FOSS</u> <u>Science Stories</u> <u>Electronic Resources</u> student book <u>Planetary Science Resources</u> student book	Pages 6. 32-37 Page 3 Pages 74-77, 90-96

4. Manufacturing Technologies

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
4.1 Describe and explain the manufacturing systems of custom and mass production.	<u>Models and Designs FOSS</u> <u>Science Stories</u> <u>Electronics Resources</u>	Pages 25-36 Pages 18-21

4.2 Explain and give examples of the impacts of interchangeable parts, components of mass-produced products, and the use of automation, e.g., robotics.	<u>Models and Designs FOSS</u> <u>Science Stories</u> <u>Electronics Resources</u>	Pages 25-36 Pages 18-21
4.3 Describe a manufacturing organization, e.g., corporate structure, research and development, production, marketing, quality control, distribution.		
4.4 Explain basic processes in manufacturing systems, e.g., cutting, shaping, assembling, joining, finishing, quality control, and safety.	<u>Models and Designs FOSS</u> <u>Science Stories</u> <u>Electronics Resources</u>	Pages 23-24 Pages 18-21

5. Construction Technologies

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
5.1 Describe and explain parts of a structure, e.g., foundation, flooring, decking, call, roofing systems.	<u>Solar Energy</u> Investigation 4, Parts 1-4	Pages 8-36
5.2 Identify and describe three major types of bridges (e.g., arch, beam, and suspension) and their appropriate uses (e.g., site, span, resources, load).		
5.3 Explain how the forces of tension, compression, torsion, bending, and shear affect the performance of bridges.		
5.4 Describe and explain the effects of loads and structural shapes on bridges.		

6. Transportation Technologies

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
6.1 Identify and compare examples of transportation systems and devices that operate on each of the following: land, air, water, and space.	<u>Levers and Pulleys FOSS</u> <u>Science Stories</u> <u>Variables,</u> Investigation 3, Parts 1-3 <u>Variables FOSS Science</u> <u>Stories</u> <u>Models and Designs</u> Investigation 3, Parts 1-3 <u>Models and Designs FOSS</u> <u>Science Stories</u> <u>Force and Motion Resources</u> student book <u>Planetary Science</u> Investigation 7, Parts 1-5	Pages 9, 23-25 Pages 8-23 Pages 15-33 Pages 8-23 Pages 17-40, 44-47 Pages 3-16, 27-35 Pages 207-238

6.2 Given a transportation problem, explain a possible solution using the universal systems model.	<u>Planetary Science</u> Investigation 7, Parts 1-5 <u>Models and Designs FOSS</u> <u>Science Stories</u>	Pages 207-238 (Students design a way to get to the moon, but “universal systems model” is not specifically mentioned.) <i>Pages 17-19, 25-40 explore issues in transportation, and even models and systems, but not the “universal system model”</i>
6.3 Identify and describe three subsystems of a transportation vehicle or device, i.e. structural, propulsion, guidance, suspension, control, and support.	<u>Variables,</u> Investigation 3, Parts 1-4 <u>Models and Designs FOSS</u> <u>Science Stories</u>	Pages 8-27 FOSS Pages 25-28, 44-47
6.4 Identify and explain lift, drag, friction, thrust, and gravity in a vehicle or device, e.g., cars, boats, airplanes, rockets.	<u>Variables FOSS Science</u> <u>Stories</u> Force and Motion Investigation 6, Parts 2-4 <u>Force and Motion CD Rom</u>	Pages 15-33,38 Pages 229-245 Force Bench

7. Bioengineering Technologies

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
7.1 Explain examples of adaptive or assistive devices, e.g., prosthetic devices, wheelchairs, eyeglasses, grab bars, hearing aids, lifts, braces.	<u>Human Brain and Senses,</u> Investigation 3, Parts 1-2 <u>Human Brain and Senses</u> <u>Resources</u> and <u>Human Brain and Senses CD-</u> <u>ROM</u> <i>Note: Hearing aids are discussed in the Grades 3-4 module Physics of Sound.</i>	Pages 92-105 Pages 25-28, 34-35
7.2 Describe and explain adaptive and assistive bioengineered products, e.g., food, bio-fuels, irradiation, integrated pest management.	<u>Environments FOSS</u> <u>Science Stories</u>	Pages 46-49

Appendix: Inquiry

The following section contains a correlation of the FOSS units to the Inquiry section of the earlier version of the Massachusetts Learning Standards for Science. This section, prepared for the correlation of FOSS to the earlier version of the Massachusetts Standards, may still be useful to school districts whose standards include specific requirements for including Inquiry in the science curriculum.

Grades PreK-2

Students are able to use the methods of scientific inquiry to plan, conduct, draw conclusions from, and evaluate scientific information.

