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

Correlation with

New York
Science Content Standards
and Performance Indicators

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Correlation of the New York Science, Mathematics, and Technology Content Standards and Performance Indicators to Full Option Science System

K-8

The following is a correlation of the New York State Learning Standards for Mathematics, Science and Technology to the Full Option Science System (FOSS). This correlation lists representative examples of investigations and activities that address the elementary science content standards and their performance indicators. A citation does not necessarily reflect all of the investigations or activities from FOSS that might address a particular standard.

May 2005
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Grades K – 4

Standard 1:
Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate to pose questions, seek answers, and develop solutions.

Mathematical Analysis

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. Abstraction and symbolic representation are used to communicate mathematically. Students: • use special mathematical notation and symbolism to communicate in mathematics and to compare and describe quantities, express relationships, and relate mathematics to their immediate environments.	**Trees** Investigation 2, Part 2 **Pebbles, Sand, and Silt** Investigation 1, Part 4 **Solids and Liquids** Investigation 3, Part 4 **Insects and Plants** Investigation 1, Math Extension **Measurement** Investigation 1, Parts 1-3 Investigation 4, Parts 1-2 Science Stories Investigation 4, Math Extensions **Matter and Energy** Investigation 3, Part 2 **Sun, Moon and Stars** Investigation 1, Math Extension	 Pages 10-15 Pages 22-25 Pages 24-27 Page 77 Pages 8-24 Pages 8-17 Pages 21-23 Pages 22-23 Pages 139-150 Pages 68-69
2. Deductive and inductive reasoning are used to reach mathematical conclusions. Students: • use simple logical reasoning to develop conclusions, recognizing that patterns and relationships present in the environment assist them in reaching these conclusions.	**Balance and Motion** Investigation 1, Part 2 **Air and Weather** Investigation 2, Part 4 **Magnetism and Electricity** Investigation 1, Part 3 **Physics of Sound** Investigation 2, Part 2 **Water,** Investigation 2, Part 2 **Measurement** Investigation 2, Part 3 Investigation 3, Part 3 **Matter and Energy** Investigation 3, Part 2 **Sun, Moon and Stars** Investigation 3, Math Extension	 Pages 14-19 Pages 24-27 Pages 23-29 Pages 13-19 Pages 14-18 Pages 18-24 Pages 18-21 Pages 139-150 Page 133
3. Critical thinking skills are used in the solution of mathematical problems. Students: • explore and solve problems generated from school, home, and community situations,	**Wood and Paper** Investigation 1, Parts 4-5 **Air and Weather** Investigation 1, Part 6 **Insects and Plants** Investigation 1, Math Extension **Measurement**	 Pages 22-32 Pages 34-38 Page 77

using concrete objects or manipulative materials when possible.	Investigation 2, Part 3 **Water** Investigation 3, Parts 1-3 **Human Body** Investigation 4, Parts 1-3 **Matter and Energy** Investigation 3, Math Extension **Sun, Moon and Stars** Investigation 2, Math Extension	Pages 18-24 Pages 8-20 Pages 8-24 Page 161 Page 101

Scientific Inquiry

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process. Students: • ask "why" questions in attempts to seek greater understanding concerning objects and events they have observed and heard about. • question the explanations they hear from others and read about, seeking clarification and comparing them with their own observations and understandings. • develop relationships among observations to construct descriptions of objects and events and to form their own tentative explanations of what they have observed.	All FOSS modules are inquiry based and students ask questions and develop explanations for natural phenomena. See for example: **Fabric** Investigation 2, Parts 1-2 **New Plants** Investigation 2, Part 2 **Pebbles, Sand and Silt** Investigation 4, Part 3 **Air and Weather** Investigation 1, Parts 4-5 **Plants and Animals** Investigation 1, Part 2 **Insects and Plants** Investigation 3, Parts 1-3 **Magnetism and Electricity** Investigation 4, Part 2 **Water** Investigation 2, Part 2 **Matter and Energy** Investigation 2, Parts 1-2 **Sun, Moon and Stars** Investigation 1, Part 2	 Pages 7-17 Pages 15-19 Pages 19-25 Pages 21-33 Pages 58-62 Pages 129-152 Pages 14-18 Pages 14-18 Pages 93-114 Pages 56-64
2. Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity. Students: • develop written plans for exploring phenomena or for evaluating explanations guided by questions or proposed	All FOSS modules are inquiry based and students test proposed explanations. See for example: **Balance and Motion** Investigation 3, Parts 2-3 **Plants and Animals** Investigation 4, Parts 1-2 **Measurement** Investigation 3, Part 3 **Earth Materials** Investigation 4, Part 2 **Water** Investigation 4, Parts 3-4 **Magnetism and Electricity** Investigation 3, Parts 2-3	 Pages 13-25 Pages 151-163 Pages 18-21 Pages 14-18 Pages 19-28 Pages 15-25

explanations they have helped formulate. • share their research plans with others and revise them based on their suggestions. • carry out their plans for exploring phenomena through direct observation and through the use of simple instruments that permit measurements of quantities (e.g., length, mass, volume, temperature, and time).	**Structures of Life** Investigation 4, Parts 3-4 **Matter and Energy** Investigation 3, Part 2	 Pages 20-29 Pages 139-150
3. The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena. Students: • organize observations and measurements of objects and events through classification and the preparation of simple charts and tables. • interpret organized observations and measurements, recognizing simple patterns, sequences, and relationships. • share their findings with others and actively seek their interpretations and ideas. • adjust their explanations and understandings of objects and events based on their findings and new ideas.	FOSS modules are inquiry based and provide the opportunity for students to make insightful observations. See for example: **Fabric** Investigation 2, Part 4 **Pebbles, Sand, and Silt** Investigation 4, Part 1-3 **Plants and Animals** Investigation 1, Part 3 **Magnetism and Electricity** Investigation 4, Part 2 **Ideas and Inventions** Investigation 2, Parts 1-2 **Earth Materials** Investigation 2, Part 2 **Measurement** Investigation 3, Part 2 **Human Body** Investigation 4, Parts 1-3 **Matter and Energy** Investigation 4, Part 1 **Sun, Moon and Stars** Investigation 2, Part 2	 Pages 22-24 Pages 8-25 Pages 63-72 Pages 14-18 Pages 8-19 Pages 14-21 Pages 14-17 Pages 8-24 Pages 174-180 Pages 89-100

Engineering Design

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. Engineering design is an iterative process involving modeling and optimization finding the best solution within given constraints which is used to develop technological solutions to problems within given constraints. Students engage in the	FOSS modules provide the opportunity for students to develop technological solutions to problems. See for example: **Wood and Paper** Investigation 4, Part 2 Investigation 5, Parts 1-3 **Solids and Liquids**	 Pages 14-18 Pages 8-21

following steps in a design process: • describe objects, imaginary or real, that might be modeled or made differently and suggest ways in which the objects can be changed, fixed, or improved. • investigate prior solutions and ideas from books, magazines, family, friends, neighbors, and community members. • generate ideas for possible solutions, individually and through group activity; apply age-appropriate mathematics and science skills; evaluate the ideas and determine the best solution; and explain reasons for the choices. • plan and build, under supervision, a model of the solution using familiar materials, processes, and hand tools. • discuss how best to test the solution; perform the test under teacher supervision; record and portray results through numerical and graphic means; discuss orally why things worked or didn't work; and summarize results in writing, suggesting ways to make the solution better.	Investigation 1, Part 3 Investigation 1, Science Extension **Balance and Motion** Investigation 3, Part 1 **Ideas and Inventions** Investigation 4, Part 3 **Water** Investigation 4, Part 2	Pages 21-24 Page 28 Pages 6-12 Pages 18-21 Pages 14-18

Standard 2:

Students will access, generate, process, and transfer information using appropriate technologies.

