



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

Correlation to:

**National
Science Education Standards**



January 2009

CONTENT STANDARD: K-12 UNIFYING CONCEPTS AND PROCESSES

As a result of activities in grades K-12, all students should develop understanding and abilities aligned with the following concepts and processes

The unifying concepts and processes are interwoven throughout the activities and investigations in the FOSS Modules. Some examples of modules that address the standards throughout the hands-on investigations and readings are listed below.

<i>UNIFYING CONCEPTS AND PROCESSES</i>	<i>FOSS</i>
Systems, order, and organization	Animals Two By Two Pebbles, Sand, and Silt Plants and Animals Human Body Earth Materials Sun, Moon and Stars Levers and Pulleys Mixtures and Solutions Variables Planetary Science Chemical Interactions Weather and Water
Evidence, models, and explanation	Wood and Paper Air and Weather Solids and Liquids Magnetism and Electricity Earth Materials Water Ideas and Inventions Solar Energy Water Planet Models and Designs Landforms Diversity of Life Earth History
Change, constancy, and measurement	Trees New Plants Insects Balance and Motion Physics of Sound Matter and Energy Measurement Environments Variables Force and Motion

<p>Evolution and equilibrium</p>	<p>Electronics</p> <p>Animals Two by Two</p> <p>New Plants</p> <p>Insects and Plants</p> <p>Balance and Motion</p> <p>Human Body</p> <p>Water</p> <p>Levers and Pulleys</p> <p>Environments</p> <p>Diversity of Life</p> <p>Populations and Ecosystems</p> <p>Earth History</p>
<p>Form and function</p>	<p>Wood and Paper</p> <p>Animals Two by Two</p> <p>Trees</p> <p>Fabric</p> <p>Insects</p> <p>Plants and Animals</p> <p>Structures of Life</p> <p>Human Body</p> <p>Levers and Pulleys</p> <p>Living Systems</p> <p>Solar Energy</p> <p>Models and Designs</p> <p>Diversity of Life</p> <p>Human Brain and Senses</p>

GRADES K-4 STANDARDS

CONTENT STANDARD A SCIENCE AS INQUIRY

As a result of activities in grades K-4, all students should develop abilities to do scientific inquiry

NOTE: FOSS is inquiry-based. The fundamentals of scientific inquiry are imbedded in ALL FOSS modules at a developmentally appropriate level. *Representative* examples of investigations for each of the standards guidelines are listed.

GUIDELINE	FOSS INVESTIGATION
Ask a question about objects, organisms, and events in the environment	<p>Wood and Paper Investigation 3, Part 1 <u>Wood and Paper FOSS Science Stories</u>, Pages 9-12: "Scientists ask questions" New Plants Investigation 2, Part 2 Insects Investigation 3, Part 2 Pebbles, Sand, and Silt <u>FOSS Science Stories</u> Pages 24-25 Structures of Life Investigation 3, Part 2 Sun, Moon and Stars, Investigation 1, Parts 1-3 Earth Materials Investigation 4, Part 2 Physics of Sound Investigation 4, Part 2</p>
Plan and conduct a simple investigation	<p>Fabric Investigation 2, Parts 1, 2 Pebbles, Sand, and Silt Investigation 2, Part 3 Plants and Animals, Investigation 2, Parts 1-3 Balance and Motion Investigation 3, Part 2 Magnetism and Electricity Investigation 4, Parts 1-3 Structures of Life Investigation 5, Part 2 Human Body Investigation 4, Parts 1-2 Note also the suggested end of module projects for ALL Grades 3-4 FOSS Modules, many of which are additional investigations.</p>
Employ simple equipment and tools to gather data and extend the senses	<p>Wood and Paper Investigation 1, Part 3 Pebbles, Sand, and Silt Investigation 2, Part 1 Insects Investigation 1, Part 2 Solids and Liquids Investigation 3, Part 1 Measurement Investigation 3, Part 2 Matter and Energy, Investigation 3, Parts 1-2 Earth Materials Investigation 1, Part 3 Ideas and Inventions Investigation 4, Part 1 End of module projects for Grades 3-4 FOSS.</p>
Use data to construct a reasonable explanation	<p>Animals Two by Two Investigation 3, Part 3 Balance and Motion Investigation 3, Part 2 Insects and Plants, Investigation 1, Parts 1-3 Air and Weather Investigation 1, Part 3 Solids and Liquids Investigation 4, Part 2 Earth Materials Investigation 3, Part 2 Human Body Investigation 4, Part 2</p>

Communicate investigations and explanations	<p>Science Notebooks are recommended for ALL FOSS modules, and a folio to assist teachers in their use is now available.</p> <p>Trees Investigation 3, Part 2 and Class Book</p> <p>Air and Weather Investigation 2, Parts 1-4 and Air and Weather Journal</p> <p>New Plants Investigation 1, Parts 2-3</p> <p>Matter and Energy Investigation 2, Parts 1-3</p> <p>Water Investigation 4, Part 2</p> <p>Ideas and Inventions Investigation 3, Part 3</p>
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CONTENT STANDARD A SCIENCE AS INQUIRY

As a result of activities in grades K-4, all students should develop understandings about scientific inquiry

NOTE: Students use the processes of scientific inquiry at a developmentally appropriate level throughout ALL FOSS investigations. Understandings about scientific inquiry are acquired through doing scientific inquiry, followed when appropriate by readings that expand the ideas. The following are *representative* examples for these guidelines, not an exhaustive listing.

GUIDELINE	FOSS INVESTIGATION
<p>Scientific investigations involve asking and answering a question and comparing the answer with what scientists already know about the world.</p> <p>Scientists use different kinds of investigations depending on the questions they are trying to answer. Types of investigations include describing objects, events, and organisms; classifying them; and doing a fair test.</p>	<p>Wood and Paper Investigation 1, Part 1 <u>Wood and Paper FOSS Science Stories</u>, Pages 9-12 “Scientists ask questions”</p> <p>Air and Weather Investigation 2, Parts 1-4</p> <p>Insects and Plants Investigation 1, Parts 1-3</p> <p>Measurement Investigation 2, Parts 1-3 <u>Measurement FOSS Science Stories</u> Pages 5-15, 21-23</p> <p>Human Body Investigation 3, Parts 1-2 <u>Human Body FOSS Science Stories</u> Pages 21-24</p> <p>Sun, Moon, and Stars Investigation 2, Parts 1-2</p> <p>Magnetism and Electricity Investigation 2, Parts 1-3</p> <p>Trees Investigation 2, Parts 1-4</p> <p>Animals Two by Two Investigation 2, Part 4</p> <p>Fabric Investigation 2, Part 4</p> <p>Pebbles, Sand, and Silt Investigation 1, Parts 1-3 <u>Pebbles, Sand and Silt FOSS Science Stories</u> Pages 24-25</p> <p>Matter and Energy Investigation 3, Part 3</p> <p>Water Investigation 1, Part 2 <u>Water FOSS Science Stories</u> Pages 24-26</p> <p>Structures of Life FOSS Science Stories Pages 6-9</p> <p>Earth Materials Investigation 4, Parts 1-2 <u>Earth Materials FOSS Science Stories</u> Pages 1-7, 30-33</p>

Simple instruments, such as magnifiers, thermometers, and rulers, provide more information than scientists obtain using only their senses.

Scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge). Good explanations are based on evidence from investigations.

Scientists make the results of their investigations public; they describe the investigations in ways that enable others to repeat investigations.

Scientists review and ask questions about the results of other scientists' work.

Trees Investigation 1, Part 1 and throughout (loupe/magnifier)

Pebbles, Sand, and Silt Investigation 1, Parts 1-3 (magnifiers)

Insects and Plants ALL, such as Investigation 2, Parts 1-3 (magnifiers)

Measurement ALL, such as Investigation 1, Parts 1-3 (rulers) and Investigation 4, Parts 1-2 (thermometers)

Ideas and Inventions

Investigation 1, Parts 1-2

Ideas and Inventions FOSS Science Stories
Pages 11-15

Matter and Energy Investigation 4, Parts 1-2

Human Body FOSS Science Stories
Pages 21-24

Wood and Paper Investigation 1, Parts 4-5

Pebbles, Sand, and Silt

Investigation 2, Parts 1-3

Pebbles, Sand and Silt FOSS Science Stories
Pages 24-25

Air and Weather Investigation 1, Parts 1-5

Human Body Investigation 1, Parts 1-2

Human Body FOSS Science Stories
Pages 21-24

Earth Materials Investigation 1, Parts 1-3

Structures of Life FOSS Science Stories
Pages 6-9

Ideas and Inventions

Investigation 2, Parts 1-2

www.fossweb.com "Ask a Scientist" (for all FOSS Modules)

Science Notebooks are recommended for ALL FOSS modules, and a folio to instruct teachers in their use is now available.

Air and Weather Investigation 1, Parts 1-5 and Air and Weather Journals/notebooks

Water Investigation 3, Parts 1-3 and science notebooks

Water FOSS Science Stories Pages 24-26

Structures of Life Investigation 2, Parts 1-3 and data sheets/science notebooks

Structures of Life FOSS Science Stories
Pages 6-9

Matter and Energy Investigation 1, Parts 1-3

Magnetism and Electricity FOSS Science Stories Pages 11, 28-29

www.fossweb.com "Careers" (for ALL FOSS modules)

This standard is addressed in the wrap-up/discussion at the end of EVERY FOSS investigation and throughout the investigations as appropriate. It also is addressed in end of module projects in the Grades 3-4 modules. See for example:

	<p>Wood and Paper Investigation 4, Part 1 New Plants Investigation 1, Parts 1-3 Insects and Plants Investigation 3, Parts 1-3 Ideas and Inventions Investigation 2, Part 3 <u>Ideas and Inventions FOSS Science Stories</u> Pages 1,18,30</p> <p>Magnetism and Electricity Investigation 5, Part 2 <u>Magnetism and Electricity FOSS Science</u> <u>Stories</u> Pages 26-29</p> <p>Structures of Life Investigation 1, Parts 1-2 <u>Structures of Life FOSS Science Stories</u> Pages 6-9</p> <p>Matter and Energy Investigation 4, Parts 1-2 <u>Matter and Energy FOSS Science Resources</u> Pages 43-46 www.fossweb.com "Careers" (for ALL FOSS modules)</p>
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CONTENT STANDARD B

PHYSICAL SCIENCE

As a result of the activities in grades K-4, all students should develop an understanding of properties of objects and materials

Representative examples of investigations for each of the standard's guidelines are listed; other modules (and other investigations within the modules cited) also meet the standards.

GUIDELINE	FOSS INVESTIGATION
<p>Objects have many observable properties, including size, weight, shape, color, temperature, and the ability to react with other substances. Those properties can be measured using tools such as rulers, balances, and thermometers.</p>	<p>Wood and Paper Investigation 1, Part 1 Fabric Investigation 1, Parts 1-2 Solids and Liquids Investigation 3, Parts 1-3 <u>Solids and Liquids FOSS Science Stories</u> Pages 8-13 Pebbles, Sand, and Silt Investigation 1, Parts 1-4 Physics of Sound Investigation 1, Part 1 Measurement Investigations 1-4 <u>Measurement FOSS Science Stories</u> Pages 22-23, 30-33 Matter and Energy Investigation 4, Parts 1-3 <u>Matter and Energy FOSS Science Resources</u> Pages 47-51,60-64 Water Investigation 2, Parts 1-3 Earth Materials Investigation 3</p>
<p>Objects are made of one or more materials, such as paper, wood, and metal. Objects can be described by the properties of the materials from which they are made, and those properties can be used to separate or sort a group of objects or materials.</p>	<p>Wood and Paper ALL, such as Investigation 1 and Investigation 3 <u>Wood and Paper FOSS Science Stories</u> Pages 13-18 Fabric, ALL, ex. Investigation 1, Parts 1-2 Solids and Liquids Investigation 1, Parts 1-3 Pebbles, Sand, and Silt ALL, such as Investigation 2, Parts 1-2 <u>Pebbles, Sand and Silt FOSS Science Stories</u> Pages 8-9, 16-19 Earth Materials Investigations 2-4 <u>Earth Materials FOSS Science Stories</u> Pages 12-15, 24-33 Magnetism and Electricity Investigation 1, Part 1 and Investigation 2, Parts 2-3 Matter and Energy Investigation 3, Part 1</p>
<p>Materials can exist in different states—solids, liquid, and gas. Some common materials, such as water, can be changed from one state to another by heating or cooling</p>	<p>Trees FOSS Science Stories Pages 14-15 Solids and Liquids Investigations 1, 2 <u>Solids and Liquids FOSS Science Stories</u> Pages 3-17 Air and Weather Investigation 1, Parts 1-5 Water Investigations 2-3 <u>Water FOSS Science Stories</u> Pages 12-17 Matter and Energy Investigation 4, Parts 2-3 <u>Matter and Energy FOSS Science Resources</u> Pages 54-63 Measurement Investigation 4, Parts 1-2</p>

CONTENT STANDARD B

PHYSICAL SCIENCE

As a result of activities in grades K-4, all students should develop an understanding of position and motions of objects

Representative examples of investigations for each of the standard's guidelines are listed.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>The position of an object can be described by locating it relative to another object or the background.</p>	<p>Animals Two by Two Investigation 4, Part 3 Balance and Motion Investigation 1 <u>Balance and Motion FOSS Science Stories</u> Pages 3-9 Air and Weather Investigation 1, Parts 3-5 Human Body Investigation 1, Parts 1-3 Investigation 4, Parts 1-2 Sun, Moon, and Stars ALL, such as Investigation 1, Parts 1-2 <u>Sun, Moon and Stars FOSS Science Resources</u> Pages 1-25, 36-39, 48-50 Magnetism and Electricity Investigation 1, Parts 1-3</p>
<p>An object's motion can be described by tracing and measuring its position over time.</p>	<p>Balance and Motion Investigations 2 and 3 <u>Balance and Motion FOSS Science Stories</u> Pages 10-13,18-21,26-31 Air and Weather Investigation 1, Parts 3-5 Sun, Moon, and Stars ALL, such as Investigation 1, Parts 1-2 <u>Sun, Moon and Stars FOSS Science Resources</u> Pages 1-25, 36-39, 48-50 Ideas and Inventions Investigation 3 Magnetism and Electricity Investigation 1, Parts 3-4</p>
<p>The position and motion of objects can be changed by pushing or pulling. The size of the change is related to the strength of the push or pull.</p>	<p>Balance and Motion Investigation 2-3 <u>Balance and Motion FOSS Science Stories</u> Pages 10-13 Air and Weather Investigation 3 Magnetism and Electricity Investigation 4, Parts 2, 3 Matter and Energy Investigation 1, Parts 1-3 Ideas and Inventions Investigation 3 Water Investigation 4, Part 2</p>
<p>Sound is produced by vibrating objects. The pitch of the sound can be varied by changing the rate of vibration.</p>	<p>Balance and Motion Door Fiddle extension <u>Balance and Motion FOSS Science Stories</u> Pages 32-35 Physics of Sound Investigation 2, Parts 1-3 <u>Physics of Sound FOSS Science Stories</u> Pages 9, 14,17-21 FOSS Web Activity: How Far is Away Matter and Energy Investigation 1, Parts 1-2 <u>Matter and Energy FOSS Science Resources</u> Pages 14-21</p>

CONTENT STANDARD B PHYSICAL SCIENCE

As a result of the activities in grades K-4, all students should develop an understanding of light, heat, electricity, and magnetism.