LEARNING STANDARDS Grades PreK-2:	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
1. Observe and describe familiar objects and events, identifying details, similarities and differences.	<u>Wood</u> Investigation 1, Parts 1-2 <u>Animals Two by Two</u> Investigation 1, Parts 1-4 <u>Trees</u> Investigation 2, Parts 1-4 <u>Air and Weather</u> Investigations 2, Part 1-4 <u>Pebbles, Sand and Silt</u> , Investigation 1, Parts 1-3 <u>Solids and Liquids</u> Investigation 1, Parts 1-2 <u>Insects</u> , Investigation 2, Parts 1-3 <u>Plants and Animals</u> Investigation 2, Parts 1-3 Investigation 4, Parts 1-2 <u>Insects and Plants</u> Investigation 3, Parts 1-3 Investigation 5, Parts 1-3	Pages 8-19 Pages 10-29 Pages 6-22 Pages 8-27 Pages 8-21 Pages 8-20 Pages 8-24 Pages 87-108 Pages 151-163 Pages 129-151 Pages 206-225
2. Make predictions based on past experience with a particular material or object.	<u>Fabric</u> Activity 2, Part 4 <u>Animals Two by Two</u> , Investigation 1, Parts 2-3 <u>Air and Weather</u> , Investigation 4, Parts 1-3 <u>Balance and Motion</u> Investigation 1, Part 2 <u>Insects</u> , Investigation 5, Parts 1-3 <u>Solids and Liquids</u> Investigation 3, Part 3 <u>Plants and Animals</u> Investigation 4, Parts 1-2 <u>Insects and Plants</u> Investigation 3, Parts 1-3	Pages 22-26 Pages 17-25 Pages 8-24 Pages 14-18 Pages 10-24 Pages 15-23 Pages 151-163 Pages 206-225
3. Suggest and describe ideas about <i>how, why, and what would happen if?</i>	<u>Animal Two by Two</u> Investigation 1 Part 3 <u>Fabric</u> Investigation 2, Part 2 <u>Wood</u> Investigation 1, Parts 3-5	Pages 22-25 Pages 12-17 Pages 20-32

	<u>Balance and Motion</u>	
	Investigation 1, Parts 1-3	Pages 8-23
	<u>New Plants,</u>	
	Investigation 2, Parts 1-2	Pages 8-19
	<u>Pebbles, Sand and Silt,</u>	
	Investigation 4, Parts 1-3	Pages 8-25
	<u>Solids and Liquids</u>	
	Investigation 1, Parts 1-3	Pages 8-24
	<u>Air and Weather</u>	
	Investigation 1, Parts 1-6	Pages 8-38
	<u>Plants and Animals</u>	
	Investigation 1, Part 1	Pages 47-62

Inquiry Grades 3-5 Learning Standards

Students are able to use the methods of scientific inquiry to plan, conduct, draw conclusions from, and evaluate scientific information.

LEARNING STANDARDS GRADES 3-5	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)	
1. Use characteristics to group objects into groups based on shared properties.	<u>Structures of Life</u> , Investigation 1, Parts 1-3	Pages 8-33	
	<u>Earth Materials</u> , Investigation 2, Parts 1-2	Pages 8-21	
	<u>Human Body</u> , Investigation 2, Parts 1-4	Pages 8-25	
	<u>Mixtures and Solutions</u> , Investigation 1, Parts 1-4	Pages 8-29	
	<u>Living Systems</u> , Investigation 4, Part 2	Pages 99-106	
2. Ask questions and make predictions about the natural world that can be tested.	<u>Human Body</u> Investigation 4, Parts 1-4	Pages 8-29	
	<u>Magnetism and Electricity</u> Investigation 2, Parts 3-4	Pages 20-29	
	<u>Water</u> Investigation 3, Parts 1-4	Pages 8-26	
	<u>Matter and Energy</u> , Investigation 3, Part 2	Pages 139-150	
	<u>Water Planet</u> , Investigation 3, Part 1	Pages 125-135	
	<u>Environments</u> Investigation 2, Parts 1-4	Pages 10-30	
	<u>Landforms</u> Investigation 3, Parts 1-3	Pages 8-24	
	<u>Mixtures and Solutions</u> , Investigation 1, Parts 1-4	Pages 8-29	
	<u>Solar Energy</u> Investigation 4, Parts 1-4	Pages 8-33	
	<u>Variables</u> , Investigation 3, Parts 1-4	Pages 8-27	
	<u>Sun, Moon and Stars</u> Investigation 1, Parts 1-2	Pages 42-64	
	3. Plan and conduct a simple investigation knowing what is to be compared or sought.	<u>Physics of Sound</u> Investigation 4, Part 1	Pages 6-15
		<u>Ideas and Inventions</u> , Investigation 2, Parts 1-3	Pages 8-22
		<u>Earth Materials</u> Investigation 3, Part 2	Pages 14-19
<u>Magnetism and Electricity</u> Investigation 4, Part 3		Pages 19-22	
<u>Measurement</u> Investigation 2, Part 3		Pages 18-21	
<u>Water</u> Investigation 1, Part 2		Pages 14-18	
<u>Matter and Energy</u> , Investigation 3, Part 2		Pages 139-150	
<u>Water Planet</u> , Investigation 2, Parts 2-3		Pages 86-100	
<u>Living Systems</u> Investigation 2, Part 1		Pages 85-98	
<u>Structures of Life</u> Investigation 3, Parts 3-4		Pages 20-30	