Information Systems

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. Information technology is used to retrieve, process, and communicate information and as a tool to enhance learning. Students:	All FOSS modules include a reader for student use with the module. All FOSS Modules for grades three through six have a Web	

• use a variety of equipment and software packages to enter, process, display, and communicate information in different forms using text, tables, pictures, and sound. • telecommunicate a message to a distant location with teacher help. • access needed information from printed media, electronic data bases, and community resources.	Site with simulations, pictures, databases, internet links, etc. **Animals Two by Two** Investigation 5, Science Extension **Magnetism and Electricity** Investigation 3, Science Extension **Human Body** Investigation 1, Science Extension Investigation 3, Language Extension FOSS Web, Movie: MRI Section, Sonogram **Sun, Moon and Stars** Science Resources	 Page 28 Page 28 Pages 28 Pages 22 Pages 54-55
2. Knowledge of the impacts and limitations of information systems is essential to its effective and ethical use. Students: • describe the uses of information systems in homes, schools, and businesses. • understand that computers are used to store personal information. • demonstrate ability to evaluate information.	All FOSS Modules have a Web Site with simulations, pictures, databases, internet links, etc. **Ideas and Inventions** Science Stories FOSS modules provide the opportunity to evaluate information. See for example: **Water** Investigation 4, Part 3 **Air and Weather** Investigation 4, Part 1	 Page 22 Pages 19-23 Pages 8-11
3. Information technology can have positive and negative impacts on society, depending upon how it is used. Students: • describe the uses of information systems in homes and schools. • demonstrate ability to evaluate information critically	All FOSS Modules have a Web Site with simulations, pictures, databases, internet links, etc. FOSS modules provide the opportunity to evaluate information from information systems.	

Standard 3:

Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry.

***NOTE**: FOSS is an inquiry approach to teaching science. In doing the investigations and activities in the science program, students have many opportunities to use mathematics concepts and skills. In addition to the opportunities to do mathematics in the investigations of FOSS, each of the FOSS modules for grades three through six also provide numerous Math Extensions. In doing Math Extensions students solve math problems related to the science*

content being studied. Listed below are some of the investigations and activities that reinforce the teaching of this mathematics standard.

Mathematical Reasoning

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence, and construct an argument. Students: • use models, facts, and relationships to draw conclusions about mathematics and explain their thinking. • use patterns and relationships to analyze mathematical situations. • justify their answers and solution processes. • use logical reasoning to reach simple conclusions.	**Wood and Paper** Investigation 1, Parts 4-5 **Pebbles, Sand and Silt** Investigation 4, Math Extension **Magnetism and Electricity** Investigation 1, Part 3 **Measurement** Investigation 2, Part 3 Investigation 3, Part 3 **Structures of Life** Investigation 2, Math Extension **Human Body** Investigation 4, Parts 1-2 **Matter and Energy** Investigation 3, Part 2 **Sun, Moon and Stars** Investigation 1, Part 2	Pages 24-32 Page 26 Pages 23-29 Pages 18-24 Pages 18-21 Page 23 Pages 8-19 Pages 139-150 Pages 56-64

Number and Numeration

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
2. Students use number sense and numeration to develop an understanding of the multiple uses of numbers in the real world, the use of numbers to communicate mathematically, and the use of numbers in the development of mathematical ideas. Students: • use whole numbers and fractions to identify locations, quantify groups of objects, and measure distances. • use concrete materials to model numbers and number relationships for whole numbers and common fractions, including decimal fractions. • relate counting to grouping and to place-value. • recognize the order of whole numbers and	**Wood and Paper** Investigation 1, Parts 4-5 **Solids and Liquids** Investigation 2, Math Extension **Measurement** Investigation 2, Parts 1-3 Investigation 1, Math Extension **Physics of Sound** Investigation 1, Math Extension **Water** Investigation 1, Part 2 **Human Body** Investigation 4, Part 3 **Matter and Energy** Investigation 1, Math Extension **Sun, Moon and Stars** Investigation 1, Math Extension	Pages 24-32 Page 29 Pages 8-24 Pages 26-27 Page 31 Pages 14-18 Pages 25-29 Page 83 Pages 68-69

commonly used fractions and decimals. • demonstrate the concept of percent through problems related to actual situations.		

Operations

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
3. Students use mathematical operations and relationships among them to understand mathematics. Students: • add, subtract, multiply, and divide whole numbers. • develop strategies for selecting the appropriate computational and operational method in problem-solving situations. • know single digit addition, subtraction, multiplication, and division facts. • understand the commutative and associative properties.	**Balance and Motion** Investigation 2, Math Extension **Solids and Liquids** Investigation 2, Math Extension **Ideas and Inventions** Investigation 1, Math Extension **Earth Materials** Investigation 1, Math Extensions **Magnetism and Electricity** Investigation 1, Math Extensions **Measurement** Investigation 2, Part 1-3 **Matter and Energy** Investigation 3, Part 2 **Sun, Moon and Stars** Investigation 3, Math Extension	 Page 26 Page 29 Pages 22-23 Pages 30-31 Page 35 Pages 8-24 Pages 139-150 Page 133

Modeling/Multiple Representation

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
4. Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships. Students: • use concrete materials to model spatial relationships. • construct tables, charts, and graphs to display and analyze real-world data. • use multiple representations (simulations, manipulative materials, pictures, and diagrams) as tools to	**Trees** Investigation 2, Parts 2-4 **Air and Weather** Investigation 4, Part 1 **Pebbles, Sand and Silt** Investigation 1, Parts 3-4 **Plants and Animals** Investigation 1, Part 3 **Insects and Plants** Investigation 3, Math Extension **Measurement** Investigation 4, Part 2 **Magnetism and Electricity** Investigation 1, Part 3 **Human Body** Investigation 4, Math Extension **Sun, Moon and Stars**	Pages 10-22 Pages 8-11 Pages 18-25 Pages 63-72 Page 154 Pages 14-17 Pages 23-29 Page 31

explain the operation of everyday procedures. • use variables such as height, weight, and hand size to predict changes over time. • use physical materials, pictures, and diagrams to explain mathematical ideas and processes and to demonstrate geometric concepts.	Investigation 2, Part 2 **Matter and Energy** Investigation 2, Math Extension	Pages 89-100 Page 115

Measurement

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
5. Students use measurement in both metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data. Students: • understand that measurement is approximate, never exact. • select appropriate standard and nonstandard measurement tools in measurement activities. • understand the attributes of area, length, capacity, weight, volume, time, temperature, and angle. • estimate and find measures such as length, perimeter, area, and volume using both nonstandard and standard units. • collect and display data. • use statistical methods such as graphs, tables, and charts to interpret data	**Wood and Paper** Investigation 1, Parts 4-5 **Air and Weather** Investigation 2, Parts 2 and 4 **Earth Materials** Investigation 1, Part 1 **Magnetism and Electricity** Investigation 1, Part 3 **Measurement** Investigation 1, Parts 1-3 Investigation 2, Parts 1-3 Investigation 3, Parts 1-3 Investigation 4, Parts 1-3 **Matter and Energy** Investigation 3, Parts 2-3 Investigation 4, Part 1	 Pages 24-32 Pages 14-19, 24-27 Pages 8-15 Pages 23-29 Pages 8-24 Pages 8-24 Pages 8-21 Pages 8-21 Pages 139-160 Pages 174-180

Uncertainty

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
6. Students use ideas of uncertainty to illustrate that mathematics involves more than exactness when dealing	**Air and Weather** Investigation 1, Part 6 Investigation 3, Part 2 **Insects and Plants**	 Pages 34-38 Pages 12-16

with everyday situations. Students: • make estimates to compare to actual results of both formal and informal measurement. • make estimates to compare to actual results of computations. • recognize situations where only an estimate is required. • develop a wide variety of estimation skills and strategies. • determine the reasonableness of results. • predict experimental probabilities. • make predictions using unbiased random samples. • determine probabilities of simple events.	Investigation 2, Part 3 **Measurement** Investigation 1, Part 2 **Magnetism and Electricity** Investigation 4. Part 2 **Water** Investigation 2, Part 2 **Structures of Life** Investigation 1, Part 1 Investigation 4, Part 3 **Matter and Energy** Investigation 3, Part 2 **Sun, Moon and Stars** Investigation 2, Part 2	Pages 105-115 Pages 16-19 Pages 14-18 Pages 14-18 Pages 8-17 Pages 20-24 Pages 139-150 Pages 89-100

Patterns/Functions

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
7. Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics, and construct generalizations that describe patterns simply and efficiently. Students: • recognize, describe, extend, and create a wide variety of patterns. • represent and describe mathematical relationships. • explore and express relationships using variables and open sentences. • solve for an unknown using manipulative materials. • use a variety of manipulative materials and technologies to explore patterns. • interpret graphs. • explore and develop relationships among two-	**Fabric** Investigation 1, Parts 4-5 **Trees** Investigation 2, Part 2-4 **Solids and Liquids** Investigation 3, Part 4 **New Plants** Investigation 2, Math Extension **Insects and Plants** Investigation 1, Math Extension **Magnetism and Electricity** Investigation 4, Part 2 **Human Body** Investigation 4, Parts 2-3 **Sun, Moon and Stars** Investigation 3, Math Extension	Pages 20-28 Pages 10-22 Pages 24-32 Page 29 Pages 77-78 Pages 14-18 Pages 17-24 Page 133

and three-dimensional geometric shapes. • discover patterns in nature, art, music, and literature.		