Representative examples of investigations for each of the standard's guidelines are listed.

GUIDELINES	FOSS INVESTIGATION/ACTIVITY
<p>Light travels in a straight line until it strikes an object. Light can be reflected by a mirror, refracted by a lens, or absorbed by the object.</p>	<p>Ideas and Inventions Investigation 4, Parts 1-3 <u>Ideas and Inventions FOSS Science Stories</u> Pages 23-32 Matter and Energy Investigation 2, Parts 1-2 <u>Matter and Energy FOSS Science Resources</u> Pages 24-36</p>
<p>Heat can be produced in many ways, such as burning, rubbing, or mixing one substance with another. Heat can move from one object to another by conduction.</p>	<p>Matter and Energy Investigation 1, Parts 1-3 <u>Matter and Energy FOSS Science Resources</u> Pages 1-21, 54-56 Water Investigation 2, Parts 1, 2 <u>Water FOSS Science Stories</u> pp. 13-16 Magnetism and Electricity Investigation 2, Part 1</p>
<p>Electricity in circuits can produce light, heat sound, and magnetic effects. Electrical circuits require a complete loop through which an electrical current can pass.</p>	<p>Magnetism and Electricity Investigations 2-5 <u>Magnetism and Electricity FOSS Science Stories</u> pp. 16-20,21-27 FOSS Web Movie: How a Light Bulb Works Matter and Energy Investigation 1, Parts 1-3 <u>Matter and Energy FOSS Science Resources</u> Pages 3-21</p>
<p>Magnets attract and repel each other and certain kinds of other materials.</p>	<p>Balance and Motion Investigation 3 Center: Magnetic Force Magnetism and Electricity Investigations 1, 4 <u>Magnetism and Electricity FOSS Science Stories</u> pp. 1-6, 24-32 FOSS Web Activity: Electromagnets</p>

CONTENT STANDARD C

LIFE SCIENCE

As a result of activities in grades K-4, all students should develop understanding of the characteristics of organisms

Representative examples of investigations for each of the standard's guidelines are listed.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Organisms have basic needs. For example, animals need air, water, and food; plants require air, water, nutrients, and light. Organisms can survive only in environments in which their needs are met. The world has many different environments, and distinct environments support the life of different types of organisms.</p>	<p>Animals Two by Two ALL, such as Investigation 1, Parts 1, 2 Trees Investigation 1, Parts 3, 9 <u>Trees FOSS Science Stories pp. 3-13</u> Insects ALL, such as Investigation 1, Part 1 Investigation 3, Parts 1-3 Plants and Animals ALL, such as Investigation 1, Parts 1-3 <u>Plants and Animals FOSS Science Resources</u> Pages 3-8, 21-27, 28-46 Insects and Plants ALL, such as Investigation 1, Parts 1-2 New Plants Investigation 1, Parts 2, 3 <u>New Plants FOSS Science Stories</u> Pages 3-7, 22-39 Structures of Life Investigation 2, Part 2 <u>Structures of Life FOSS Science Stories</u> Pages 22-34 Human Body FOSS Science Stories Pages 9, 25</p>
<p>Each plant or animal has different structures that serve different functions in growth, survival, and reproduction. For example, humans have distinct body structures for walking, holding, seeing, and talking.</p>	<p>Animals Two by Two ALL, such as Investigation 3, Parts 1-3 Plants and Animals ALL, such as Investigation 2, Parts 1-3 <u>Plants and Animals FOSS Science Resources</u> Pages 1-7, 16-19, 47-51 Insects and Plants Investigation 4, Parts 1-5 <u>Insects and Plants FOSS Science Resources</u> Pages 15-19, 30-36 Insects Investigation 3, Part 3 <u>Insects FOSS Science Stories pp. 8-14, 34-35</u> New Plants Investigation 4, Parts 1, 2 <u>New Plants FOSS Science Stories pp. 40-43</u> Structures of Life Investigation 3, Part 1 Human Body ALL, such as Investigation 2, 3 <u>Human Body FOSS Science Stories pp. 1-4, 14-20</u> FOSS Web Activity: Putting Bones Together Physics of Sound FOSS Science Stories pp. 9-10, 32-35</p>
<p>The behavior of individual organisms is influenced by internal cues (such as hunger) and by external cues (such as change in the environment). Humans and other organisms</p>	<p>Animals Two by Two, ALL, such as Investigation 3, Part 2 Investigation 4, Parts 1-2 New Plants Investigation 1, Parts 2, 3</p>

<p>have senses that help them detect internal and external cues.</p>	<p>Insects and Plants Investigation 3, Parts 1-3 <u>Insects and Plants FOSS Science Resources</u> Pages 8-14 Insects ALL, such as Investigation 1, Part 3 <u>Insects FOSS Science Stories</u> pp. 36-41 Plants and Animals ALL, such as Investigation 3, Parts 1-3 Structures of Life Investigation 3, Parts 3, 4 Human Body Investigation 4 Physics of Sound <u>FOSS Science Stories</u> pp. 9-10, 32-35</p>
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CONTENT STANDARD C LIFE SCIENCE

As a result of the activities in grades K-4, all students should develop understanding of life cycles of organisms

Representative examples of investigations for each of the standard's guidelines are listed.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Plants and animals have life cycles that include being born, developing into adults, reproducing, and eventually dying. The details of this life cycle are different for different organisms.</p>	<p>Animals Two by Two Investigation 1, Part 3 Investigation 5, Parts 1-3 <u>Animals Two by Two FOSS Science Stories</u> Pages 3-24 Insects ALL, such as Investigations 1-4 <u>Insects FOSS Science Stories</u> Pages 16-33 New Plants ALL, such as Investigation 1, Parts 1-3 <u>New Plants FOSS Science Stories</u> pp. 8-21 Insects and Plants ALL, such as Investigation 1, Parts 1-2 <u>Insects and Plants FOSS Science Resources</u> Pages 15-19, 44-58 Structures of Life Investigation 2, Parts 1-3 <u>Structures of Life FOSS Science Stories</u> Pages 20-21</p>
<p>Plants and animals closely resemble their parents.</p>	<p>Animals Two by Two Investigation 5 Parts 1-3 <u>Animals Two by Two FOSS Science Stories</u> Pages 20-24 Insects Investigations 1-4 <u>Insects FOSS Science Stories</u> pp.16-21 Insects and Plants ALL, such as Investigation 3, Parts 1-3 <u>Insects and Plants FOSS Science Resources</u> Pages 44-56 New Plants Investigations 1, 3, 4 Structures of Life Investigation 2, Part 3 <u>Structures of Life FOSS Science Stories</u> Pages 6-9, 20-21</p>
<p>Many characteristics of an organism are inherited from the parents of the organism, but other characteristics result from an individual's</p>	<p>Animals Two by Two Investigation 5, Parts 1-3 Insects Investigations 1-4</p>

<p>interaction with the environment. Inherited characteristics include the color of flowers, and the number of limbs of an animal. Other features, such as the ability to ride a bicycle, are learned through interactions with the environment and cannot be passed on to the next generation.</p>	<p><u>Insects FOSS Science Stories Pages 36-46</u> Insects and Plants throughout, such as Investigations 1 and 3 <u>Insects and Plants FOSS Science Resources Pages 8-25</u> New Plants Investigations 1, 3, 4 Structures of Life Investigation 2, Part 3 <u>Structures of Life FOSS Science Stories Pages 6-9</u></p>
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CONTENT STANDARD C LIFE SCIENCE

As a result of the activities in grades K-4, all students should develop understanding of organisms and environments

Representative examples of investigations for each of the standard's guidelines are listed

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>All animals depend on plants. Some animals eat plants for food. Other animals eat animals that eat plants.</p>	<p>Animals Two by Two Investigation 1, Part 2 Investigation 4, Part 1 Insects ALL, such as Investigation 2, Part 3 Investigation 3, Parts 1-3 New Plants <u>FOSS Science Stories Pages 22-39</u> Insects and Plants throughout, such as Investigations 1 and 4 Plants and Animals <u>FOSS Science Resources Pages 21-22, 47-51</u> Structures of Life Investigation 3, Part 2 Investigation 5, Part 1 <u>Structures of Life FOSS Science Stories p. 43</u> Water <u>FOSS Science Stories Pages 5-6</u></p>
<p>An organism's patterns of behavior are related to the nature of that organism's environment, including the kinds and numbers of other organisms present, the availability of food and resources, and the physical characteristics of the environment. When the environment changes, some plants and animals survive and reproduce, and others die or move to new locations.</p>	<p><u>Trees FOSS Science Stories Pages 3-13</u> Animals Two by Two Investigation 1, Parts 3, 4 Investigation 3, Parts 1-3 Insects Investigation 5, Parts 2,3 Investigation 6, Part 1 <u>Insects FOSS Science Stories pp. 36-46</u> Insects and Plants Investigation 3, Parts 1-3 <u>Insects and Plants FOSS Science Resources Pages 8-14</u> Plants and Animals Investigation 4, Part 3 Structures of Life Investigation 3, Parts 3, 4 <u>Structures of Life FOSS Science Stories Pages 10-11, 20-21,22-36, 45-48</u></p>
<p>All organisms cause changes in the environment where they live. Some of these changes are detrimental to the organism or other organisms, whereas others are beneficial.</p>	<p>Animals Two by Two throughout, such as Investigation 1, Parts 1-3 Investigation 3, Parts 1-3 Insects Investigation 3, Part 3 Investigation 4, Parts 4-5</p>

Humans depend on their natural and constructed environments. Humans change environments in ways that can be either beneficial or detrimental for themselves and other organisms.

Plants and Animals Investigation 4,
Parts 1-2
Structures of Life
Investigation 3, Part 4
Water FOSS Science Stories Pages 18-23

Trees Investigation 1, Parts 3, 9
Trees FOSS Science Stories Pages 12-21
Wood and Paper FOSS Science Stories
Pages 19-24

Pebbles, Sand, and Silt Investigation 3
Pebbles, Sand and Silt FOSS Science Stories
Pages 16-19

New Plants Investigation 2, Parts 1-3
New Plants FOSS Science Stories
Pages 16-22

Water FOSS Science Stories Pages 17-23
Structures of Life FOSS Science Stories

Pages 4-5, 10-11

Earth Materials FOSS Science Stories
Pages 24-29

CONTENT STANDARD D EARTH SCIENCE

As a result of the activities in grade K-4, all students should develop an understanding of properties of earth materials

Representative examples of investigations for each of the standard's guidelines are listed.