	<u>Human Body</u> Investigation 4, Parts 1-4 <u>Environments</u> Investigation 6, Parts 1-2 <u>Landforms</u> Investigation 3, Parts 1-3 <u>Levers and Pulleys</u> Investigation 3, Parts 1-3 <u>Mixtures and Solutions</u> Investigation 1, Part 4 <u>Solar Energy</u> Investigation 4, Part 3 <u>Variables</u> Investigation 4, Part 2 <u>Sun, Moon and Stars</u> Investigation 1, Parts 1-2	Pages 8-29 Pages 8-17 Pages 8-24 Pages 8-24 Pages 25-29 Pages 24-28 Pages 12-17 Pages 42-64
4. Extend observations and make measurements using simple tools e.g. hand lens, rulers, two-arm balance.	<u>Magnetism and Electricity</u> Investigation 1, Part 3 <u>Measurement</u> Investigation 3, Parts 1-3 <u>Water</u> Investigation 2, Parts 1-3 <u>Earth Materials</u> Investigation 1, Parts 1-3 <u>Matter and Energy,</u> Investigation 3, Part 2 <u>Water Planet,</u> Investigation 3, Part 1 <u>Living Systems</u> Investigation 2, Part 1 <u>Mixtures and Solutions</u> Investigation 2, Part 1	Pages 23-29 Pages 8-21 Pages 8-29 Pages 8-29 Pages 139-150 Pages 125-135 Pages 85-98 Pages 8-15
5. Recognize simple patterns in data and use data to create a reasonable explanation for the results of an investigation.	<u>Environments</u> Investigation 5, Parts 1-3 <u>Water,</u> Investigation 4, Part 1 <u>Magnetism and Electricity,</u> Investigation 4, Parts 1-3 <u>Matter and Energy,</u> Investigation 3, Part 2 <u>Water Planet,</u> Investigation 3, Part 1 <u>Living Systems</u> Investigation 2, Part 1 <u>Levers and Pulleys</u> Investigation 1, Parts 1-3 <u>Solar Energy</u> Investigation 3, Parts 1-2 <u>Variables,</u> Investigation 2, Parts 1-3 <u>Sun, Moon and Stars</u> Investigation 2, Part 2	Pages 8-22 Pages 8-13 Pages 8-22 Pages 139-150 Pages 125-135 Pages 85-98 Pages 8-28 Pages 8-23 Pages 8-23 Pages 89-100
6. Communicate observations, results and explanations through discussions, drawings, models, simple graphs, and writing.	<u>Structures of Life,</u> Investigation 2, Parts 1-3 <u>Matter and Energy,</u> Investigation 4, Parts 1-3 <u>Water Planet,</u> Investigation 2, Parts 1-3 <u>Living Systems</u>	Pages 8-22 Pages 174-206 Pages 80-100

	Investigation 3, Part 3 <u>Variables,</u>	Page 136-141
	Investigation 1, Parts 1-3 <u>Environments,</u>	Pages 8-27
	Investigation 5, Parts 1-3 <u>Landforms,</u>	Pages 8-22
	Investigation 4, Parts 1-3 <u>Sun, Moon and Stars</u>	Pages 8-24
	Investigation 1, Parts 1-2	Pages 42-64
	Investigation 2, Part 2	Pages 89-100
	<i>This standard is also addressed in the end-of- module projects suggested in every FOSS module from Grades 3-6. See for example:</i>	
	<u>Ideas and Inventions</u> Investigation 4, Part 4	Pages 22-26

Inquiry Grades 6-8 Learning Standards

Lifelong learners are able to use the methods of inquiry to participate in scientific investigation and technological problem solving.