Standard 4:

Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

Physical Setting

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. The Earth and celestial phenomena can be described by principles of relative motion and perspective. Students: • describe patterns of daily, monthly, and seasonal changes in their environment.	**Trees** Investigation 3, Parts 1-9 Science Stories **Air and Weather** Investigation 2, Part 1 Investigation 4, Parts 1-3 Science Stories **Water** Science Stories **Ideas and Inventions** Science Stories **Sun, Moon and Stars** Investigation 1, Part 1 Investigation 2, Part 2 Science Resources	 Pages 10-38 Pages 14-23 Pages 8-13 Pages 8-24 Pages 18-23 Pages 5-7, 14-16 Pages 33-36 Pages 42-55 Pages 89-100 Pages 1-7, 24-27
2. Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land Students: • describe the relationships among air, water, and land on Earth.	**Pebbles, Sand, and Silt** Investigation 1, Parts 2 **Solids and Liquids** Investigation 4, Part 1 FOSS Web, Activity: Change It! **Earth Materials** Investigation 3, Parts 1-2 Science Stories **Water** Investigation 4, Part 1 Investigation 3, Parts 1-4 Science Stories FOSS Web, Activity: Evaporation **Matter and Energy** Investigation 4, Parts 2-3	 Pages 13-17 Pages 7-16 Pages 8-19 Pages 1-7 Pages 8-13 Pages 8-26 Pages 1-2, 4, 13-16 Pages 181-203
3. Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity. Students: • observe and describe properties of materials using appropriate tools.	**Fabric** Investigation 1, Part 4 **Wood and Paper** Investigation 2, Parts 1-3 **Solids and Liquids** Investigation 4, Parts 1-2 Science Stories FOSS Web, Activity: Change It!	 Pages 20-22 Pages 5-19 Pages 7-22 Pages 14-23

• describe chemical and physical changes, including changes in states of matter.	**Pebbles, Sand, and Silt** Investigation 2, Parts 1-4 **Water** Investigation 1, Parts 1-3 Investigation 3, Parts 1-4 FOSS Web, Activity: Evaporation **Earth Materials** Investigation 1, Parts 2-3 Science Stories **Measurement** Science Stories **Matter and Energy** Investigation 3, Parts 1-3 Investigation 4, Parts 1-3 Science Resources	 Pages 8-29 Pages 8-28 Pages 8-26 Pages 16-29 Pages 34-35 Pages 30-33 Pages 129-160 Pages 174-203 Pages 54-64
4. Energy exists in many forms, and when these forms change energy is conserved. Students: • describe a variety of forms of energy (e.g., heat, chemical, light) and the changes that occur in objects when they interact with those forms of energy. • observe the way one form of energy can be transformed into another form of energy present in common situations (e.g., mechanical to heat energy, mechanical to electrical energy, chemical to heat energy).	**Air and Weather** Investigation 1, Part 6 **Balance and Motion** Science Stories **Water** Investigation 4, Part 2 Science Stories **Magnetism and Electricity** Investigation 2, Part 1-2 Science Stories FOSS Web, Activity: Electromagnet FOSS Web, Movie: How a Light Bulb Works **Physics of Sound** Investigation 1, Part 3 Science Stories **Ideas and Inventions** Investigation 4, Parts 1-3 Science Stories **Matter and Energy** Investigation 1, Parts 1-3 Investigation 2, Parts 1-2 Science Resources	 Pages 34-39 Pages 18-21, 28-29, 32-35 Pages 14-18 Pages 22-23 Pages 8-19 Pages 10-13, 28-33 Pages 21-29 Pages 21-28 Pages 8-21 Pages 23-29 Pages 50-82 Pages 93-114 Pages 1-21
5. Energy and matter interact through forces that result in changes in motion. Students: • describe the effects of common forces (pushes and pulls) on objects, such as those caused by gravity, magnetism, and mechanical forces. • describe how forces can operate across distances.	**Wood and Paper** Investigation 1, Parts 4-5 **Balance and Motion** Investigation 2, Parts 1-3 Investigation 3, Parts 1-3 Science Stories FOSS Web, Activity: Roller Coasters **Air and Weather** Investigation 1, Parts 3-6 Investigation 3, Parts 3-4 **Magnetism and Electricity** Investigation 1, Part 1and 3 Investigation 4, Parts 1-3 FOSS Web, Activity: Electromagnet	 Pages 24-32 Pages 8-25 Pages 6-25 Pages 10-21 Pages 17-38 Pages 17-27 Pages 8-17, 23-29 Pages 8-22

The Living Environment

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. Living things are both similar to and different from each other and nonliving things. Students: • describe the characteristics of and variations between living and nonliving things. • describe the life processes common to all living things.	**Animals Two by Two** Investigation 1, Part 2 Science Stories **Trees** Investigation 1, Part 2 Science Stories **New Plants** Investigation 1, Part 2-3 Science Stories FOSS Web, Activity Watch it Grow! **Insects** Investigation 1, Part 1 Investigation 3, Part 2 Science Stories FOSS Web, Activity: Insect Hunt **Plants and Animals** Investigation 1, Parts 1-3 Science Resources **Insects and Plants** Investigation 3, Parts 1-3 Investigation 5, Parts 1-3 Science Resources **Structures of Life** Investigation 2, Parts 2-3 Investigation 3, Part 2 **Human Body** Investigation 4, Parts 1-3	 Pages 17-21 Pages 3-23 Pages 15-19 Pages 2-12 Pages 13-30 Pages 3-11 Pages 8-15 Pages12-20 Pages 5-15 Pages 47-72 Pages 3-7, 19-50 Pages 129-151 Pages 206-226 Pages 3-55 Pages 14-21 Pages 16-19 Pages 8-29
2. Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring. Students: • recognize that traits of living things are both inherited and acquired or learned. • recognize that for humans and other living things there is genetic continuity between generations.	**Animals Two by Two** Investigation 5, Parts 1-4 Science Stories FOSS Web, Photo Gallery: Young and Adult Animals **New Plants** Investigation 1, Parts 1-3 **Insects** Investigation 3, Parts 1-3 Science Stories FOSS Web, Activity: Insect Hunt **Plants and Animals** Investigation 1, Parts 1-2 **Insects and Plants** Investigation 1, Parts 1-3 Investigation 2, Parts 1-3 Science Resources **Structures of Life** Investigation 3, Parts 3-4 Science Stories FOSS Web, Activity: Life Cycles	 Pages 10-27 Pages 4-11, 20-24 Pages 8-30 Pages 8-26 Pages 12-15, 22-46 Pages 47-62 Pages 52-75 Pages 91-115 Pages 8-12, 20-25 Pages 20-30 Pages 1-3, 17-18, 40-42
3. Individual organisms and species change over time.	**Animals Two by Two** Investigation 1, Part 1	 Pages 10-16