GUIDELINES	FOSS INVESTIGATION/ACTIVITY
<p>Earth materials are solid rocks and soils, water, and the gases of the atmosphere. The varied materials have different physical and chemical properties, which make them useful in different ways, for example, as building materials, as sources of fuel, or for growing plants we use as food. Earth materials provide many of the resources that humans use.</p>	<p>Pebbles, Sand, and Silt ALL Investigations 1-4 <u>Pebbles, Sand and Silt FOSS Science Stories</u> Pages 3-7, 16-25 Air and Weather Investigation 1 <u>Air and Weather FOSS Science Stories</u> Pages 3-5 Earth Materials Investigation 1, Parts 1-3 <u>Earth Materials FOSS Science Stories</u> Pages 8-15, 24-29 FOSS Web Rock Database Water Investigation 2, Parts 2, 3 Investigation 4, Parts 1-3 <u>Water FOSS Science Stories</u> Pages 17-26</p>
<p>Soils have properties of color and texture, capacity to retain water, and ability to support the growth of many kinds of plants, including those in our food supply.</p>	<p>New Plants Investigation 1, Parts 1-3 Insects and Plants Investigation 2, Parts 1-3 Pebbles, Sand, and Silt Investigation 2, Parts 3, 4 Investigation 4, Parts 1-3 <u>Pebbles, Sand, and Silt FOSS Science Stories</u> Pages 20-25 Water Investigation 4, Part 1</p>
<p>Fossils provide evidence about the plants and animals that lived long ago and the nature of the environment at that time.</p>	<p>Pebbles, Sand, and Silt <u>FOSS Science Stories</u> Pages 26-32 Earth Materials <u>FOSS Science Stories</u> Pages 1-4 Structures of Life <u>FOSS Science Stories</u> Pages 45-48 Matter and Energy <u>FOSS Science Resources</u> Page 9</p>

CONTENT STANDARD D EARTH SCIENCE

As a result of the activities in grades K-4, all students should develop an understanding of objects in the sky

Representative examples of investigations for each of the standard's guidelines are listed.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>The sun, moon, stars, clouds, birds, and airplanes all have properties, locations, and movements that can be observed and described.</p>	<p>Air and Weather Investigation 2, Parts 1-4 Investigation 4, Parts 2-3 <u>Air and Weather FOSS Science Stories</u> p. 5 Water <u>FOSS Science Stories</u> Pages 14-15</p>

<p>The sun provides the light and heat necessary to maintain the temperature of the earth.</p>	<p>Sun, Moon and Stars ALL Investigations 1-3 <u>Sun, Moon and Stars FOSS Science Resources</u> Pages 1-11,14-32, 35-39</p> <p>Air and Weather Investigation 2, Parts 1-4 Investigation 4, Parts 1,3 Water FOSS Science Stories Pages 14-15 Physics of Sound FOSS Science Stories Pages 22-24 Sun, Moon and Stars Investigation 1 <u>Sun, Moon and Stars FOSS Science Resources</u> Pages 1-3</p>
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CONTENT STANDARD D EARTH SCIENCE

As a result of the activities in grades K-4, all students should develop an understanding of changes in the earth and sky

Representative examples of investigations for each of the standard's guidelines are listed.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>The surface of the earth changes. Some of the changes are due to slow processes such as erosion and weathering, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.</p>	<p>Pebbles Sand, and Silt throughout, such as Investigation 1, Parts 1-3 Investigation 2, Parts 3, 4 Investigation 4 <u>Pebbles, Sand and Silt FOSS Science Stories</u> Pages 3-7,10-15 Water Investigation 4, Parts 1-2 Earth Materials Investigation 1, Part 2 <u>Investigation 2, Part 2</u> <u>Earth Materials FOSS Science Stories</u> Pages 1-7, 24-29,34-36 Matter and Energy FOSS Science Resources Page 16</p>
<p>Weather changes from day to day and over the seasons. Weather can be described by measurable quantities, such as temperature, wind direction and speed, and precipitation.</p>	<p>Air and Weather Investigation 2, Parts 1-4 Investigation 4, Parts 1,3 <u>Air and Weather FOSS Science Stories</u> Pages 7-13 Water FOSS Science Stories Pages 14-15, 22</p>
<p>Objects in the sky have patterns of movement. The sun, for example, appears to move across the sky in the same way every day, but its path changes slowly over the seasons. The moon moves across the sky on a daily basis much like the sun. The observable shape of the moon changes from day to day in a cycle that lasts about a month.</p>	<p>Air and Weather Investigation 4, Part 2 Ideas and Inventions FOSS Science Stories Pages 33-38 Sun, Moon and Stars Investigations 1-3 ALL <u>Sun, Moon and Stars FOSS Science Resources</u> Pages 1-11,14-32, 35-39</p>

CONTENT STANDARD E SCIENCE AND TECHNOLOGY

As a result of activities in grades K-4, all students should develop abilities of technological design.

Representative examples of investigations for each of the standard's guidelines are listed.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
Identify a simple problem	<p>Wood and Paper Investigation 5, Parts 1-3 Solids and Liquids Investigation 1, Part 3 Ideas and Inventions Investigation 3, Part 3 Water Investigation 4, Part 2 Magnetism and Electricity Investigation 4, Parts 1-2 Matter and Energy Investigation 2, Parts 1-2 Note: this standard is also addressed in the end of module projects suggested for the Grades 3-6 modules. See for example: Earth Materials Investigation 4, Part 2</p>
Propose a solution	<p>Wood and Paper Investigation 5, Parts 1-3 Solids and Liquids Investigation 1, Part 3 Ideas and Inventions Investigation 3, Part 3 Water Investigation 4, Part 2 Magnetism and Electricity Investigation 4, Parts 1-2 Matter and Energy Investigation 2, Parts 1-2 Note: this standard is also addressed in the end of module projects suggested for the Grades 3-6 modules. See for example: Structures of Life Investigation 5, Part 3</p>
Implement proposed solutions	<p>Wood and Paper Investigation 5, Parts 1-3 Solids and Liquids Investigation 1, Part 3 Ideas and Inventions Investigation 3, Part 3 Water Investigation 4, Part 2 Magnetism and Electricity Investigation 4, Parts 1-2 Matter and Energy Investigation 2, Parts 1-2 Note: this standard is also addressed in the end of module projects suggested for the Grades 3-6 modules. See for example: Physics of Sound Investigation 4, Part 2</p>
Evaluate a product or design	<p>Wood and Paper Investigation 5, Parts 1-3 Solids and Liquids Investigation 1, Part 3 Ideas and Inventions Investigation 3, Part 3 Water Investigation 4, Part 2 Magnetism and Electricity Investigation 4, Parts 1-2 Matter and Energy Investigation 2, Parts 1-2 Note: this standard is also addressed in the end of module projects suggested for the Grades 3-6 modules. See for example: Earth Materials Investigation 4, Part 2</p>

Communicate a problem design and solution	<p>Wood and Paper Investigation 5, Parts 1-3 Solids and Liquids Investigation 1, Part 3 Ideas and Inventions Investigation 4, Part 2 Water Investigation 4, Part 2 Magnetism and Electricity Investigation 4, Parts 1-2 Matter and Energy Investigation 2, Parts 1-2 Note: this standard is also addressed in the end of module projects suggested for the Grades 3-6 modules. See for example: Human Body Investigation 4, Part 3</p>
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CONTENT STANDARD E SCIENCE AND TECHNOLOGY

As a result of activities in grades K-4, all students should develop understanding about science and technology

Representative examples of investigations for each of the standard's guidelines are listed

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>People have always had questions about their world. Science is one way of answering questions and explaining the natural world.</p>	<p><u>Wood and Paper</u> FOSS Science Stories Pages 9-12 <u>Air and Weather</u> FOSS Science Stories Pages 14-16 Sun, Moon and Stars Investigation 3 <u>Sun, Moon and Stars FOSS Science Resources</u> Pages 35-49 Structures of Life Investigation 1, Parts 1-3 <u>Structures of Life</u> FOSS Science Stories Pages 10-11 <u>Ideas and Inventions</u> FOSS Science Stories Pages 1-3, 9, 11-13 <u>Earth Materials</u> FOSS Science Stories Pages 16-23 <u>Magnetism and Electricity</u> FOSS Science Stories Pages 12-13</p>
<p>People have always had problems and invented tools and techniques (ways of doing something) to solve problems. Trying to determine the effects of solutions helps people avoid some new problems.</p>	<p>Pebbles, Sand and Silt Investigation 3, Parts 1-4 <u>Pebbles, Sand and Silt FOSS Science Stories</u> Pages 16-19 <u>Air and Weather</u> FOSS Science Stories Pages 14-16 <u>Water</u> FOSS Science Stories Pages 18-29 Ideas and Inventions ALL, such as Investigation 2, Parts 1-3 <u>Ideas and Inventions FOSS Science Stories</u> Pages 10-16, 17-22, 28-32,39-40 Magnetism and Electricity Investigation 5, Parts 1-2 <u>Magnetism and Electricity FOSS Science Stories</u> Pages 12-37</p>
<p>Scientists and engineers often work in teams</p>	<p>Students work in collaborative teams in ALL</p>

<p>with different individuals doing different things that contribute to the results.</p>	<p>FOSS Grades 3-6 modules, with common group goals and clearly defined roles to be sure all students contribute to results. They model the collaborative nature of science in EVERY investigation. See for example: Magnetism and Electricity Investigation 4, Parts 1-3 <u>Magnetism and Electricity FOSS Science Stories Pages 12-37</u> Matter and Energy ALL, such as Investigation 1 See also “Ask a Scientist” and the “Careers” section on the web site: www.fossweb.com</p>
<p>Women and men of all ages, backgrounds, and groups engage in a variety of scientific and technological work.</p>	<p>Structures of Life FOSS Science Stories Pages 6-9 Water FOSS Science Stories Pages 24-26 Ideas and Inventions FOSS Science Stories Pages 1-3, 10-22, 28-32,39-40 Measurement FOSS Science Stories Pages 14-15 Sun, Moon and Stars FOSS Science Resources Pages 40-47</p>
<p>Tools help scientists make better observations, measurements, equipment for investigations. They help scientists see, measure, and do things that they could not otherwise do.</p>	<p>Pebbles, Sand and Silt Investigation 1, Parts 1-4 and “Geologist Tool Kit” Air and Weather Investigation 2, Parts 1-4 and “Meteorologist Tool Kit” Insects throughout, such as Investigation 3, Parts 1,3 Measurement ALL, such as Investigation 2 Measurement FOSS Science Stories Pages 22-26 Matter and Energy Investigation 3, 4 <u>Matter and Energy FOSS Science Resources Pages 26-28, 51</u> Sun, Moon and Stars FOSS Science Resources Pages 40-47 Physics of Sound FOSS Science Stories Pages 17-18</p>

CONTENT STANDARD E SCIENCE AND TECHNOLOGY

As a result of activities in grades K-4, all students should develop abilities to distinguish between natural objects and objects made by humans

Representative examples of investigations for each of the standard’s guidelines are listed

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Some objects occur in nature; others have been designed and made by people to solve human problems and enhance the quality of life.</p>	<p>Wood and Paper ALL, such as Investigation 1, Parts 1-2 Investigation 3, Parts 1-4 <u>Wood and Paper FOSS Science Stories Pages 3-8,13-18</u> Trees Investigation 1, Parts 1-9</p>

Objects can be categorized into two groups, natural and designed.

Trees FOSS Science Stories Pages 3-24
Fabric Investigation 2, Parts 1-4
Fabric FOSS Science Stories Pages 3-24
Pebbles, Sand, and Silt Investigation 3
Pebbles, Sand and Silt FOSS Science Stories
Pages 3-23
Matter and Energy Investigation 1, Parts 1-3
Matter and Energy FOSS Science Resources
Pages 1-13
Water FOSS Science Stories Pages 22-23,
27-29
Magnetism and Electricity
Investigation 4, Parts 1-3
Investigation 5, Parts 1-2
Magnetism and Electricity FOSS Science
Stories Pages 14-37

Wood and Paper ALL, such as
Investigation 1, Parts 1-2
Investigation 3, Parts 1-4
Wood and Paper FOSS Science Stories
Pages 3-8,13-18
Trees Investigation 1, Parts 1-9
Trees FOSS Science Stories Pages 3-24
Fabric Investigation 2, Parts 1-4
Fabric FOSS Science Stories Pages 3-24
Pebbles, Sand, and Silt Investigation 3
Pebbles, Sand and Silt FOSS Science Stories
Pages 3-23
Water Investigation 4, Part 2
Water FOSS Science Stories
Pages 22-23, 27-29
Magnetism and Electricity
Investigation 4, Parts 1-3
Investigation 5, Parts 1-2
Magnetism and Electricity FOSS Science
Stories Pages 14-37

CONTENT STANDARD F

SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

As a result of activities in grades K-4, all students should develop understanding of personal health

Representative examples of investigations for each of the standard's guidelines are listed

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Safety and security are basic needs of humans. Safety involves freedom from danger, risk, or injury. Security involves feelings of confidence and lack of anxiety and fear.</p>	<p>Safety is top priority in FOSS. Each module includes a safety section in the Overview, and possible safety issues are marked with a “goggles” icon in the margin and notes to the teacher on how to ensure a safe environment for student. Some FOSS Science Stories also have readings about safety and security. See: Earth Materials Overview, Investigation 1 and Investigation 3 <u>Air and Weather</u> FOSS Science Stories Pages 16-17 <u>Ideas and Inventions</u> FOSS Science Stories Page 40 <u>Magnetism and Electricity</u> Investigations 2-5 <u>Magnetism and Electricity</u> FOSS Science Stories Pages 12-13 <u>Physics of Sound</u> FOSS Science Stories Page 35</p>
<p>Individuals have some responsibility for their own health. Students should engage in personal care—dental hygiene, cleanliness, and exercise—that will maintain and improve health.</p>	<p>Note that FOSS is a science program, not a health program. However, connections to these guidelines are found in the following investigations and readings: <u>Human Body</u> Investigation 3 Science Extension <u>Human Body</u> FOSS Science Stories Pages 17-20, 25-27 <u>Physics of Sound</u> FOSS Science Stories Pages 8-9</p>
<p>Nutrition is essential to health. Students should understand how the body uses food and how various foods contribute to health.</p>	<p><u>Plants and Animals</u> Investigation 4, Parts 1-2 <u>Plants and Animals</u> FOSS Science Resources Pages 47-51 <u>Human Body</u> FOSS Science Stories p. 28 <u>Matter and Energy</u> FOSS Science Resources Pages 4-13</p>
<p>Different substances can damage the body and how it functions. Such substances include tobacco, alcohol, over-the-counter medicines, and illicit drugs. Students should understand that some substances, such as prescription drugs, can be beneficial, but that any substance can be harmful if used inappropriately.</p>	<p><u>Human Body</u> FOSS Science Stories pp. 12, 25 <u>Structures of Life</u> Investigation 1, Parts 1-2 <u>Structures of Life</u> FOSS Science Stories Pages 4-5,12-16</p> <p><i>This standard is best addressed with a high-quality health program including a drug education component.</i></p>

CONTENT STANDARD F SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

As a result of activities in grades K-4, all students should develop an understanding of characteristics and changes in populations

Representative examples of investigations for each of the standard's guidelines are listed