LEARNING STANDARDS Grades 6-8	FOSS INVESTIGATION/ ACTIVITY	PAGE NUMBER(S)
1. Design an investigation or problem, specifying variables, to be changed, controlled, and measured	<u>Mixtures and Solutions</u> Investigation 1, Part 4 <u>Variables</u> Investigation 4, Parts 1-3 <u>Environments</u> Investigation 6, Part 1 <u>Levers and Pulleys</u> Investigation 4, Parts 1-2 <u>Water Planet</u> , Investigation 3, Part 1 <u>Planetary Science</u> Investigation 5, Parts 1-4 <u>Electronics</u> Investigation 5, Part 3 <u>Force and Motion</u> Investigation 8, Part 2 <u>Weather and Water</u> Investigation 2, Part 2	Pages 25-29 Pages 8-23 Pages 8-22 Pages 8-20 Pages 125-135 Pages 154-173 Pages 171-174 Pages 294-301 Pages 69-80
2. Use more complex tools, technologies and appropriate measurement units to make observations, collect and organize qualitative and quantitative data, e.g., microscopes, graduated cylinders, computer probes, stress and impact testers, and timers.	<u>Food and Nutrition</u> Investigation 2, Parts 1-3 <u>Mixtures and Solutions</u> Investigation 1, Parts 1-4 <u>Variables</u> Investigation 3, Part 2 <u>Levers and Pulleys</u> Investigation 1, Parts 1-3 <u>Water Planet</u> , Investigation 3, Part 1 <u>Living Systems</u> Investigation 2, Part 1 Investigation 3, Part 3 <u>Electronics</u> Investigation 2, Parts 1-4 <u>Human Brain and Senses</u> Investigation 1, Part 1 <u>Diversity of Life</u> Investigation 2, Parts 1-3 <u>Force and Motion</u> Investigation 5, Parts 1-4 <u>Weather and Water</u> Investigation 1, Parts 1-2 <i>Note: Every FOSS Middle School module has a CD-ROM component, which is an integral part of the program, to be used by students and teachers. See for example:</i> <u>Planetary Science</u> , Investigation 2, Parts 1-2	Pages 8-25 Pages 8-29 Pages 16-22 Pages 8-28 Pages 125-135 Pages 85-98 Pages 136-141 Pages 89-107 Pages 37-40 Pages 65-92 Pages 169-201 Pages 43-56 Pages 55-78
3. Present and explain data and findings using multiple	<u>Variables</u> Investigation 1, Parts 1-3 <u>Landforms</u>	Pages 8-28

<p>representations including tables, mathematical and physical models, demonstrations and graphs.</p>	<p>Investigation 4, Parts 1-3 <u>Models and Designs</u> Investigation 2, Parts 1-2 <u>Water Planet</u>, Investigation 3, Part 1 <u>Living Systems</u> Investigation 3, Part 3 <u>Electronics</u> Investigation 2, Parts 1-4 <u>Planetary Science</u> Investigation 5, Parts 1-5</p>	<p>Pages 8-24 Pages 8-21 Pages 125-135 Pages 136-141 Pages 89-107 Pages 143-175</p>
<p>4. Communicate scientific procedures, results, and explanations using appropriate science and technology terminology.</p>	<p><i>Note: Every FOSS Grades 5-6 module and many of the FOSS Middle School modules involve an end-of-unit project with a presentation to the class. See for example:</i> <u>Solar Energy</u> Investigation 4, Part 4 <u>Environments</u> Investigation 6, Part 3 Mid-module examples: <u>Models and Designs</u>, Investigation 3, Parts 1-2 <u>Water Planet</u>, Investigation 2, Parts 1-3 <u>Living Systems</u> Investigation 2, Part 1 <u>Human Brain and Senses</u> Investigation 5, Parts 1-4 <u>Earth History</u> Investigation 1, Parts 1-2 <u>Diversity of Life</u> Investigation 3, Part 3</p>	<p>Pages 29-33 Pages 18-22 Pages 8-19 Pages 80-100 Pages 85-98 Pages 145-176 Pages 33-49 Pages 116-123</p>
<p>5. Explanations and procedures may be critiqued and revised, but data must never be changed to match the expected results.</p>	<p><u>Models and Designs</u> Investigation 2, Parts 1-2 <u>Environments</u>, Investigation 1, Parts 1-2 <u>Variables</u>, Investigation 3, Part 3 <u>Water Planet</u>, Investigation 3, Part 1 <u>Living Systems</u> Investigation 3, Part 3 <u>Planetary Science</u>, Investigation 5, Parts 1-5 <u>Electronics</u>, Investigation 3, Parts 1-4 <u>Human Brain and Senses</u> Investigation 4, Parts 1-3</p>	<p>Pages 8-21 Pages 8-19 t Pages 20-23 Pages 125-135 Pages 136-141 Pages 143-175 Pages 119-135 Pages 120-143</p>