Students: • describe how the structures of plants and animals complement the environment of the plant or animal. • observe that differences within a species may give individuals an advantage in surviving and reproducing.	Investigation 3, Part 1 Science Stories **Insects** Investigation 3, Part 3 Science Stories **New Plants** Investigation 2, Parts 1-2 Science Stories **Plants and Animals** Investigation 1, Parts 1-3 Science Resources **Insects and Plants** Investigation 1, Parts 1-3 Investigation 5, Parts 1-3 Science Resources **Structures of Life** Investigation 3, Part 1 Investigation 4, Part 1 Science Stories **Human Body** Investigation 3, Part 1-3 Science Stories FOSS Web, Movie: Jellyfish	Pages 8-12 Pages 4-7 Pages 21-26 Pages 8-11 Pages 8-19 Pages 22-43 Pages 47-72 Pages 28-50 Pages 52-75 Pages 206-225 Pages 26-29 Pages 8-15 Pages 14-19 Pages 17-18, 22-34 Pages 8-21 Page 10
4. The continuity of life is sustained through reproduction and development. Students: • describe the major stages in the life cycles of selected plants and animals. • describe evidence of growth, repair, and maintenance, such as nails, hair, and bone, and the healing of cuts and bruises.	**Animals Two by Two** Investigation 5, Parts 1-4 Science Stories **New Plants** Investigation 1, Parts 1-3 Science Stories **Insects** Investigation 1, Parts 1-3 Investigation 2, Parts 1-3 Investigation 5, Parts 1-3 Science Stories **Insects and Plants** Investigation 1-5, all parts Science Resources **Structures of Life** Investigation 2, Parts 1-3 Science Stories FOSS Web, Activity: Life Cycles	 Pages 10-27 Pages 20-24 Pages 8-30 Pages 13-19 Pages 8-25 Pages 8-24 Pages 10-24 Pages 16-33 Pages 37-55 Pages 8-22 Pages 20-21
5. Organisms maintain a dynamic equilibrium that sustains life. Students: • describe basic life functions of common living specimens (guppy, mealworm, gerbil). • describe some survival behaviors of common living specimens. • describe the factors that help promote good health and growth in humans.	**Animals Two by Two** Investigation 1, Parts 1-2 Investigation 4, Part 2 **Insects** Investigation 3, Part 3 Investigation 4, Part 3 Science Stories **New Plants** Science Stories FOSS Web, Activity Watch it Grow **Plants and Animals** Science Resources **Insects and Plants** Investigation 3, Part 3 Investigation 4, Part 3 **Structures of Life**	 Pages 10-21 Pages 12-16 Pages 21-26 Pages 19-22 Pages 8-11 Pages 8-11, 22-41 Pages 3-7, 19-25 Pages 145-151 Pages 175-178

	Investigation 3, Part 1-4 Science Stories **Human Body** Investigation 4, Parts 3 Science Stories	Pages 8-29 Pages 37-39 Pages 20-24 Pages 25-27
6. Plants and animals depend on each other and their physical environment. Students: • describe how plants and animals, including humans, depend upon each other and the nonliving environment. • describe the relationship of the sun as an energy source for living and nonliving cycles.	**Animals Two by Two** Investigation 1, Part 2 Science Stories **Trees** Investigation 1, Part 2 FOSS Web, Activity: Who Lives Here? **New Plants** Investigation 1, Parts 2-3 Science Stories **Insects** Investigation 4, Parts 2-4 Investigation 5, Part 1 Science Stories **Plants and Animals** Investigation 3, Parts 1-2 Science Resources **Insects and Plants** Investigation 4, Parts 2-4 Investigation 5, Part 1 Science Resources **Structures of Life** Investigation 2, Part 2-3 Investigation 3, Part 2 Science Stories, **Water** Science Stories	 Pages 17-21 Page 12 Pages 15-19 Pages 13-38 Pages 3-7, 22-29 Pages 14-27 Pages 10-15 Pages 8-11 Pages 120-134 Pages 3-7, 16-19, 28-45 Pages 170-186 Pages 206-211 Pages 5-7 Pages 16-19 Pages 14-22 Pages 22-36, 43 Pages 5-7
7. Human decisions and activities have had a profound impact on the physical and living environment. Students: • identify ways in which humans have changed their environment and the effects of those changes.	**Trees** Science Stories **New Plants** Science Stories **Pebbles, Sand and Silt** Science Stories **Plants and Animals** Science Resources **Structures of Life** Science Stories **Measurement** Science Stories **Earth Materials** Science Stories **Water** Science Stories	 Page 12 Pages 16-19 Pages 16-18 Pages 9-14 Pages 4-5, 10-11 Pages 16-17 Pages 24-29 Pages 17-23

Standard 5:

Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs.

Engineering Design

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. Engineering design is an iterative process involving modeling and optimization used to develop technological solutions to problems within given constraints. Students: • describe objects, imaginary or real, that might be modeled or made differently and suggest ways in which the objects can be changed, fixed, or improved. • investigate prior solutions and ideas from books, magazines, family, friends, neighbors, and community members. • generate ideas for possible solutions, individually and through group activity; apply age-appropriate mathematics and science skills; evaluate the ideas and determine the best solution; and explain reasons for the choices. • plan and build, under supervision, a model of the solution using familiar materials, processes, and hand tools. • discuss how best to test the solution; perform the test under teacher supervision; record and portray results through numerical and graphic means; discuss orally why things worked or didn't work; and summarize results in writing, suggesting ways to make the solution better.	**Wood and Paper** Investigation 4, Part 2 Investigation 5, Parts 1-3 **Solids and Liquids** Investigation 1, Part 3 Investigation 1, Science Extension **Balance and Motion** Investigation 3, Part 1 **Water** Investigation 4, Part 2 **Ideas and Inventions** Investigation 4, Part 3	 Pages 14-18 Pages 8-21 Pages 21-24 Page 28 Pages 6-12 Pages 14-18 Pages 18-21

Tools, Resources, Technological Processes

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
2. Technological tools, materials, and other resources should be selected on the basis of safety, cost, availability, appropriateness, and environmental impact; technological processes change energy, information, and material resources into more useful forms. Students: • explore, use, and process a variety of materials and energy sources to design and construct things. • understand the importance of safety, cost, ease of use, and availability in selecting tools and resources for a specific purpose. • develop basic skill in the use of hand tools. • use simple manufacturing processes (e.g., assembly, multiple stages of production, quality control) to produce a product. • use appropriate graphic and electronic tools and techniques to process information.	**Wood and Paper** Investigation 2, Parts 1-4 **Fabric** Investigation 1, Part 6 **Solids and Liquids** Investigation 1, Part 3 **Balance and Motion** Investigation 3, Part 1 **Magnetism and Electricity** Investigation 5, Science Extensions **Ideas and Inventions** Investigation 4, Part 3 **Matter and Energy** Science Resources	Pages 8-23 Pages 29-33 Pages 21-24 Pages 6-12 Page 28 Pages 18-21 Page 69

Computer Technology

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
3. Computers, as tools for design, modeling, information processing, communication, and system control, have greatly increased human productivity and knowledge. Students: • identify and describe the function of the major components of a computer system. • use the computer as a tool for generating and drawing ideas. • control computerized	FOSS encourages the use of computers using the FOSS website.	

devices and systems through programming. • model and simulate the design of a complex environment by giving direct commands.		

Technological Systems

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
4. Technological systems are designed to achieve specific results and produce outputs, such as products, structures, services, energy, or other systems. Students: • identify familiar examples of technological systems that are used to satisfy human needs and wants, and select them on the basis of safety, cost, and function. • assemble and operate simple technological systems, including those with interconnecting mechanisms to achieve different kinds of movement. • understand that larger systems are made up of smaller component subsystems.	**Wood and Paper** Science Stories **Air and Weather** Investigation 3, Parts 2 and 4 **Balance and Motion** Investigation 3, Part 3 **New Plants** Science Stories **Plants and Animals** Science Resources **Magnetism and Electricity** Investigation 2, Parts 1-2 Investigation 4, Parts 1-3 Investigation 5, Parts 1-2 Science Stories **Water** Investigation 4, Part 2 Science Stories **Matter and Energy** Investigation 1, Parts 1 and 3	 Pages 3-8, 13-18 Pages 12-16, 22-27 Pages 19-25 Pages 16-21 Pages 9-14 Pages 8-19 Pages 8-22 Pages 8-20 Pages 28-31 Pages 14-18 Pages 18-19 Pages 50-62, 71-82

History and Evolution of Technology

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
5. Technology has been the driving force in the evolution of society from an agricultural to an industrial to an information base. Students: • identify technological developments that have significantly accelerated human progress.	**Magnetism and Electricity** Investigation 5, Part 1 Science Stories **Ideas and Inventions** Science Stories **Physics of Sound** Science Stories **Water** Science Stories **Human Body** Science Stories **Matter and Energy** Science Resources	 Pages 8-14 Pages 12-19, 21-23, 28-31 Pages 1-3, 9, 10, 11-14, 17, 18, 19-20, 21, 22, 28-29 Pages 32-35 Pages 18-19 Pages 5-7 Pages 6-7, 9-13

	Sun, Moon and Stars Science Resources	 Pages 40-42

Impacts of Technology

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
6. Technology can have positive and negative impacts on individuals, society, and the environment and humans have the capability and responsibility to constrain or promote technological development. Students: • describe how technology can have positive and negative effects on the environment and on the way people live and work.	FOSS modules provide opportunity for the teaching of this concept. See for example: **Wood and Paper** Science Stories **Fabric** Science Stories **New Plants** Science Stories **Plants and Animals** Science Resources **Pebbles, Sand and Silt** Science Stories **Structures of Life** Science Stories **Human Body** Science Stories FOSS Web, Movie: MRI Section, Sonogram **Water** Science Stories **Physics of Sound** Science Stories **Matter and Energy** Science Resources	 Pages 13-19 Pages 3-15 Pages 16-21 Pages 9-14 Pages 16-19 Pages 10-11 Pages 5-7 Pages 17-21, 22-23 Pages 32-35 Pages 6-7, 9-13

Management of Technology

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
7. Project management is essential to ensuring that technological endeavors are profitable and that products and systems are of high quality and built safely, on schedule, and within budget. Students: • participate in small group projects and in structured group tasks requiring planning, financing, production, quality control, and follow-up. • speculate on and model possible technological solutions that can improve the safety and quality of the school or community environment.		