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Human populations include groups of individuals living in a particular location. One important characteristic of a human population is the population density—the number of individuals of a particular population that lives in a given amount of space.</p> <p>The size of a human population can increase or decrease. Populations will increase unless other factors such as disease or famine decrease the population.</p>	<p><i>Due to its inferential nature, this standard is addressed in detail in Populations and Ecosystems, designed for Grades 6-8.</i></p> <p><i>Due to its inferential nature, this standard is addressed in detail in Populations and Ecosystems, designed for Grades 6-8.</i></p>

CONTENT STANDARD F SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

As a result of activities in grades K-4, all students should develop understanding of types of resources

Representative examples of investigations for each of the standard's guidelines are listed.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Resources are things that we get from the living and nonliving environment to meet the needs and wants of a population.</p> <p>Some resources are basic materials, such as air, water, and soil; some are produced from basic resources, such as food, fuel, and building materials; and some resources are nonmaterial, such as quiet places, beauty, security, and safety.</p>	<p>Wood and Paper Investigations 1 and 3 <u>Wood and Paper FOSS Science Stories</u> Pages 3-8,13-18,19-24</p> <p>Fabric Investigation 1 <u>Fabric FOSS Science Stories</u> Pages 3-24</p> <p>Trees Investigation 3, Parts 1-2 <u>Trees FOSS Science Stories</u> Pages 3-24</p> <p>Plants and Animals <u>FOSS Science Resources</u> Pages 3-15, 21-27</p> <p>New Plants Investigation 1, Parts 1,2 <u>New Plants FOSS Science Stories</u> Pages 16-21</p> <p>Water <u>FOSS Science Stories</u> Pages 17-18, 23</p> <p>Matter and Energy <u>FOSS Science Resources</u> Pages 1-13</p> <p>Earth Materials <u>FOSS Science Stories</u> Pages 8-15, 24-29</p> <p>Wood and Paper ALL, such as Investigations 1 and 5</p> <p>Air and Weather Investigation 1, Parts 1-5 Investigation 3, Parts 1-4</p> <p>Plants and Animals <u>FOSS Science</u></p>

<p>The supply of many resources is limited. If used, resources can be extended through recycling and decreased use.</p>	<p><u>Resources</u> Pages 3-15, 21-27 New Plants Investigation 3, Parts 1,2 <u>New Plants FOSS Science Stories</u> Pages 6-7,16-21 Pebbles, Sand, and Silt Investigations 3-4 <u>Pebbles, Sand and Silt FOSS Science Stories</u> Pages 16-19,20-25 Earth Materials <u>FOSS Science Stories</u> pp. 10-13, 24-29 Water <u>FOSS Science Stories</u> pp. 17-29 Matter and Energy <u>FOSS Science Resources</u> Pages 1-13</p> <p>Conservation of resources through reduced used, re-use and recycling is stressed throughout FOSS investigations. Even materials like paper plates and cups are re-used as long as possible. See for example: Wood and Paper Investigation 4 <u>Wood and Paper FOSS Science Stories</u> Pages 19-24 Water ALL, such as Investigation 1 <u>Water FOSS Science Stories</u> Pages 17-21 Earth Materials <u>FOSS Science Stories</u> Pages 10-13, 24-29 Matter and Energy <u>FOSS Science Resources</u> Pages 1-13 Measurement <u>FOSS Science Stories</u> Pages 16-17</p>
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CONTENT STANDARD F SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

As a result of activities in grades K-4, all students should develop understanding of changes in environment

Representative examples of investigations for each of the standard's guidelines are listed

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Environments are the space, conditions, and factors that affect an individual's and a population's ability to survive and their quality of life.</p> <p>Changes in environments can be natural or influenced by humans. Some changes are good, some bad, and some are neither good nor bad.</p>	<p>Animals Two by Two Investigation 1, Part 2, Investigation 3, Part 1 Insects ALL, such as Investigation 1, Part 1 Investigation 3, Part 2 Plants and Animals Investigation 3, Parts 1-4 <u>Plants and Animals FOSS Science Resources</u> Pages 21-46 New Plants <u>FOSS Science Stories</u> pp. 22-39 Structures of Life Investigation 2, Part 2 <u>Structures of Life FOSS Science Stories</u> Pages 22-36 Water <u>FOSS Science Stories</u> Pages 5-7 Wood and Paper <u>FOSS Science Stories</u> Pages 19-24 New Plants Investigation 2, Part 2</p>

<p>Pollution is a change in the environment that can influence the health, survival, or activities of organisms, including humans.</p> <p>Some environmental changes occur slowly, and others occur rapidly. Students should understand the different consequences of changing environments in small increments over long periods as compared with changing environments in large increments over short periods.</p>	<p><u>Insects</u> FOSS Science Stories Pages 36-41 <u>Pebbles, Sand, and Silt</u> FOSS Science Stories Pages 16-19 <u>Structures of Life</u> Investigation 2, Part 2 <u>Structures of Life</u> FOSS Science Stories Pages 22-36, 45-48 <u>Water</u> FOSS Science Stories pp. 17-20</p> <p><u>Animals Two by Two</u> ALL, such as Investigation 1, Parts 1-3 (water quality) <u>New Plants</u> Investigation 2, Part 2 <u>Plants and Animals</u> Investigation 3, Parts 1-3 <u>Plants and Animals</u> FOSS Science Resources Pages 21-46 <u>Insects</u> FOSS Science Stories Pages 36-41 <u>Water</u> FOSS Science Stories pp. 22-23 <u>Earth Materials</u> FOSS Science Stories pp.1-7</p>
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CONTENT STANDARD F SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

As a result of activities in grades K-4, all students should develop understanding of science and technology in local challenges

Representative examples of investigations for each of the standard's guidelines are listed

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>People continue inventing new ways of doing things, solving problems, and getting work done. New ideas and inventions often affect other people; sometimes the effects are good and sometimes they are bad. It is helpful to try to determine in advance how ideas and inventions will affect other people.</p> <p>Science and technology have greatly improved food quality and quantity, transportation, health, sanitation, and communication. These benefits of science and technology are not available to all of the people in the world.</p>	<p><u>Magnetism and Electricity</u> FOSS Science Stories Pages 12-36 <u>Ideas and Inventions</u> ALL such as Investigation 4, Parts 1-3 <u>Ideas and Inventions</u> FOSS Science Stories, Pages 1-3, 10-22,28-32,39-40 <u>Structures of Life</u> FOSS Science Stories Pages 10-11 <u>Water</u> FOSS Science Stories Pages 18-19 www.fossweb.com "Careers" section</p> <p><u>New Plants</u> FOSS Science Stories Pages 16-21 <u>Human Body</u> FOSS Science Stories Pages 5-7, 17-20 <u>Structures of Life</u> FOSS Science Stories Pages 6-9, 10-11 <u>Physics of Sound</u> FOSS Science Stories Pages 29-31,32-36 <u>Ideas and Inventions</u> FOSS Science Stories Pages 1-3, 18, 21-22 <u>Magnetism and Electricity</u> FOSS Science Stories Pages 12-23, 28-36</p>

CONTENT STANDARD G

HISTORY AND NATURE OF SCIENCE

As a result of activities in grades K-4, all students should develop understanding of science as a human endeavor

Representative examples of investigations for each of the standard's guidelines are listed

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Science and technology have been practiced by people for a long time.</p>	<p>Ideas and Inventions ALL, such as Investigation 2, Parts 1-3 Investigation 4, Parts 1-3 <u>Ideas and Inventions FOSS Science Stories</u> Pages 1-3,8-22,28-31,38-40 Sun, Moon and Stars <u>FOSS Science Resources</u> Pages 40-48 Earth Materials <u>FOSS Science Stories</u> Pages 24-29 Water <u>FOSS Science Stories</u> Pages 24-26 Magnetism and Electricity <u>FOSS Science Stories</u> Pages 12-27,34-35 www.fossweb.com "Ask a Scientist" (section in each module selection)</p>
<p>Men and women have made a variety of contributions throughout the history of science and technology.</p>	<p>Ideas and Inventions ALL, such as Investigation 2, Parts 1-3 Investigation 4, Parts 1-3 <u>Ideas and Inventions FOSS Science Stories</u> Pages 1-3,8-22,28-31,38-40 Structures of Life <u>FOSS Science Stories</u> Pages 6-9 Earth Materials <u>FOSS Science Stories</u> Pages 24-29 Water <u>FOSS Science Stories</u> Pages 24-26 Sun, Moon and Stars <u>FOSS Science Resources</u> Pages 40-48 Magnetism and Electricity <u>FOSS Science Stories</u> Pages 12-27,34-35 Measurement <u>FOSS Science Stories</u> Pages 8-15, 21, 24-26 www.fossweb.com "Ask a Scientist"</p>
<p>Although men and women using scientific inquiry have learned much about the objects, events, and phenomena in nature, much more remains to be understood. Science will never be finished.</p>	<p>This standard is addressed throughout the FOSS Modules as students use the inquiry process and sometimes find answers, sometimes not. See also Structures of Life <u>FOSS Science Stories</u> Pages 6-9 Sun, Moon and Stars <u>FOSS Science Resources</u> Pages 40-48 www.fossweb.com "Ask a Scientist"</p>
<p>Many people choose science as a career and devote their entire lives to studying it. Many people derive great pleasure from doing science.</p>	<p>Earth Materials Investigation 1 and Science Extension Ideas and Inventions <u>FOSS Science Stories</u> Pages 1-3,8-22,28-31,38-40</p>

Structures of Life FOSS Science Stories

Pages 6-9

Water FOSS Science Stories Pages 24-26

Magnetism and Electricity FOSS Science
Stories Pages 12-27, 34-35

Measurement FOSS Science Stories

Pages 8-15, 21, 24-26

Sun, Moon and Stars FOSS Science

Resources Pages 40-48

www.fossweb.com "careers" and "Ask a
Scientist"

GRADES 5-8 STANDARDS

CONTENT STANDARD A SCIENCE AS INQUIRY

As a result of activities in grades 5-8, all students should develop abilities necessary to do scientific inquiry

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8. Grades 5-6 modules were originally designed for the self-contained classroom, and have consumables for 3 classes of up to 32 students. FOSS Middle School modules were designed for the middle school, with teachers who are content specialists; they contain materials for 5 sections of up to 32 students each.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
Identify questions that can be answered through scientific investigations.	FOSS is an inquiry-based, hands-on science program, so this standard is addressed in ALL FOSS modules. See for example: Variables Investigation 4, Part 4 Mixtures and Solutions Investigation 4, Part 4 Living Systems Investigation 2, Part 1 Force and Motion Investigation 8, Parts 1-2 Chemical Interactions Investigation 1, Parts 1-3 Earth History Investigation 2, Parts 3, 4 Planetary Science Investigation 4, Part 2 Populations and Ecosystems Investigation 5, Parts 1-2
Design and conduct a scientific investigation.	FOSS is an inquiry-based, hands-on science program, so this standard is addressed in ALL FOSS modules. See for example: Variables Investigation 4, Part 4 Mixtures and Solutions Investigation 1, Part 4 Solar Energy Investigation 4, Part 4 Environments Investigation 5, Parts 1-3 Landforms Investigation 3, Parts 1-2 Models and Designs Investigation 4, Parts 1-2 Water Planet Investigation 3, Parts 1-3 Electronics Investigation 4, Part 2 Diversity of Life Investigation 6, Parts 1-2 Earth History Investigation 4, Parts 1-3 Chemical Interactions Investigation 4, Part 1
Use appropriate tools and techniques to gather, analyze, and interpret data.	FOSS is an inquiry-based, hands-on science program, so this standard is addressed in ALL FOSS modules. See for example: Levers and Pulleys Investigation 3, Parts 1-3 Food and Nutrition Investigation 1, Parts 1-2 Solar Energy Investigation 3, Parts 1, 2 Mixtures and Solutions Investigation 2, Parts 1-3 Living Systems Investigation 3, Parts 1-3 Weather and Water Investigation 3, Parts 1-2

<p>Develop descriptions, explanations, predictions, and models using evidence.</p>	<p>Force and Motion Investigation 5, Parts 1-4 Diversity of Life Investigation 3, Parts 1-3 Electronics Investigation 8, Parts 1-4 Planetary Science Investigation 3, Part 2</p> <p>FOSS is an inquiry-based, hands-on science program, so this standard is addressed in ALL FOSS modules. See for example:</p> <p>Models and Designs Investigation 2, Parts 1-3 Landforms Investigation 2, Parts 1, 2 Food and Nutrition Investigation 1, Parts 1, 2 Human Brain and Senses Investigation 2, Part 1 Diversity of Life Investigation 6, Parts 1-3 Planetary Science Investigation 7, Parts 1-5 Force and Motion Investigation 4, Parts 1-3 Weather and Water Investigation 5, Parts 1-3</p>
<p>Think critically and logically to make the relationships between evidence and data.</p>	<p>FOSS is an inquiry-based, hands-on science program, so this standard is addressed in ALL FOSS modules. See for example:</p> <p>Levers and Pulleys Investigation 1, Parts 2, 3 Models and Designs Investigation 1, Parts 1-3 Environments Investigation 2, Parts 2, 3 Electronics Investigation 2, Parts 1-3 Chemical Interactions Investigation 3, Parts 1-3 Earth History Investigation 3, Parts 1-3</p>
<p>Recognize and analyze alternative explanations and predictions.</p>	<p>This standard is addressed throughout ALL FOSS modules as students discuss their results and conclusions during the investigation and at the Word Bank and Content/Inquiry Bank time at the end of the lesson. It also occurs as they reflect on the lab experiences in their science notebooks/lab notebooks/journals.</p> <p>Variables Investigation 3, Parts 2, 4 Models and Designs Investigation 1, Parts 1, 2 Water Planet Investigation 4, Parts 1-4 Human Brain and Senses Investigation 6, Part 2 Populations and Ecosystems Investigation 7 Planetary Science Investigation 5, Parts 1-3</p>
<p>Communicate scientific procedures and explanations.</p>	<p>This standard is addressed throughout ALL FOSS modules as students discuss their results and conclusions during the investigation and at the Word Bank and Content/Inquiry Bank time at the end of the lesson. It also occurs as they reflect on the lab experiences in their science notebooks/lab notebooks/journals. Note that the Grades 5-6 modules</p>