Standard 6:

Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning.

System Thinking

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
2. Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions. Students: • observe and describe interactions among components of simple systems. • identify common things that can be considered to be systems (e.g., a plant population, a subway system, human beings).	**Wood and Paper** Investigation 4, Part 1 Science Stories **Trees** Investigation 1, Part 1 **Air and Weather** Investigation 1, Part 5-6 **Plants and Animals** Investigation 2, Parts 1-3 Science Resources **Insects and Plants** Investigation 1, Parts 1-3 Science Resources **Balance and Motion** Investigation 1, Part 4 Investigation 2, Part 1 **Magnetism and Electricity** Investigation 2, Parts 1-2 Investigation 4, Part 1 Investigation 5, Part 1 FOSS Web, Activity: Electromagnet **Human Body** Investigation 1, Part 1 Investigation 3, Parts 1-3 Science Stories FOSS Web, Activity: Mr. Bones **Matter and Energy** Investigation 1, Parts 1-3 Investigation 2, Part 1 **Sun, Moon and Stars** Investigation 2, Parts 1-2	 Pages 8-13 Pages 13-14 Pages 7-14 Pages 27-38 Pages 87-108 Pages 3-7 Pages 52-75 Pages 30-33 Pages 24-28 Pages 8-13 Pages 8-19 Pages 8-13 Pages 8-14 Pages 8-25 Pages 8-21 Pages 1-3, 12-16, 28-29 Pages 50-82 Pages 93-102 Pages 79-100

Models

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
2. Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design. Students: • analyze, construct, and operate models in order to discover attributes of the real thing.	**Wood and Paper** Investigation 2, Parts 3-4 **Animals Two by Two** Investigation 1, Part 3 **Solids and Liquids** Investigation 1, Part 3 **Insects** Investigation 1, Part 1 **Insects and Plants** Investigation 5, Part 3	 Pages 16-23 Pages 22-25 Pages 21-24 Pages 8-15 Pages 219-225

• discover that a model of something is different from the real thing but can be used to study the real thing. • use different types of models, such as graphs, sketches, diagrams, and maps, to represent various aspects of the real world.	**Water** Investigation 4, Part 2 **Magnetism and Electricity** Investigation 4, Part 1 Investigation 5, Part 1 FOSS Web, Activity: Electromagnet **Human Body** Investigation 1, Part 2 Investigation 3, Part 1 FOSS Web, Activity Mr. Bones **Sun, Moon and Stars** Investigation 2, Part 2	 Pages 14-18 Pages 8-13 Pages 8-14 Pages 16-20 Pages 8-21 Pages 89-100

Magnitude and Scale

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
3. The grouping of magnitudes of size, time, frequency, and pressures or other units of measurement into a series of relative order provides a useful way to deal with the immense range and the changes in scale that affect the behavior and design of systems. Students: • provide examples of natural and manufactured things that belong to the same category yet have very different sizes, weights, ages, speeds, and other measurements. • identify the biggest and the smallest values as well as the average value of a system when given information about its characteristics and behavior.	**Pebbles, Sand and Silt** Investigation 2, Parts 1-4 **Air and Weather** Investigation 3, Part 2 **Solids and Liquids** Investigation 3, Part 4 **Physics of Sound** Science Stories **Measurement** Investigation 1, Part 3 **Matter and Energy** Investigation 4, Part 1	 Pages 8-29 Pages 19-24 Pages 24-27 Pages 11, 13, 20 Pages 20-24 Pages 174-180

Equilibrium and Stability

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
4. Equilibrium is a state of stability due either to a lack of changes (static equilibrium) or a balance between opposing forces (dynamic equilibrium). Students: • cite examples of systems in which some features stay the same while other	**Balance and Motion** Investigation 1, Parts 1-4 **Solids and Liquids** Investigation 1, Part 3 Investigation 4, Part 1 **Measurement** Investigation 2, Parts 1-2 Investigation 4, Part 1 **Magnetism and Electricity**	 Pages 8-28 Pages 21-24 Pages 7-17 Pages 8-17 Pages 8-13

features change. • distinguish between reasons for stability—from lack of changes to changes that counterbalance one another to changes within cycles.	Investigation 1, Parts 1-3 **Human Body** Investigation 3, Parts 1-3 **Sun, Moon and Stars** Investigation 2, Part 2	Pages 10-26 Pages 8-21 Pages 89-100

Patterns of Change

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
5. Identifying patterns of change is necessary for making predictions about future behavior and conditions. Students: • use simple instruments to measure such quantities as distance, size, and weight and look for patterns in the data. • analyze data by making tables and graphs and looking for patterns of change.	**Wood and Paper** Investigation 1, Parts 4-5 **Air and Weather** Investigation 4, Parts 1 and 3 **Measurement** Investigation 1, Part 3 Investigation 4, Part 2 **Magnetism and Electricity** Investigation 1, Part 3 **Water** Investigation 3, Parts 2-3 **Matter and Energy** Investigation 3, Part 2 **Sun, Moon and Stars** Investigation 2, Part 2	 Pages 24-32 Pages 8-11, 19-21 Pages 20-24 Pages 14-17 Pages 23-29 Pages 12-20 Pages 139-160 Pages 89-100

Optimization

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
6. In order to arrive at the best solution that meets criteria within constraints, it is often necessary to make trade-offs. Students: • determine the criteria and constraints of a simple decision making problem. • use simple quantitative methods, such as ratios, to compare costs to benefits of a decision problem.	**Solids and Liquids** Investigation 1, Part 3 **Measurement** Investigation 2, Math Extension Science Stories **Water** Investigation 4, Math Extension	 Pages 21-24 Pages 22-23 Pages 18-20 Pages 30-31

Standard 7:

Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life problems and make informed decisions.

Connections

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. The knowledge and skills of mathematics, science, and technology are used together to make informed decisions and solve problems, especially those relating to issues of science/technology/society, consumer decision making, design, and inquiry into phenomena. Students: • analyze science/technology/society problems and issues that affect their home, school, or community, and carry out a remedial course of action. • make informed consumer decisions by applying knowledge about the attributes of particular products and making cost/benefit tradeoffs to arrive at an optimal choice. • design solutions to problems involving a familiar and real context, investigate related science concepts to inform the solution, and use mathematics to model, quantify, measure, and compute. • observe phenomena and evaluate them scientifically and mathematically by conducting a fair test of the effect of variables and using mathematical knowledge and technological tools to collect, analyze, and present data and conclusions.	**Wood and Paper** Investigation 4, Part 1 **Balance and Motion** Investigation 3, Part 1-2 **Water** Investigation 4, Math Extension **Human Body** Investigation 4, Parts 1-3 **Measurement** Investigation 2, Part 3 Science Stories **Matter and Energy** Investigation 3, Part 2	 Pages 8-13 Pages 6-12, 19-25 Pages 30-31 Pages 8-24 Pages 18-24 Pages 18-20 Pages 139-150

Strategies

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
2. Solving interdisciplinary problems involves a variety of skills and strategies, including effective work habits; gathering and processing information; generating and analyzing ideas; realizing ideas; making connections among the common themes of mathematics, science, and technology; and presenting results. Students participate in an extended, culminating mathematics, science, and technology project. The project would require students to: • work effectively • gather and process information generate and analyze ideas • observe common themes • realize ideas • present results	In all of the FOSS modules for grades three through six, with the exception of Measurement, students end the module with "Choosing Your Own Investigation". This is an extended, culminating project in which students select an area to research, gather and process information and present their results. See for example: **Water** Investigation 4, Part 4 **Magnetism and Electricity** Investigation 5, Part 3	 Pages 24-28 Pages 21-25

Middle School
Grades 5-8

Standard 1:
Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate to pose questions, seek answers, and develop solutions.

Mathematical Analysis

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. Abstraction and symbolic representation are used to communicate mathematically. Students: • extend mathematical notation and symbolism to include variables and algebraic expressions in order to describe and compare quantities and express mathematical.relationships.	**Levers and Pulleys** Investigation 4, Parts 1-2 **Variables** Investigation 3, Math Extension **Models and Designs** Investigation 3, Math Extension **Living Systems** Investigation 3, Math Extension **Water Planet** Investigation 1, Math Extension **Chemical Interactions** Investigation 5, Part 3 **Electronics** Investigation 5, Parts 2-3 **Force and Motion** Investigation 2, Parts 2-3 Investigation 8, Part 1 **Planetary Science** Investigation 8, Parts 3-4	Pages 8-20 Pages 20-31 Pages 24-25 Pages 142-143 Page 67 Pages 165-171 Pages 166-174 Pages 83-99 Pages 284-293 Pages 260-270
2. Deductive and inductive reasoning are used to reach mathematical conclusions. Students: • use inductive reasoning to construct, evaluate and validate conjectures and arguments, recognizing that patterns and relationships can assist in explaining and extending mathematical phenomena.	**Levers and Pulleys** Investigation 4, Parts 1-2 **Food and Nutrition** Investigation 4, Math Extension **Living Systems** Investigation 3, Part 3 **Planetary Science** Investigation 5, Parts 2-3 **Electronics** Investigation 8, Parts 2-3 **Force and Motion** Investigation 3, Parts 1-3 Investigation 5, Parts 3-4	Pages 8-20 Pages 21-22 Pages 126-135 Pages 158-167 Pages 256-261 Pages 111-127 Pages 187-201
3. Critical thinking skills are used in the solution of mathematical problems. Students: • apply mathematical knowledge to solve real-world problems and	**Levers and Pulleys** Investigation 1, Parts 2-3 **Variables** Investigation 2, Part 2 **Solar Energy** Investigation 2, Parts 1-2 Investigation 2, Math	Pages 18-28 Pages 14-18 Pages 8-24

problems that arise from the investigation of mathematical ideas, using representations such as pictures, charts and tables.	Extension **Water Planet** Investigation 1, Math Extension **Chemical Interactions** Investigation 6 **Force and Motion** Investigation 4, Part 1-3 **Electronics** Investigation 8, Parts 2-3 **Weather and Water** Investigation 4, Part 1	Pages 26-27 Page 67 Pages 173-187 Pages 138-155 Pages 256-271 Pages 121-130

Scientific Inquiry

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process. Students: • formulate questions independently with the aid of references appropriate for guiding the search for explanations of everyday observations. • construct explanations independently for natural phenomena especially by proposing preliminary visual models of phenomena.. • represent, present, and defend their proposed explanations of everyday observations so that they can be understood and assessed by others. • seek to clarify, to assess critically, and reconcile with their own thinking the ideas presented by others, including peers, teachers, authors, and scientists.	**Environments** Investigation 6, Parts 1-3 **Landforms** Investigation 3, Parts 1-3 **Mixtures and Solutions** Investigation 4, Parts 1-4 **Living Systems** Investigation 2, Part 1 **Water Planet** Investigation 2, Parts 2-3 **Chemical Interactions** Investigation 1, Parts 1-2 **Planetary Science** Investigation 5, Parts 2-3 **Human Brain and Senses** Investigation 7, Part 2 **Diversity of Life** Investigation 9, Part 2	Pages 8-22 Pages 8-24 Pages 8-28 Pages 85-98 Pages 86-100 Pages 41-58 Pages 158-167 Pages 219-225 Pages 278-285
2. Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity. Students:	**Models and Designs** Investigation 4, Parts 1-3 **Variables** Investigation 3, Parts 2-3 **Landforms** Investigation 3, Parts 1-3 **Living Systems** Investigation 3, Part 3 **Water Planet** Investigation 3, Part 1	Pages 6-20 Pages 14-23 Pages 8-24 Pages 136-141 Pages 125-135

• use conventional techniques and those of their own design to make further observations and refine their explanations, guided by a need for more information. • develop, present, and defend formal research proposals for testing their own explanations of common phenomena, including ways of obtaining needed observations and ways of conducting simple controlled experiments. • carry out their research proposals, recording observations and measurements (e.g., lab notes, audio tapes, computer disk, video tape) to help assess the explanation.	**Chemical Interactions** Investigation 7, Part 5 **Planetary Science** Investigation 5, Parts 2-3 **Diversity of Life** Investigation 8, Part 2 Investigation 9, Part 2 **Earth History** Investigation 4, Part 3	 Page 229-234 Pages 158-167 Pages 244-252 Pages 278-285 Pages 138-146
3. The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena. Students: • design charts, tables, graphs and other representations of observations in conventional and creative ways to help them address their research question and hypothesis. • interpret the organized data to answer the research question or hypothesis and to gain insight into the problem. • modify their personal understanding of phenomena based on evaluation of their hypothesis.	**Solar Energy** Investigation 2, Part 2 **Variables** Investigation 1, Parts 2-3 **Levels and Pulleys** Investigation 1, Parts 2-3 **Living Systems** Investigation 2, Part 2 **Water Planet** Investigation 3, Part 1 **Chemical Interactions** Investigation 7, Part 4 **Force and Motion** Investigation 3, Parts 1-2 **Electronics** Investigation 8, Parts 2-3 **Weather and Water** Investigation 4, Part 1	 Pages 16-24 Pages 16-27 Pages 18-28 Pages 85-98 Pages 125-135 Pages 222-228 Pages 111-123 Pages 256-264 Pages 121-130

Engineering Design

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. Engineering design is an	FOSS modules provide the	

iterative process involving modeling and optimization finding the best solution within given constraints which is used to develop technological solutions to problems within given constraints. Students engage in the following steps in a design process: • identify needs and opportunities for technical solutions from an investigation of situations of general or social interest. • locate and utilize a range of printed, electronic, and human information resources to obtain ideas. • consider constraints and generate several ideas for alternative solutions, using group and individual ideation techniques (group discussion, brainstorming, forced connections, role play); defer judgment until a number of ideas have been generated; evaluate (critique) ideas; and explain why the chosen solution is optimal. • develop plans, including drawings with measurements and details of construction, and construct a model of the solution, exhibiting a degree of craftsmanship. • in a group setting, test their solution against design specifications, present and evaluate results, describe how the solution might have been modified for different or better results, and discuss tradeoffs that might have to be made.	opportunity for students to develop technological solutions to problems. See for example: **Models and Designs** Investigation 2, parts 1-2 Investigation 3, Parts 1-3 **Variables** Investigation 2, Part 1 **Solar Energy** Investigation 4, Part 3 **Force and Motion** Investigation 8, Part 2 **Electronics** Investigation 9, Part 2	 Pages 8-21 Pages 8-23 Pages 8-13 Pages 24-28 Pages 284-293 Pages 290-297

Standard 2:

Students will access, generate, process, and transfer information using appropriate technologies.

Information Systems

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. Information technology is used to retrieve, process, and communicate information and as a tool to enhance learning. Students: • use a range of equipment and software to integrate several forms of information in order to create good quality audio, video, graphic, and text-based presentations. • use spreadsheets and date-base software to collect, process, display, and analyze information. Students access needed information from electronic data bases and on-line telecommunication services. • systematically obtain accurate and relevant information pertaining to topic from a range of sources, including local and national media, libraries, museums, governmental agencies, industries, and individuals. • collect data from probes to measure events and phenomena. • use simple modeling programs to make predictions.	FOSS grades 5-6 modules have a website with simulations, pictures, databases, internet links, etc. FOSS middle school modules use a multi-media CD-ROM to provide information, databases, simulations, pictures, etc. See for example: **Environments** FOSS Web, Activity: Life Cycles **Landforms** FOSS Web, Activity: Database Populations and Ecosystems CD: Moon, Rocks and Minerals **Living Systems** Science Resources	Page 54
2. Knowledge of the impacts and limitations of information systems is essential to its effective and ethical use. Students: • understand the need to question the accuracy of information displayed on a computer because the results produced by a computer may be affected by incorrect data entry. • identify advantages and	FOSS encourages the teaching of this standard through the use of the FOSS website and middle school CD-ROMs.	

limitations of data-handling programs and graphics programs. • understand why electronically stored personal information has greater potential for misuse than records kept in conventional form.		
3. Information technology can have positive and negative impacts on society, depending upon how it is used. Students: • use graphical, statistical and presentation software to present project to fellow classmates • describe applications of information technology in mathematics, science, and other technologies that address needs and solve problems in the community. • explain the impact of the use and abuse of electronically generated information on individuals and families.	FOSS encourages the use of computers and technology in the classroom and the teaching of this standard. The FOSS website and middle school CD-ROMs are an integral part of the program.	