<p>Use mathematics in all aspects of scientific inquiry.</p>	<p>have a “Science Notebooks” folio to assist teachers in this process.</p> <p>Models and Designs Investigation 2, Parts 1-2</p> <p>Landforms Investigation 5, Part 4</p> <p>Food and Nutrition Investigation 4, Part 2</p> <p>Living Systems Investigation 2 Part 1</p> <p>Diversity of Life Investigation 6, Parts 1-2</p> <p>Earth History Investigation 8, Part 4</p> <p>Weather and Water Investigation 8, Parts 1-4</p> <p>Electronics Investigation 6, Part 3</p> <p>This standard is addressed throughout ALL FOSS modules since students use math in nearly every investigation. See for example:</p> <p>Variables Investigation 2, Parts 1-3</p> <p>Levers and Pulleys Investigation 2, Part 1</p> <p>Mixtures and Solutions Investigation 2, Parts 1-3</p> <p>Food and Nutrition Investigation 2, Parts 1-3</p> <p>Human Brain and Senses Investigation 4, Part 2</p> <p>Force and Motion Investigation 1, Parts 1-3</p> <p>Populations and Ecosystems Investigation 5, Parts 1-2</p> <p>Chemical Interactions Investigation 8, Parts 1-3</p>
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CONTENT STANDARD A SCIENCE AS INQUIRY

As a result of activities in grades 5-8, all students should develop understandings about scientific inquiry

Examples of each of the standard’s guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Different kinds of questions suggest different kinds of scientific investigations. Some investigations involve observing and describing objects, organisms, or events; some involve collecting specimens; some involve experiments; some involve seeking more information; some involve discovery of new objects and phenomena; and some involve making models.</p>	<p>Variables Investigation 4, Parts 1-3 <u>Variables FOSS Science Stories</u> Pages 4-5</p> <p>Mixtures and Solutions Investigation 1, Part 4 <u>Mixtures and Solutions FOSS Science Stories</u> Pages 32-33</p> <p>Living Systems Investigation 2, Part 2</p> <p>Planetary Science Investigation 8, Parts 1-2 <u>Planetary Science Resources</u> Pages 71-73</p> <p>Electronics Investigation 4, Part 1</p> <p>Diversity of Life Investigation 6, Parts 1-3</p> <p>Populations and Ecosystems Investigation 7 <u>Populations and Ecosystems Resources</u> Pages 8-13, 30-41</p> <p>www.fossweb.com “Ask a Scientist”</p>

Current scientific knowledge and understanding guide scientific investigations. Different scientific domains employ different methods, core theories, and standards to advance scientific knowledge and understanding.

Mathematics is important in all aspects of scientific inquiry.

Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.

Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models, and theories. The scientific community accepts and uses such explanations until displaced by better scientific ones. When such displacement occurs, science

Solar Energy FOSS Science Stories

Pages 22-32

Variables FOSS Science Stories Pages 4-5

Water Planet Investigation 4, Parts 1-4

Water Planet FOSS Science Resources

Pages 71-92

Chemical Interactions

Investigation 2, Parts 1-2

Chemical Interactions Resources

Pages 69-85

Populations and Ecosystems

Investigation 4, Parts 1-2

Populations and Ecosystems Resources

Pages 8-13, 30-63

Earth History Resources

Pages 60-61, 100-105

Planetary Science Resources Pages 71-73, 80-82

www.fossweb.com "Ask a Scientist"

This standard is addressed throughout ALL FOSS modules since students use math in nearly every investigation. Modules for Grades 5-6 also have Math Extensions for each investigation. See for example:

Environments Investigation 3, Parts 1-3

Math Extensions

Mixtures and Solutions

Investigation 4, Parts 1-2

Math Extensions

Water Planet Investigation 3, Parts 1-2

Planetary Science

Investigation 3, Parts 3-4

Investigation 5, parts 1-4

Planetary Science Resources Pages 52-53

Electronics Investigation 6, Part 3

Chemical Interactions Investigation 6

Levers and Pulleys

Investigation 4, Parts 1, 2

Variables FOSS Science Stories Page 3

Water Planet Investigation 4, Parts 1-4

Water Planet FOSS Science Resources

Pages 71-92

Force and Motion Investigation 5, Parts 1-4

Force and Motion Resources Pages 41-65

Diversity of Life Investigation 2, Parts 1-2

Earth History Resources Page 87

Planetary Science Resources Pages 74-77

Water Planet Investigation 4, Parts 1-4

FOSS Web Site: www.fossweb.com

Models and Designs FOSS Science Stories

Pages 1-16

Food and Nutrition Science Stories

Pages 34-36

Variables FOSS Science Stories

Pages 4-5, 12-14

advances.

Science advances through legitimate skepticism. Asking questions and querying other scientists' explanations is part of scientific inquiry. Scientists evaluate the explanations proposed by other scientists by examining evidence, comparing evidence, identifying faulty reasoning, pointing out statements that go beyond evidence, and suggesting alternative explanations for the same observations.

Scientific investigations sometimes result in new ideas and phenomena for study, generate new methods or procedures for an investigation, or develop new techniques to improve the collection of data. All of these results can lead to new investigations.

Earth History Resources Pages 60-67, 74-87

Chemical Interactions

Investigation 2, Parts 1-2

Chemical Interactions Resources

Pages 3-8, 69-85

Force and Motion Resources Pages 50-52

FOSS Web Site: www.fossweb.com

This standard is addressed throughout ALL FOSS modules as students discuss their results and conclusions during investigations and at the end of the lesson. It is also addressed in the readings and FOSS web site. See for example:

Models and Designs FOSS Science Stories

Pages 6-9

Variables FOSS Science Stories

Pages 1-9, 12-14

Planetary Science Investigation 5, Parts 1-4

Planetary Science Resources pp. 59-66

Human Brain and Senses

Investigation 6, Part 2

Force and Motion Resources Pages 50-52

Chemical Interactions Resources

Pages 3-8, 69-85

FOSS Web Site: www.fossweb.com

Scientific inquiry in the classroom nearly always leads to differences in data that need to be discussed, and ideas for other techniques or experiments, so this standard can be addressed in ALL FOSS modules. See for example:

Food and Nutrition Science Stories

Pages 24-25

Variables Investigation 1, Parts 1-3

Variables FOSS Science Stories Pages 1-9

Models and Designs FOSS Science Stories

Pages 6-9

Populations and Ecosystems

Investigation 4, Parts 1-2

Populations and Ecosystems Resources

Pages 8-13, 30-63

Earth History Resources

Pages 79, 83-84, 87

Human Brain and Senses

Investigation 9, Part 1

www.fossweb.com "Ask a Scientist"

CONTENT STANDARD B

PHYSICAL SCIENCE

As a result of activities in grades 5-8, all students should develop an understanding of properties and changes of properties in matter

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>A substance has characteristic properties, such as density, a boiling point, and solubility, all of which are independent of the amount of the sample. A mixture of substances often can be separated into the original substances using one or more of the characteristic properties.</p>	<p>Mixtures and Solutions Investigation 1, Parts 1-4 Investigation 2, Parts 1-4 <u>Mixtures and Solutions Science Stories</u> Pages 3, 16-17 <u>Variables FOSS Science Stories</u> Pages 10-11 Chemical Interactions throughout, such as Investigation 7, Parts 1-5 Investigation 8, Parts 1-3 <u>Chemical Interactions Resources</u> Pages 42-62 Earth History Resources Pages 89-92 Planetary Science Investigation 8, Parts 1-4</p>
<p>Substances react chemically in characteristic ways with other substances to form new substances (compounds) with different characteristic properties. In chemical reactions, the total mass is conserved. Substances often are placed in categories or groups if they react in similar ways; metals is an example of such a group.</p>	<p>Mixtures and Solutions Investigation 4, Parts 1-3 <u>Mixtures and Solutions Science FOSS Science Stories</u> Pages 21-22, 26-30 Food and Nutrition Investigation 3, Parts 1-3 Chemical Interactions Investigation 1, Parts 1-2 Investigation 3, Part 1 Investigation 8, Parts 1-4 Investigation 9, Parts 1-2 <u>Chemical Interactions Resources</u> Pages 63-79, 96-97 Chemical Interactions CD-ROM/FOSS Web Site</p>
<p>Chemical elements do not breakdown during normal laboratory reactions involving such treatments as heating, exposure to electric current, or reaction with acids. There are more than 100 known elements that combine in a multitude of ways to produce compounds, which account for the living and nonliving substances we encounter.</p>	<p>Mixtures and Solutions FOSS Science Stories Pages 3-6, 26-30 Chemical Interactions throughout, such as Investigation 2, Parts 1-2 Investigation 9, Parts 1-4 <u>Chemical Interactions Resources</u> Pages 3-15, 63-79, 90-95 Chemical Interactions CD-ROM/FOSS Web Site: "Interactive Periodic Table"</p>

CONTENT STANDARD B PHYSICAL SCIENCE

As a result of activities in grades 5-8, all students should develop an understanding of motion and forces

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>The motion of an object can be described by its position, direction of motion, and speed. That motion can be measured and represented on a graph.</p>	<p>Models and Designs Investigation 3, Parts 1-3 Variables Investigation 1, Parts 1-3 Investigation 3, Parts 1-3 Levers and Pulleys Investigation 2, Parts 1-4 Force and Motion ALL, such as Investigation 1, Parts 1-1-3 Investigation 2, Parts 1-3 Investigation 4, Parts 1-3 <u>Force and Motion Resources</u> Pages 3-31 Force and Motion CD-ROM/FOSS Web Site</p>
<p>An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.</p>	<p>Models and Designs Investigation 4, Parts 1-3 Variables Investigation 1, Parts 1-3 Levers and Pulleys Investigation 4, Part 2 Force and Motion throughout, such as Investigation 5, Parts 1-4 Investigation 6, Parts 1-4 Investigation 7, Parts 1-3 <u>Force and Motion Resources</u> Pages 32-69 Force and Motion CD-ROM/FOSS Web Site</p>
<p>If more than one force acts on an object along a straight line, then the forces will reinforce or cancel one another, depending on their direction and magnitude. Unbalanced forces will cause changes in the speed or direction of an object's motion.</p>	<p>Models and Designs Investigation 4, Parts 1, 2 Levers and Pulleys Investigation 1, Parts 1-3 <u>Water Planet Resources</u> Pages 16-17 Force and Motion Investigation 6, Parts 1-4 Investigation 8, Parts 1-2 <u>Force and Motion Resources</u> Pages 32-69 Force and Motion CD-ROM/FOSS Web Site Planetary Science Resources Pages</p>

CONTENT STANDARD B PHYSICAL SCIENCE

As a result of activities in grades 5-8, all students should develop an understanding of transfer of energy

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

<i>GUIDELINE</i>	<i>FOSS INVESTIGATION/ACTIVITY</i>
<p>Energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical. Energy is transferred in many ways.</p>	<p>Solar Energy Investigation 2, Parts 1, 2 Models and Designs Investigation 2, Parts 1-3 Water Planet Investigation 3, Parts 1-3 <u>Water Planet Resources</u> Pages 42-51 Chemical Interactions Investigation 5, Parts 1-3 <u>Chemical Interactions Resources</u> Pages 23-48 Electronics Investigations 1-3 <u>Electronics Resources</u> Pages 1-15 Force and Motion Investigation 6, Parts 1-4 Force and Motion CD-ROM/FOSS Web Site Populations and Ecosystems Investigation 5, Parts 1-3 <u>Populations and Ecosystems Resources</u> Pages 14-16</p>
<p>Heat moves in predictable ways, flowing from warmer objects to cooler ones, until both reach the same temperature.</p>	<p>Solar Energy throughout, such as Investigation 2, Parts 1, 2 <u>Solar Energy FOSS Science Stories</u> Pages 2-24 Water Planet Investigation 3, Parts 1-3 <u>Water Planet Resources</u> Pages 42-51 Weather and Water throughout, such as Investigation 4, Parts 1-2 Investigation 9, Parts 1-4 <u>Weather and Water Resources</u> Pages 22-26, 63-66 Weather and Water CD-Rom/FOSS Web Site Chemical Interactions Investigation 5, Parts 1-3 Investigation 9, Parts 1-2 <u>Chemical Interactions Resources</u> Pages 23-48</p>
<p>Light interacts with matter by transmission (including refraction), absorption, or scattering (including reflection). To see an object, light from that object—emitted by or scattered from it—must enter the eye.</p>	<p>Solar Energy Investigation 2, Parts 1, 2 Investigation 4, Parts 1-3 Human Brain and Senses Investigation 3, Parts 1-3 <u>Human Brain and Senses Resources</u> Pages 31-35 Human Brain and Senses CD-Rom/FOSS Web Site "Optics Bench"</p>

Electrical circuits provide a means of transferring electrical energy when heat, light, sound, and chemical changes are produced.

In most chemical and nuclear reactions, energy is transferred into or out of a system. Heat, light, mechanical motion, or electricity might all be involved in such transfers.

The sun is a major source of energy for changes on the earth's surface. The sun loses energy by emitting light. A tiny fraction of that light reaches the earth, transferring energy from the sun to the earth. The sun's energy arrives as light with a range of wavelengths, consisting of visible light, infrared, and ultraviolet radiation.