Standard 3:

Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry.

***NOTE**: FOSS is an inquiry approach to teaching science. In doing the investigations and activities in the science program, students have many opportunities to use mathematics concepts and skills. In addition to the opportunities to do mathematics in the investigations of FOSS, each of the FOSS modules for grades three through six also provide numerous Math Extensions. In doing Math Extensions students solve math problems related to the science content being studied. Listed below are some of the investigations and activities that reinforce the teaching of this math learner standard.*

Mathematical Reasoning

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence,	**Levers and Pulleys** Investigation 4, Parts 1-2 **Food and Nutrition** Investigation 4, Math	Pages 8-20

and construct an argument. Students: • apply a variety of reasoning strategies. • make and evaluate conjectures and arguments using appropriate language. • make conclusions based on inductive reasoning. • justify conclusions involving simple and compound (i.e., and/or) statements.	Extension **Living Systems** Investigation 3, Part 3 **Water Planet** Investigation 1, Math Extension **Chemical Interactions** Investigation 5, Part 1 **Planetary Science** Investigation 5, Parts 2-3 **Electronics** Investigation 8, Parts 2-3 **Force and Motion** Investigation 3, Parts 1-3 Investigation 5, Parts 3-4	Pages 21-22 Pages 136-141 Page 67 Pages 153-158 Pages 158-167 Pages 256-261 Pages 111-127 Pages 187-201

Number and Numeration

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
2. Students use number sense and numeration to develop an understanding of the multiple uses of numbers in the real world, the use of numbers to communicate mathematically, and the use of numbers in the development of mathematical ideas. Students: • understand, represent, and use numbers in a variety of equivalent forms (integer, fraction, decimal, percent, exponential, expanded and scientific notation). • understand and apply ratios, proportions, and percents through a wide variety of hands-on explorations. • develop an understanding of number theory (primes, factors, and multiples). • recognize order relations for decimal, integers and rational numbers.	**Food and Nutrition** Investigation 2, Part 3 Investigation 3, Part 1 **Solar Energy** Investigation 3, Math Extension **Levers and Pulleys** Investigation 1, Parts 1-3 **Living Systems** Investigation 2, Math Extension **Water Planet** Investigation 1, Math Extension **Chemical Interactions** Investigation 6 **Force and Motion** Investigation 2, Parts 2-3 **Electronics** Investigation 3, Parts 2-3 **Weather and Water** Investigation 3, Parts 1 and 3	 Pages 22-25 Pages 8-15 Page 25 Pages 8-29 Page 107 Page 67 Pages 178-187 Pages 83-99 Pages 124-132 Pages 93-96, 106-110

Operations

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
3. Students use mathematical operations and relationships	**Food and Nutrition** Investigation 4, Part 1	 Pages 8-15

among them to understand mathematics. Students: • add, subtract, multiply, and divide fractions, decimals, and integers. • explore and use the operations dealing with roots and powers. • use grouping symbols (parentheses) to clarify the intended order of operations. • apply the associative, commutative, distributive, inverse, and identify properties. • demonstrate an understanding of operational algorithms (procedures for adding, subtracting, etc.). • develop appropriate proficiency with facts and algorithms. • apply concepts of ratio and proportion to solve problems.	**Levers and Pulleys** Investigation 1, Parts 2-3 **Variables** Investigation 3, Math Extension **Living Systems** Investigation 2, Math Extension **Water Planet** Investigation 1, Math Extension **Chemical Interactions** Investigation 5, Part 3 **Planetary Science** Investigation 5, Parts 2-3 **Force and Motion** Investigation 5, Parts 1-2 **Weather and Water** Investigation 5, Part 1	 Pages 18-28 Pages 30-31 Page 107 Page 67 Pages 165-171 Pages 158-167 Pages 169-186 Pages 152-162

Modeling/Multiple Representation

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
4. Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships. Students: • visualize, represent, transform two- and three-dimensional shapes. • use maps and scale drawings to represent real objects or places. • use the coordinate plane to explore geometric ideas. • represent numerical relationships in one- and two- dimensional graphs. • use variables to represent relationships. • use concrete materials and diagrams to describe the operation of real-world	**Solar Energy** Investigation 3, Parts 1-2 **Landforms** Investigation 4, Parts 1-3 **Variables** Investigation 1, Part 2-3 **Water Planet** Investigation 1, Part 1 Investigation 3, Part 2 **Chemical Interactions** Investigation 9, Part 1 **Planetary Science** Investigation 9, Parts 1 and 3 **Force and Motion** Investigation 4, Parts 1-3 **Weather and Water** Investigation 4, Part 1	 Pages 8-23 Pages 8-24 Pages 16-27 Pages 50-58 Pages 136-144 Pages 280-287 Pages 283-287, 293-298 Pages 138-155 Pages 121-130

processes and systems. • develop and explore models that do and do not rely on chance. • investigate both two- and three-dimensional transformations. • use appropriate tools to construct and verify geometric relationships. • develop procedures for basic geometric constructions.		

Measurement

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
5. Students use measurement in both metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data. Students: • estimate, make, and use measurements in real-world situations. • select appropriate standard and nonstandard measurement units and tolls to measure to a desired degree of accuracy. • develop measurement skills and informally derive and apply formulas in direct measurement activities. • use statistical methods and measures of central tendencies to display, describe, and compare data. • Explore and produce graphic representations of data using calculator/computers. • develop critical judgment for the seasonableness of measurement.	**Models and Designs** Investigation 3, Part 3 **Levers and Pulleys** Investigation 4, Part 1-2 **Variables** Investigation 3, Parts 2-3 **Living Systems** Investigation 2, Part 1 **Water Planet** Investigation 3, Part 1 **Chemical Interactions** Investigation 5, Parts 1, 3 **Force and Motion** Investigation 3, Part 3 **Electronics** Investigation 3, Parts 1-3 **Planetary Science** Investigation 8, Parts 3-4	 Pages 20-23 Pages 8-20 Pages 14-23 Pages 85-98 Pages 125-135 Pages 153-158, 165-171 Pages 89-99 Pages 119-132 Pages 260-270

Uncertainty

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
6. Students use ideas of uncertainty to illustrate that mathematics involves more than exactness when dealing with everyday situations. Students: • use estimation to check the reasonableness of results obtained by computation, algorithms, or the use of technology. • use estimation to solve problems for which exact answers are inappropriate. • estimate the probability of events. • use stimulation techniques to estimate probabilities. • determine probabilities of independent and mutually exclusive events.	**Landforms** Investigation 5, Part 3 **Variables** Investigation 4, Part 2 **Mixtures and Solutions** Investigation 2, Part 1 **Diversity of Life** Investigation 5, Part 3 **Weather and Water** Investigation 5, Part 2	 Pages 21-26 Pages 12-17 Pages 8-15 Pages 165-170 Pages 163-168

Patterns/Functions

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
7. Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics, and construct generalizations that describe patterns simply and efficiently. Students: • recognize, describe, and generalize a wide variety of patterns and functions. • describe and represent patterns and functional relationships using tables, charts and graphs, algebraic expressions, rules, and verbal descriptions. • develop methods to solve basic linear and quadratic equations. • develop an understanding of functions and functional relationships; that a change in one quantity (variable) results in change in another .	**Solar Energy** Investigation 2, Part 2 **Variables** Investigation 1, Parts 2-3 **Levers and Pulleys** Investigation 4, Parts 1-2 **Living Systems** Investigation 1, Math Extension **Water Planet** Investigation 3, Part 1 **Chemical Interactions** Investigation 5, Part 1 **Planetary Science** Investigation 3, Part 1 **Electronics** Investigation 8, Part 4 **Force and Motion** Investigation 7, Part 3	 Pages 16-34 Pages 16-27 Pages 8-20 Pages 71-72 Pages 125-135 Pages 153-158 Pages 93-96 Pages 265-271 Pages 267-272

• verify results of substituting variables. • apply the concept of similarity in relevant situations. • use properties of polygons to classify them. • explore relationships involving points, lines, angles, and planes. • develop and apply the Pythagorean principle in the solution of problems. • explore and develop basic concepts of right triangle trigonometry. • use patterns and functions to represent and solve problems.		