Models and Designs

Investigation 2, Parts 1-3

Electronics

Investigations 1-3

[Electronics Resources](#) Pages 1-15

[Electronics CD-ROM/FOSS Web Site](#)

Mixtures and Solutions

Investigation 4, Parts 1-3

[Mixtures and Solutions FOSS Science Stories](#)
Pages 21-22

[Solar Energy FOSS Science Stories](#) Page 4

Chemical Interactions

Investigation 5, Parts 1-3

Investigation 9, Parts 1-2

[Chemical Interactions Resources](#)

Pages 23-48

Solar Energy

Investigation 3, Parts 1, 2

[Solar Energy FOSS Science Stories](#)

Pages 1-5, 16-17, 22-24

Water Planet

Investigation 3, Parts 1-3

Investigation 4, Parts 1-4

[Water Planet Resources](#) Pages 2-6, 15, 20-23, 42-45

Weather and Water

Investigation 3, Parts 1-3

Investigation 4, Parts 1-2

[Weather and Water Resources](#)

Pages 22-26, 63-66

[Weather and Water CD-ROM/FOSS Web Site](#)

CONTENT STANDARD C LIFE SCIENCE

As a result of activities in grades 5-8, all students should develop understanding of structure and function in living systems

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Living systems at all levels of organization demonstrate the complimentary nature of structure and function. Important levels of organization for structure and function include cells, organs, tissues, organ systems, whole organisms, and ecosystems.</p>	<p>Environments Investigation 2, Part 3 <u>Environments FOSS Science Stories</u> Pages 21-22, 38-52</p> <p>Food and Nutrition <u>FOSS Science Stories</u> Pages 6-9, 41-50</p> <p>Living Systems Investigation 1, Parts 1-3 <u>Living Systems FOSS Science Resources</u> Pages 2-13, 16-20</p> <p>Human Brain and Senses Investigation 4, Part 2</p> <p>Diversity of Life Investigation 4, Parts 1-2 <u>Diversity of Life Resources</u> Pages 8-9, 24-39 Diversity of Life CD-ROM/Web site: "Ribbon of Life"</p> <p>Populations and Ecosystems Investigation 2, Parts 1-2</p>
<p>All organisms are composed of cells—the fundamental unit of life. Most organisms are single cells; other organisms, including humans, are multicellular.</p>	<p>Living Systems Investigation 1, Parts 1-3 <u>Living Systems FOSS Science Resources</u> Pages 2-13, 16-20</p> <p>Food and Nutrition Investigation 2, Part 1 Food and Nutrition <u>FOSS Science Stories</u> Pages 41-43</p> <p>Diversity of Life Investigation 3, Parts 1-3 Investigation 4, Parts 1-2 <u>Diversity of Life Resources</u> Pages 8-9, 24-39 Diversity of Life CD-ROM/Web site: "Ribbon of Life"</p> <p>Human Brain and Senses Resources Pages 60-62</p>
<p>Cells carry on the many functions needed to sustain life. They grow and divide, thereby producing more cells, This requires that they take in nutrients, which they use to provide energy for the work that cells do and to make the materials that a cell or an organism needs.</p>	<p>Food and Nutrition Investigation 2, Part 1 Food and Nutrition <u>FOSS Science Stories</u> Pages 41-43</p> <p>Living Systems Investigation 1, Parts 1-3 Investigation 3, Parts 1-2 <u>Living Systems FOSS Science Resources</u> Pages 7-14, 31-35</p> <p>Diversity of Life Investigation 4, Parts 1-2</p> <p>Populations and Ecosystems</p>

<p>Specialized cells perform specialized functions in multicellular organisms. Groups of specialized cells cooperate to form a tissue, such as muscle. Different tissues are in-turn grouped together to form larger functional units, called organs. Each type of cell, tissue, and organ has a distinct structure, and set of functions that serve the organism as a whole.</p> <p>The human organism has systems for digestion, respiration, reproduction, circulation, excrement, movement, control, and coordination, and for protection from disease. These systems interact with one another.</p> <p>Disease is a breakdown in structures or functions of an organism. Some diseases are the result of intrinsic failures of the system. Others are the result of damage by infection by other organisms.</p>	<p>Investigation 5, Parts 1-3</p> <p>Living Systems Investigation 1, Parts 1-3 <u>Living Systems FOSS Science Resources</u> Pages 2-13,16-20</p> <p>Food and Nutrition FOSS Science Stories Pages 1, 6-9, 20, 23-24, 41-50</p> <p>Human Brain and Senses Investigation 4, Part 2 <u>Human Brain and Senses Resources</u> Pages 29-33, 40-46, 57-73 Human Brain and Senses CD-ROM/ Web Site: Cow Eye Dissection</p> <p>Diversity of Life Investigation 4, Parts 1-2 Diversity of Life CD-ROM/ Web Site: Ribbon of Life</p> <p>Food and Nutrition FOSS Science Stories Pages 6-9, 16-19, 24-25, 44-50</p> <p>Living Systems Investigation 1, Parts 1-3 <u>Living Systems FOSS Science Resources</u> Pages 2-13,16-20</p> <p>Diversity of Life Investigation 4, Parts 1-2 Diversity of Life CD-ROM/ Web Site: Ribbon of Life</p> <p>Human Brain and Senses Investigations 1-9</p> <p>Food and Nutrition Investigation 3 Interdisciplinary Extension <u>Food and Nutrition FOSS Science Stories</u> Pages 2, 26, 34-36 <u>Living Systems FOSS Science Resources</u> Pages 34-36</p> <p>Diversity of Life Investigation 10, Parts 1-3 <u>Diversity of Life Resources</u> Pages 59, 65-70</p>
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CONTENT STANDARD C LIFE SCIENCE

As a result of activities in grades 5-8, all students should develop understanding of reproduction and heredity

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Reproduction is a characteristic of all living systems; because no individual organism lives forever, reproduction is essential to the continuation of every species. Some organisms reproduce asexually. Other organisms reproduce sexually.</p>	<p>Environments Investigation 5, Parts 1-3 <u>Environments FOSS Science Stories</u> Pages 46-48</p> <p>Diversity of Life Investigation 7, Parts 1-2</p>

In many species, including humans, females produce eggs and males produce sperm, Plants also reproduce sexually—the egg and sperm are produced in the flowers of flowering plants. An egg and sperm unite to begin development of a new individual. That new individual receives genetic information from its mother (via the egg) and its father (via the sperm). Sexually produced offspring never are identical to either of their parents.

Every organism requires a set of instructions for specifying its traits. Heredity is the passage of these instructions from one generation to another.

Hereditary information is contained in the genes, located in the chromosomes of each cell. Each gene carries a single unit of information. An inherited trait of an individual can be determined by one or by many genes, and a single gene can influence more than one trait. A human cell contains many thousands of different genes.

The characteristics of an organism can be described in terms of a combination of traits. Some traits are inherited and others result from interactions with the environment.

Investigation 8, Part 1
Investigation 10, Part 2
Diversity of Life Resources Pages 40-70
Populations and Ecosystems
Investigation 9, Parts 2-4
Populations and Ecosystems Resources
Pages 46-61

Environments
Investigation 5, Parts 1-3
Environments FOSS Science Stories Page 53
Diversity of Life
Investigation 7
Diversity of Life Resources Pages 40-64
Populations and Ecosystems
Investigations 9-10
Populations and Ecosystems Resources
Pages 46-61
Populations and Ecosystems CD-ROM/FOSS
Web Site: [electronic Punnett squares](#)

Populations and Ecosystems
Investigations 9-10
Populations and Ecosystems Resources
Pages 46-61
Populations and Ecosystems CD-ROM/FOSS
Web Site: [electronic Punnett squares](#)

Populations and Ecosystems
Investigation 9
Populations and Ecosystems Resources
Pages 46-61
Populations and Ecosystems CD-ROM/FOSS
Web Site

Environments Investigations 3 and 6
Environments FOSS Science Stories
Pages 46-52
Populations and Ecosystems
Investigations 9-10
Populations and Ecosystems Resources
Pages 46-61
Populations and Ecosystems CD-ROM/FOSS
Web Site: [electronic Punnett squares](#)

CONTENT STANDARD C LIFE SCIENCE

As a result of activities in grades 5-8, all students should develop understanding of regulation and behavior

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.</p>	<p>Environments throughout, such as Investigations 1-2 <u>Environments FOSS Science Stories</u> Pages 1-17, 23-35, 49-52</p> <p>Diversity of Life throughout, such as Investigation 1, Parts 1-2 <u>Diversity of Life Resources</u> Pages 21-26 <u>Populations and Ecosystems Resources</u> Pages 22-29</p>
<p>Regulation of an organism's internal environment involves sensing the internal environment and changing physiological activities to keep within the range required to survive.</p>	<p>Food and Nutrition FOSS Science Stories Pages 16-18</p> <p>Environments FOSS Science Stories Pages 11, 49-52</p>
<p>Behavior is one kind of response an organism can make to an internal or environmental stimulus. A behavioral response requires coordination and communication at many levels, including cells, organs systems, and whole organisms. Behavioral response is a set of actions determined in part by heredity and in part from experience.</p>	<p>Environments FOSS Science Stories Pages 2-6, 10-17, 32-33, 49-52</p> <p>Diversity of Life Investigation 8 Diversity of Life CD-ROM/FOSS Web Site: Ribbon of Life</p> <p>Human Brain and Senses Investigation 8, Parts 1-2 <u>Human Brain and Senses Resources</u> Pages 60-62</p>
<p>An organism's behavior evolves through adaptation to its environment. How a species moves, obtains food, reproduces, and responds to danger is based in the species evolutionary behavior.</p>	<p>Variables FOSS Science Stories Pages 5-6</p> <p>Environments FOSS Science Stories Pages 10-17, 49-55</p> <p>Populations and Ecosystems Investigation 8, Parts 1-2 Investigation 10</p> <p>Populations and Ecosystems Resources Pages 42-45 Populations and Ecosystems CD-ROM/FOSS Web Site</p> <p>Diversity of Life Resources Pages 22-23</p>

CONTENT STANDARD C

LIFE SCIENCE

As a result of activities in grades 5-8, all students should develop understanding of populations and ecosystems

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>A population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.</p>	<p><u>Environments</u> FOSS Science Stories Pages 38-45 Populations and Ecosystems Investigation 2, Parts 1-2 <u>Populations and Ecosystems Resources</u> Pages 6-13, 25-41</p>
<p>Populations of organisms can be categorized by the function they serve in an ecosystem. Plants and some micro-organisms are producers—they make their own food. All animals, including humans, are consumers, which obtain food by eating other organisms. Decomposers, primarily bacteria and fungi, are consumers that use waste materials and dead organisms for food. Food webs identify relationships among producers, consumers, and decomposers in an ecosystem.</p>	<p><u>Environments</u> FOSS Science Stories Pages 38-41, 45 Populations and Ecosystems Investigations 4-5 Investigation 7 Ecoscenarios <u>Populations and Ecosystems Resources</u> Pages 14-21 Populations and Ecosystems CD-ROM/ FOSS Web Site</p>
<p>For ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism to organism in food webs.</p>	<p><u>Solar Energy</u> FOSS Science Stories Pages 1-2 <u>Environments</u> FOSS Science Stories Pages 27-28, 38-41 Populations and Ecosystems Investigations 4-5 <u>Populations and Ecosystems Resources</u> Pages 17-21 Populations and Ecosystems CD-ROM/ FOSS Web Site</p>
<p>The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition. Given adequate biotic and abiotic resources and no disease or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.</p>	<p>Environments Investigation 3, Parts 1-3 Investigation 6, Parts 1,2 <u>Environments</u> FOSS Science Stories Pages 38-55 FOSS Web Activity: Virtual Aquarium Populations and Ecosystems Investigation 1, Parts 2-3 Investigation 6, Parts 1-3 <u>Populations and Ecosystems Resources</u> Pages 8-13, 22-24 Populations and Ecosystems CD-ROM/ FOSS Web Site</p>

CONTENT STANDARD C

LIFE SCIENCE

As a result of activities in grades 5-8, all students should develop understanding of diversity and adaptations of organisms

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Millions of species of animals, plants, and microorganisms are alive today. Although different species might look dissimilar, the unity among organisms becomes apparent from an analysis of internal structures, the similarity of their chemical processes, and the evidence of common ancestry.</p>	<p>Environments Investigations 1-6 <u>Environments FOSS Science Stories</u> Pages 1-22, 27-35, 38-55 Living Systems Investigation 2 <u>Living Systems FOSS Science Resources</u> Pages 16-23, 31-35 Diversity of Life Investigations 3, 10 <u>Diversity of Life Resources</u> Pages 17, 27-30, 55-70 Populations and Ecosystems Investigation 5 <u>Populations and Ecosystems Resources</u> Pages 46-55</p>
<p>Biological evolution accounts for the diversity of species developed through gradual processes over many generations. Species acquire many of their unique characteristics through biological adaptation, which involves the selection of naturally occurring variations in populations. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.</p>	<p>Populations and Ecosystems Investigations 8, 10 <u>Populations and Ecosystems Resources</u> Pages 42-63 Populations and Ecosystems CD-ROM/FOSS Web Site: walkingsticks <u>Diversity of Life Resources</u> Pages 59, 65-70 Earth History Resources Pages 83-86</p>
<p>Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival. Fossils indicate that many organisms that lived long ago are extinct. Extinction of species is common; most of the species that have lived on the earth no longer exist.</p>	<p>Models and Designs FOSS Science Stories Pages 13-16 Earth History Investigation 7, Parts 1, 2 <u>Earth History Resources</u> Pages 38-41, 83-86 Earth History CD-ROM/FOSS Web Site Populations and Ecosystems Investigation 10, Parts 1-3 <u>Populations and Ecosystems Resources</u> Pages 58-63</p>

CONTENT STANDARD D EARTH SCIENCE

As a result of activities in grades 5-8, all students should develop an understanding of structure of the earth system

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>The solid earth is layered with a lithosphere; hot convecting mantle; and dense, metallic core.</p>	<p>Landforms FOSS Science Stories Pages 22-24 Earth History Resources Pages 100-103</p>
<p>Lithospheric plates on the scales of continents and oceans constantly move at rates of centimeters per year in response to movements in the mantle. Major geological events, such as earthquakes, volcanic eruptions, and mountain building, result from these plate movements.</p>	<p>Landforms FOSS Science Stories Pages 22-24 Earth History Resources Pages 100-103</p>
<p>Landforms are the result of a combination of constructive and destructive forces. Constructive forces include crustal deformation, volcanic eruption, and deposition of sediment, while destructive forces include weathering and erosion.</p>	<p>Landforms ALL, such as Investigation 3, Parts 1-3 Landforms FOSS Science Stories Pages 15-29, 37-44 FOSS Web Site: www.fossweb.com Earth History throughout, such as Investigation 3, Parts 3, 4 Investigation 4, Parts 3, 4 Earth History Resources Pages 3-28, 36, 73-75 Earth History CD-ROM/FOSS Web Site</p>
<p>Some changes in the solid earth can be described as the "rock cycle." Old rocks at the earth's surface weather, forming sediments that are buried, then compacted, heated, and often recrystallized into new rock. Eventually, those new rocks may be brought to the surface by the forces that drive plate motions, and the rock cycle continues.</p>	<p>Earth History Investigation 4, Parts 5, 6 Investigation 8, Parts 1, 2 Earth History Resources Pages 42-46, 93-97 Earth History CD-ROM/FOSS Web Site</p>
<p>Soil consists of weathered rocks and decomposed organic material from dead plants, animals, and bacteria. Soils are often found in layers, with each having a different chemical composition and texture.</p>	<p>Earth History Investigation 4, Parts 1, 2</p>
<p>Water, which covers the majority of the earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the "water cycle." Water evaporates from the earth's surface, rises and cools as it moves to higher elevations, condenses as rain or snow, and falls to the surface where it collects in lakes, ocean, soil, and in rocks underground.</p>	<p>Water Planet Investigation 2, Parts 1-4 Water Planet FOSS Science Resources Pages 26-30, 33-40, 63-70 Solar Energy FOSS Science Stories Pages 2, 19 Weather and Water throughout, such as Investigation 5, Parts 1-3 Investigations 6-7</p>

<p>Water is a solvent. As it passes through the water cycle it dissolves minerals and gases and carries them to the oceans.</p> <p>The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor. The atmosphere has different properties at different elevations.</p> <p>Clouds, formed by the condensation of water vapor, affect weather and climate.</p> <p>Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate, because water in the oceans holds a large amount of heat.</p> <p>Living organisms have played many roles in the earth system, including affecting the composition of the atmosphere, producing some types of rocks, and contributing to the weathering of rocks.</p>	<p><u>Weather and Water Resources</u> Pages 45-47 Weather and Water CD-ROM/FOSS Web Site</p> <p>Mixtures and Solutions Investigation 2 <u>Mixtures and Solutions FOSS Science Stories</u> Pages 2, 18-22 Weather and Water Investigation 5, Part 1 Investigations 6-7 Chemical Interactions Investigation 8</p> <p><u>Water Planet</u> FOSS Science Resources Pages 52-57 Mixtures and Solutions Science Stories Pages 2, 18-20 Weather and Water Investigation 2 <u>Weather and Water Resources</u> Pages 6-11 Weather and Water CD-ROM/FOSS Web Site</p> <p>Solar Energy FOSS Science Stories Pages 22-25 <u>Water Planet</u> FOSS Science Resources Pages 33-39 Weather and Water Investigation 6 <u>Weather and Water Resources</u> Pages 34-44, 57-62 Weather and Water CD-ROM/FOSS Web Site</p> <p>Solar Energy FOSS Science Stories Pages 2, 22-25 <u>Water Planet</u> FOSS Science Resources Pages 71-79 Weather and Water throughout, such as Investigation 7, Parts 1-2 Investigation 9, Parts 1-4 <u>Weather and Water Resources</u> Pages 45-47, 53-55, 63-76 Weather and Water CD-ROM/FOSS Web Site</p> <p>Environments FOSS Science Stories Page 37 <u>Solar Energy</u> FOSS Science Stories Page 2 <u>Earth History</u> Resources Pages 70-71 Weather and Water Investigation 9, Part 4 <u>Weather and Water Resources</u> Pages 63-66</p>
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CONTENT STANDARD D EARTH SCIENCE

As a result of activities in grades 5-8, all students should develop an understanding of earth history

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>The earth processes we see today, including erosion, movement of lithospheric plates, and changes in atmospheric composition, are similar to those that occurred in the past. Earth History is also influenced by occasional catastrophes, such as the impact of an asteroid or comet.</p> <p>Fossils provide important evidence of how life and environmental conditions have changed.</p>	<p>Landforms Investigations 2, 3 <u>Landforms FOSS Science Stories</u> Pages 22-29</p> <p>Earth History Investigation 5, Parts 3, 4 <u>Earth History Resources</u> Pages 73-79, 85-88 CD-ROM/FOSS Web Site: History of the Colorado Plateau</p> <p>Weather and Water Investigation 9 <u>Weather and Water Resources</u> Pages 63-66</p> <p>Planetary Science Investigation 5, Parts 1-4 <u>Planetary Science Resources</u> Pages 67-68, 71-73 Planetary Science CD-ROM/FOSS Web Site</p> <p>Models and Designs FOSS Science Stories Pages 13-16</p> <p>Earth History Investigation 7, Parts 1, 2 <u>Earth History Resources</u> Pages 38-41, 83-86 Earth History CD-ROM/FOSS Web Site</p>

CONTENT STANDARD D EARTH SCIENCE

As a result of activities in grades 5-8, all students should develop an understanding of earth in the solar system

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>The earth is the third planet from the sun in a system that includes the moon, the sun, eight other planets and their moons, and smaller objects, such as asteroids and comets. The sun, an average star, is the central and largest body in the solar system.</p>	<p>Water Planet Investigation 1, Parts 1-2 <u>Water Planet FOSS Science Resources</u> Pages 1-23</p> <p>Models and Designs FOSS Science Stories Pages 5-9</p> <p>Solar Energy FOSS Science Stories Pages 3-4 FOSS Web Picture: Solar System</p> <p>Planetary Science throughout: Investigations 2-10 <u>Planetary Science Resources</u> Pages 80-89 Planetary Science CD-ROM/FOSS Web Site</p>

Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.

Gravity is the force that keeps planets in orbit around the sun and governs the rest of the motion in the solar system. Gravity alone holds us to the earth's surface and explains the phenomena of the tides.

The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day.

Models and Designs FOSS Science Stories
Page 9

Solar Energy

Investigation 1, Parts 1, 2

Solar Energy FOSS Science Stories

Pages 3-4

FOSS Web Activity: Lunar Calendar

Planetary Science throughout, such as:

Investigation 3, Parts 1, 2

Investigation 9, Parts 1-4

Planetary Science CD-ROM/FOSS Web Site:

Phases of the Moon

Weather and Water Investigation 3

Weather and Water Resources Pages 17-19

Water Planet FOSS Science Resources

Pages 16-23

Models and Designs FOSS Science Stories

Pages 5-9

Planetary Science Resources Pages 69-70,

84, 97-100

Environments

Investigation 1, Part 2

Environments FOSS Science Stories

Pages 33, 38-41

Solar Energy Investigation 2

Solar Energy FOSS Science Stories

Pages 1-2, 18-20

FOSS Web Movie: How Weather Occurs

Water Planet FOSS Science Resources

Pages 42-45

Weather and Water Investigation 3

Weather and Water Resources Pages 17-19

Weather and Water CD-ROM/FOSS Web Site

CONTENT STANDARD E SCIENCE AND TECHNOLOGY

As a result of activities in grades 5-8, all students should develop abilities of technological design

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
Identify appropriate problems for technological design.	Models and Designs throughout, such as Investigation 4, Part 2 <u>Models and Designs FOSS Science Stories</u> Pages 1-4, 17-40
Design a solution or product.	Solar Energy Investigation 4, Parts 1-4 <u>Solar Energy FOSS Science Stories</u> Pages 29-39
Implement a proposed design.	Force and Motion Investigation 8, Part 2 <u>Force and Motion Resources</u> Pages 41-61
Evaluate completed technological designs or products.	Chemical Interactions Investigation 4, Part 1
Communicate the process of technological design.	Planetary Science Investigation 7, Parts 1-5 <u>Planetary Science Resources</u> Pages 74-79, 90-95 Electronics Investigation 4, Parts 1-2 <u>Electronics Resources</u> Pages 1-2, 18-21, 23-25, 34-36

CONTENT STANDARD E SCIENCE AND TECHNOLOGY

As a result of activities in grades 5-8, all students should develop understandings about science and technology

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
Scientific inquiry and technological design have similarities and differences. Scientists propose explanations for questions about the natural world, and engineers propose solutions relating to human problems, needs, and aspirations. Technological solutions are temporary; technologies exist within nature and so they cannot contravene physical or biological principles; technological solutions have side effects; and technologies cost, carry risks, and provide benefits.	Variables throughout, such as Investigation 3 <u>Variables FOSS Science Stories</u> Pages 1-9, 18-20 Models and Designs throughout, such as Investigation 2, Parts 1-3 <u>Models and Designs FOSS Science Stories</u> Pages 1-4, 17-40 Landforms FOSS Science Stories Pages 6-8, 35-36 Levers and Pulleys FOSS Science Stories Pages 23-25 Solar Energy

Many different people in different cultures have made and continue to make contributions to science and technology.

Science and technology are reciprocal. Science helps drive technology, as it addresses questions that demand more sophisticated instruments and provides principles for better instrumentation and technique. Technology is essential to science, because it provides instruments and techniques that enable observations of objects and phenomena that are otherwise unobservable due to factors such as quantity, distance, location, size, and speed. Technology also provides tools for investigations, inquiry, and analysis.

Perfectly designed solutions do not exist. All technological solutions have tradeoffs, such as safety, cost, efficiency, and appearance. Engineers often build in back-up systems to provide safety. Risk is part of living in a highly technological world. Reducing risk often results in new technology.

Technological designs have constraints. Some constraints are unavoidable, for example, properties of materials, or effects of weather and

Investigation 4, Parts 1-4
Solar Energy FOSS Science Stories
Pages 29-39
Electronics Investigation 4, Parts 1-2
Electronics Resources
Pages 1-2,18-21,23-25,34-36
Force and Motion
Investigation 8, Part 2
Force and Motion Resources Pages 41-61
Planetary Science
Investigation 7, Parts 1-5
Planetary Science Resources
Pages 74-79, 90-95

This standard is addressed throughout all FOSS modules. Careful attention is paid in the readings and on the FOSS web site to include stories and images of scientists of ALL backgrounds, and to feature their contributions to science and technology. See for example:

Mixtures and Solutions FOSS Science Stories Pages 24, 29-36
Variables FOSS Science Stories Pages 18-20
Environments Investigation 5
Environments FOSS Science Stories
Pages 1-8
Chemical Interactions Investigation 2
Chemical Interactions Resources
Pages 4-8, 60, 69-72, 78-85
Force and Motion Resources Pages 41-61
FOSS Web Site www.fossweb.com for ALL modules, including "Ask a Scientist"

Variables throughout, such as Investigation 4
Variables FOSS Science Stories
Pages 1-9, 18-20
Models and Designs *throughout*, such as Investigation 2, Parts 1-3
Models and Designs FOSS Science Stories
Pages 1-4, 9, 17-40
Landforms FOSS Science Stories
Pages 6-8, 35-36
Levers and Pulleys FOSS Science Stories
Pages 23-25
Solar Energy
Investigation 4, Parts 1-4
Solar Energy FOSS Science Stories
Pages 29-39
Electronics Investigation 4, Parts 1-2
Electronics Resources
Pages 1-2,18-21,23-25,34-36
Force and Motion
Investigation 8, Part 2
Force and Motion Resources Pages 41-61
Weather and Water Investigation 1
Weather and Water Resources
Pages 5, 20-21, 43-44, 63-66

<p>friction; other constraints limit choices in the design, for example, environmental protection, human safety, and aesthetics.</p> <p>Technological solutions have intended benefits and unintended consequences. Some consequences can be predicted, others cannot.</p>	<p>Planetary Science Investigation 7, Parts 1-5 <u>Planetary Science Resources</u> Pages 74-79, 90-95</p> <p>Earth History Resources Pages 64-65 <u>Chemical Interactions Resources</u> Pages 60, 69-72, 78-85</p> <p>Populations and Ecosystems Investigation 7 FOSS Web Site: www.fossweb.com for ALL FOSS modules</p>
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CONTENT STANDARD F SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

As a result of activities in grades 5-8, all students should develop an understanding of personal health

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Regular exercise is important to the maintenance and improvement of health.</p> <p>The potential for accidents and the existence of hazards imposes the need for injury prevention.</p> <p>The use of tobacco increases the risk of illness.</p> <p>Alcohol and other drugs are often abused substances. Such drugs change how the body functions and can lead to addiction.</p> <p>Food provides energy and nutrients for growth and development.</p> <p>Sex drive is a natural human function that requires understanding.</p> <p>Natural environments may contain substances (for example, radon and lead) that are harmful to human beings. Maintaining environmental health involves establishing or monitoring quality standards of soil, water, and air use.</p>	<p><i>Safety and injury prevention are top priority in FOSS. Each module includes a safety section in the Overview, and possible safety issues are marked with a "goggles" icon in the margin with notes to the teacher on how to ensure a safe environment. Readings, investigations, and web links have health and safety guidelines for students. See for example:</i></p> <p>Mixtures and Solutions throughout, such as Overview and Investigation 4, Parts 1-4 <u>Mixtures and Solutions FOSS Science Stories</u> Pages 13-15,21</p> <p>Force and Motion Overview and Investigation 8 (crashes, helmets and restraints) <u>Force and Motion Resources</u> Pages 70-74</p> <p>Human Brain and Senses Investigation 4, Part 3 Blind Spot <u>Human Brain and Senses Resources</u> Pages 38, 66-79</p> <p><i>Note that FOSS is a science program, not a health program. However, connections to the guidelines regarding food, nutrition and exercise are found in the following investigations and readings:</i></p> <p>Living Systems Investigations 1 and 3 <u>Living Systems FOSS Science Resources</u> Pages 37-46</p> <p>Food and Nutrition ALL Investigations 1-4 <u>Food and Nutrition FOSS Science Stories</u> Pages 12-40</p> <p>Populations and Ecosystems</p>

	Investigation 5 “Energy” (food/nutrition) Investigation 7, “Ecoscenarios” (environmental health) FOSS Web Site: www.fossweb.com
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CONTENT STANDARD F SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

As a result of activities in grades 5-8, all students should develop an understanding of populations, resources and environments

Examples of each of the standard’s guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

<i>GUIDELINE</i>	<i>FOSS INVESTIGATION/ACTIVITY</i>
<p>When an area becomes overpopulated, the environment will become degraded due to the increased use of resources.</p> <p>Causes of environmental degradation and resource depletion vary from region to region and from country to country.</p>	<p>Environments Investigation 5, Parts 1-3 Investigation 6, Parts 1-2 <u>Environments FOSS Science Stories</u> Pages 1-17, 30-37, 43-46</p> <p>Populations and Ecosystems Investigation 4 Mono Lake Investigation 7 “Ecoscenarios” Investigation 8 <u>Populations and Ecosystems Resources</u> Pages 8-13, 31-41 Populations and Ecosystems CD-ROM/FOSS Web Site</p>

CONTENT STANDARD F SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

As a result of activities in grades 5-8, all students should develop an understanding of natural hazards

Examples of each of the standard’s guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

<i>GUIDELINE</i>	<i>FOSS INVESTIGATION/ACTIVITY</i>
<p>Internal and external processes of the earth system cause natural hazards, events that change or destroy human and wildlife habitats, damage property, and harm or kill humans. Natural hazards include earthquakes, landslides, wildfires, volcanic eruptions, floods, storms, and even possible impacts of asteroids.</p> <p>Human activities also can induce hazards through resource acquisition, urban growth, land-use decisions, and waste disposal. Such activities can accelerate many natural changes.</p>	<p>Landforms Investigation 3, Parts 1-2 <u>Landforms FOSS Science Stories</u> Pages 22-25</p> <p>Solar Energy <u>FOSS Science Stories</u> Pages 14-15, 23-28</p> <p>Planetary Science Investigation 5 Video: “Asteroids: Deadly Impact”</p> <p>Weather and Water throughout, such as Investigation 1, Parts 1-2 Investigation 9, Part 4 <u>Weather and Water Resources</u> Pages 3-4, 6-7, 45-47, 56, 63-66, 67-76 Weather and Water CD-ROM/FOSS Web Site</p> <p>Electronics Resources Pages 12-14, 18-21</p>

Natural hazards can present personal and societal challenges because misidentifying the change or incorrectly estimating the rate and scale of change may result in either too little attention and significant human costs or too much cost for unneeded preventive measures.

Populations and Ecosystems
Investigation 7 “Ecoscenarios”
Populations and Ecosystems Resources
Pages 8-13, 31-41
Populations and Ecosystems CD-ROM/FOSS
Web Site

CONTENT STANDARD F SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

As a result of activities in grades 5-8, all students should develop an understanding of risks and benefits

Examples of each of the standard’s guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Risk analysis considers the type of hazard and estimates the number of people that might be exposed and the number likely to suffer consequences. The results are used to determine the options for reducing or eliminating the risks.</p> <p>Students should understand the risks associated with natural hazards (fires, floods, tornadoes, etc), with chemical hazards (pollutants in air, water, soil, and food), with biological hazards (pollen, viruses, bacteria, and parasites), social hazards, and with personal hazards.</p> <p>Individuals can use a systematic approach to thinking critically about risks and benefits.</p> <p>Important personal and social decisions are made based on perceptions of benefits and risks.</p>	<p><i>Students explore risks to individuals, society and the planet throughout their studies in the FOSS program, especially in the readings. See for example:</i></p> <p>Landforms Investigation 3, Parts 1-2 <u>Landforms FOSS Science Stories</u> Pages 22-25</p> <p>Solar Energy throughout, such as Investigation 1, Parts 1-2 <u>Solar Energy FOSS Science Stories</u> Pages 14-15, 23-28</p> <p>Weather and Water throughout, such as Investigation 1, Parts 1-2 Investigation 9, Part 4 <u>Weather and Water Resources</u> Pages 3-4, 6-7, 45-47, 56, 63-66, 67-76 Weather and Water CD-ROM/FOSS Web Site</p> <p>Diversity of Life Investigation 10, Parts 1-3 <u>Diversity of Life Resources</u> Pages 40-44,65-70</p> <p>Electronics Investigation 1, Parts 1-2 <u>Electronics Resources</u> Pages 12-14,18-21 Electronics CD-ROM/FOSS Web Site</p> <p>Planetary Science Investigation 5</p> <p>Populations and Ecosystems Investigation 7 “Ecoscenarios” <u>Populations and Ecosystems Resources</u> Pages 8-13, 31-41 Populations and Ecosystems CD-ROM/FOSS Web Site</p> <p>Earth History Resources Pages 100-103</p>

CONTENT STANDARD F

SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

As a result of activities in grades 5-8, all students should develop an understanding of science and technology in society

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Science influences society through its knowledge and world view.</p> <p>Societal challenges often inspire questions for scientific research, and social priorities often influence research priorities through the availability of funding for research.</p> <p>Technology influences society through its products and processes. Technology influences the quality of life and the ways people act and interact. Technological changes are often accompanied by social, political, and economic changes that can be beneficial or detrimental to individuals and to society, etc.</p> <p>Science and technology have advanced through contributions of many different people, in different cultures, at different times in history.</p>	<p><i>This standard is addressed throughout all FOSS modules. Students explore the nature of scientific knowledge and how scientific research influences society, especially in readings and on the FOSS web site. See for example:</i></p> <p><u>Solar Energy</u> FOSS Science Stories Pages 29-39</p> <p><u>Models and Designs</u> FOSS Science Stories Pages 3-16</p> <p><u>Mixtures and Solutions</u> FOSS Science Stories Pages 24, 29-36</p> <p><u>Food and Nutrition</u> FOSS Science Stories Pages 9, 21, 24-26</p> <p>Electronics throughout, such as Investigation 4, parts 1-2 <u>Electronics Resources</u> Pages 1-2, 12-21, 23-25, 34-36</p> <p>Chemical Interactions Investigation 2 <u>Chemical Interactions Resources</u> Pages 4-8, 60, 69-72, 78-85</p> <p>Planetary Science Investigations 2, 5, 7 <u>Planetary Science Resources</u> Pages 52-53, 59-62, 67, 71-73, 101-103</p> <p><u>Earth History Resources</u> Pages 64-67, 74-75, 83-87, 98-99</p> <p>FOSS Web Site www.fossweb.com for ALL modules, including "Ask a Scientist"</p>

CONTENT STANDARD G HISTORY AND NATURE OF SCIENCE

As a result of activities in grades 5-8, all students should develop understanding of science as a human endeavor

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Women and men of various social and ethnic backgrounds—and with diverse interests, talents, qualities, and motivations—engage in the activities of science, engineering, and related fields such as the health professions. Some scientists work in teams, and some work alone, but all communicate extensively with others.</p> <p>Science requires different abilities, depending on such factors as the field of study and type of inquiry. Science is very much a human endeavor, and the work of science relies on basic human qualities, such as reasoning, insight, energy, skill, and creativity—as well as on scientific habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas.</p>	<p><i>This standard is addressed throughout all FOSS modules. Students work in collaborative teams on ALL FOSS investigations (with a possible exception of end-of-module projects, if teachers choose to let students work independently on those.) Careful attention is paid in readings and on the FOSS web site to show science as a human endeavor, to include stories and images of male and female scientists of ALL backgrounds, and to feature their contributions to science and technology. See for example:</i></p> <p><u>Mixtures and Solutions</u> FOSS Science Stories Pages 24, 29-36</p> <p><u>Variables</u> FOSS Science Stories Pages 1-6, 18-20</p> <p><u>Food and Nutrition</u> FOSS Science Stories Pages 9, 21, 24-26</p> <p><u>Solar Energy</u> FOSS Science Stories Pages 29-39</p> <p><u>Chemical Interactions</u> Investigations 2, 4 <u>Chemical Interactions Resources</u> Pages 4-8, 60, 69-72, 78-85</p> <p><u>Force and Motion</u> Resources Pages 41-61</p> <p><u>Planetary Science</u> Investigations 2, 5, 7 <u>Planetary Science Resources</u> Pages 52-53, 59-62, 67, 71-73, 101-103</p> <p><u>Earth History</u> Resources Pages 64-67, 75, 87, 98-99</p> <p>FOSS Web Site www.fossweb.com for ALL modules, including “Ask a Scientist”</p>

CONTENT STANDARD G HISTORY AND NATURE OF SCIENCE

As a result of activities in grades 5-8, all students should develop understanding of nature of science

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for Grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
<p>Scientists formulate and test their explanations of nature using observation, experiments, and</p>	<p><i>Since FOSS is an inquiry-based program, this standard is addressed throughout the</i></p>

theoretical and mathematical models. Although all scientific ideas are tentative and subject to change and improvement in principle, for most major ideas in science, there is much experimental and observational confirmation. Those ideas are not likely to change greatly in the future. Scientists do and have changed their ideas about nature when they encounter new experimental evidence that does not match their existing explanations.

In areas where active research is being pursued and in which there is not a great deal of experimental or observational evidence and understanding, it is normal for scientists to differ with one another about interpretation of the evidence or theory being considered. Different scientists might publish conflicting experimental results or might draw different conclusions from the same data. Ideally, scientists acknowledge such conflict and work towards finding evidence that will resolve their disagreement.

It is part of scientific inquiry to evaluate the results of scientific investigations, experiments, observations, theoretical models, and the explanations proposed by other scientists. Evaluation includes reviewing the experimental procedures, examining the evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Although scientists may disagree about explanations of phenomena, about interpretations of data, or about the value of rival theories, they agree that questioning, response to criticism, and open communication are integral to the process of science. As scientific knowledge evolves, major disagreements are eventually resolved through such interactions between scientists.

experiments, discussion and readings that occur in ALL FOSS modules. See for example:

Variables FOSS Science Stories

Pages 1-7, 12-14, 18-20

Models and Designs FOSS Science Stories

Pages 3-16

Environments Investigation 5

Food and Nutrition Investigation 2

Food and Nutrition FOSS Science Stories

Pages 24-26, 34-36

Force and Motion throughout, such as Investigation 7, Parts 1-3

Force and Motion Resources Pages 32-69

Force and Motion CD-ROM/FOSS Web Site

Planetary Science Investigations 2, 5, 7

Planetary Science Resources

Pages 52-53, 59-62, 67, 71-73, 101-103

Earth History Resources

Pages 61, 64-67, 75, 83-85

Chemical Interactions

Investigation 2

Chemical Interactions Resources

Pages 3-8, 60-61, 78-85

Populations and Ecosystems

Investigation 4

Investigation 7

Populations and Ecosystems Resources

Pages 8-13, 14-29, 31-41

Populations and Ecosystems CD-ROM/FOSS

Web Site: Ecoscenarios

Weather and Water Investigation 9

Weather and Water Resources Pages 63-66

CONTENT STANDARD G HISTORY AND NATURE OF SCIENCE

As a result of activities in grades 5-8, all students should develop understanding of history of science

Examples of each of the standard's guidelines are listed from the K-6 FOSS modules for grades 5-6, and from the FOSS Middle School Modules for grades 6-8.

GUIDELINE	FOSS INVESTIGATION/ACTIVITY
Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor,	<i>This standard is addressed throughout all FOSS modules. Careful attention is paid in readings and on the FOSS web site to show science as a human endeavor, to include</i>

the nature of science, and the relationships between science and society.

In historical perspective, science has been practiced by different individuals in different cultures. In looking at the history of many peoples, one finds that scientists and engineers of high achievement are considered to be among the most valued contributors to their culture.

Tracing the history of science can show how difficult it was for scientific innovators to break through the accepted ideas of their time to reach the conclusions that we currently take for granted.

stories and images of male and female scientists of ALL backgrounds, and to feature their contributions to science and society.

See for example:

Solar Energy FOSS Science Stories

Pages 29-39

Models and Designs FOSS Science Stories

Pages 3-16

Mixtures and Solutions FOSS Science

Stories Pages 24, 29-36

Food and Nutrition FOSS Science Stories

Pages 9, 21, 24-26

Chemical Interactions Investigation 2

Chemical Interactions Resources

Pages 4-8, 60, 69-72, 78-85

Planetary Science Investigations 2, 5, 7

Planetary Science Resources

Pages 52-53, 59-62, 67, 71-73, 101-103

Earth History Resources Pages 64-67, 74-

75, 83-87, 98-99

FOSS Web Site www.fossweb.com for ALL

modules, including "Ask a Scientist"