Standard 4:

Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

Physical Setting

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. The Earth and celestial phenomena can be described by principles of relative motion and perspective. Students: • explain daily, monthly, and seasonal changes on earth.	**Water Planet** Investigation 1, Part 2 Science Resources **Planetary Science** Investigation 3, Parts 1-2 Investigation 9, Parts 1-4 Resources CD: Day-Night Simulation, Lunar Calendar, Phases of the Moon **Weather and Water** Investigation 3, Parts 1-2 Resources CD; Cycles: Seasons	 Pages 59-66 Pages 16-17 Pages 89-93 Pages 283-301 Page 32 Pages 93-96 Pages 17-19
2. Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land Students: • explain how the atmosphere (air), hydrosphere (water), and lithosphere (land) interact, evolve, and change. • describe volcano and	**Landforms** Investigation 2, Parts 1-2 Investigation 3, Part 1-2 Science Stories FOSS Web, Activity: Jigsaw Puzzle FOSS Web, Movie: Volcanic Eruption **Solar Energy** Investigation 2, Parts 1-2 Science Stories FOSS Web, Movies: Wind, How Weather Occurs	 Pages 8-22 Pages 8-24 Pages 13-29 Pages 8-24 Pages 22-28

earthquake patterns, the rock cycle, and weather climate changes.	**Water Planet** Investigation 2, Parts 1-4 Investigation 4, Parts 1-2 Science Resources **Weather and Water** Investigation 4, Part 1 Investigation 7, Parts 1-2 Investigation 9, Parts 1-4 Resources CD; Cycles: Water Cycles CD; Climate Factors: Weather and Landforms **Earth History** Investigation 3, Part 4 Investigation 4, Parts 4-5 Resources CD; Earth Processes: Stream Tables	 Pages 80-110 Pages 184-202 Pages 26-30, 33-37, 42-51, 67-79 Pages 121-130 Pages 232-243 Pages 296-318 Pages 32-33, 37-42, 53-76 Pages 108-111 Pages 138-149 Pages 64-66, 81-82, 93-97, 100-105
3. Matter is made up of particles whose properties determine the observable characteristics o f matter and its reactivity. Students: • observe and describe properties of materials such as density, conductivity, and solubility. • distinguish between chemical and physical changes. • develop their own mental models to explain common chemical reactions and changes in stated of matter.	**Mixtures and Solutions** Investigation 1, Parts 1-4 Investigation 2, Parts 1-4 Investigation 3, Parts 1-3 Investigation 4, Parts 1-3 Science Stories FOSS Web, Movies: Physical vs. Chemical Change **Planetary Science** Investigation 8, Part 3-4 **Weather and Water** Investigation 2, Part 1 Investigation 5, Part 1 Resources CD; Matter and Energy: Molecules in Solids, Liquids and Gases **Chemical Interactions** Investigation 1, Parts 1-2 Investigation 2, Part 1 Investigation 8, Parts 1-3 Investigation 9, Parts 1-4 Investigation 10, Parts 1-2 Resources Video: Atoms and Molecules	 Pages 8-25 Pages 8-28 Pages 8-24 Pages 8-24 Pages 1-12, 23-28, 37-42 Pages 260-270 Pages 69-77 Pages 152-162 Pages 6-7, 22-31 Pages 41-58 Pages 70-74 Pages 248-268 Pages 280-312 Pages 323-336 Pages 2-5, 14-28, 44-53, 63-67
4. Energy exists in many forms, and when these forms change energy is conserved. Students: • describe the sources and identify the transformations of energy observed in everyday life. • observe and describe heating and cooling events. • observe and describe energy changes as related	**Solar Energy** Investigation 2, Parts 1-2 Investigation 3, Parts 1-2 Investigation 4, Parts 1-4 Science Stories FOSS Web, Activity: Solar Road Race **Models and Designs** Investigation 2, Parts 1-3 **Water Planet** Investigation 2, Parts 1-4 Investigation 3, Parts -1-2 Science Resources	 Pages 8-24 Pages 8-23 Pages 8-33 Pages 1-5, 22-24, 29-39 Pages 8-24 Pages 80-110 Pages 125-144 Pages 26-30, 33-37, 42-51

to chemical reactions. • observe and describe the properties of sound, light, magnetism, and electricity. • describe situations that support the principle of conservation of energy.	**Chemical Interactions** Investigation 5, Parts 1-3 Investigation 6 Investigation 7, Parts 1-5 Resources **Electronics** Investigation 1, Parts 1-5 Investigation 4, Parts 1-2 Investigation 9, Part 2 Resources Video; Television: Window to the World CD: Static Electricity **Weather and Water** Investigation 4, Parts 1-2 Investigation 5, Parts 2-3 Resources CD; Matter and Energy: Heat and Energy CD: Matter and Energy: Molecules in Solids, Liquids and Gases **Populations and Ecosystems** Investigation 5, Part 1 Resources	 Pages 153-171 Pages 178-187 Pages 204-234 Pages 23-48 Pages 55-79 Pages 143-151 Pages 290-297 Pages 1-2, 12-14 Pages 121-139 Pages 163-174 Pages 22-26 Pages 142-150 Pages 14-15
5. Energy and matter interact through forces that result in changes in motion. Students: • describe different patterns of motion of objects. • observe, describe, and compare effects of forces (gravity, electric current and magnetism) on the motion of objects.	**Levers and Pulleys** Investigation 1, Parts 1-3 Investigation 3, Parts 1-2 Investigation 4, Parts 1-2 FOSS Web, Activity: Building a Rube Goldberg Machine **Variables** Investigation 3, Parts 1-4 Investigation 4, Parts 1-3 Science Stories **Models and Designs** Investigation 3, Parts 1-3 Investigation 4, Parts 1-2 **Water Planet** Investigation 1, Part 2 Science Resources **Force and Motion** Investigation 1-8, All Parts Resources CD: Force Bench Video: Understanding Car Crashes	 Pages 8-28 Pages 8-20 Pages 8-20 Pages 8-27 Pages 8-23 Pages 15-20, 32-33 Pages 8-23 Pages 6-15 Pages 59-66 Pages 16-17 Pages 3-19, 24-40, 50-52

The Living Environment

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. Living things are both similar to and different from each other and nonliving things. Students:	**Environments** Science Stories **Food and Nutrition** Science Stories **Living Systems**	 Pages 18-21, 42 Pages 6-9, 44-50

• compare and contrast the parts of plants, animals, and one-celled organisms. • explain the functioning of the major human organ systems and their interactions.	Investigation 1, Parts 1-3 Investigation 2, Part 1 Science Resources **Diversity of Life** Investigation 1, Parts 1-2 Investigation 3, Parts 1-3 Investigation 5, Part 2 Investigation 7, Parts 1-2 Investigation 9, Part 1 Investigation 10, Parts 1-2 Resources CD: Collection, Insects, Protista **Human Brain and Senses** Investigation 2, Parts 1-3 Resources CD; Vision: How the Eye Looks, How the Eye Works **Populations and Ecosystems** Investigation 1, Part 1 Resources	Pages 51-70 Pages 85-98 Pages 2-13, 16-30 Pages 43-63 Pages 102-122 Pages 157-164 Pages 218-229 Pages 273-277 Pages 302-316 Pages 21-28, 51-69 Pages 67-83 Pages 29-30, 36-38, 45-46, 63-74 Pages 411-46 Pages 3-5
2. Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring. Students: • describe sexual and asexual mechanisms for passing genetic materials form generation to generation. • describe simple mechanisms related to the inheritance of some physical traits in offspring.	**Diversity of Life** Investigation 7, Part 1 Resources **Populations and Ecosystems** Investigation 9, Parts 1-4 Resources CD: Larkey's, Punnett Square	 Pages 218-223 Pages 26, 40-44, 53-54, 58-59 Pages 262-292 Pages 46-55
3. Individual organisms and species change over time. Students: • describe sources of variation in organisms and their structures and relate the variations to survival. • describe factors responsible for competition within species and the significance of that competition.	**Populations and Ecosystems** Investigation 8, Parts 1-2 Investigation 10, Parts 1-3 Resources CD: Lackey's, Natural Selection CD: Lackey's Selective Breeding Video: Voyage to the Galapagos	 Pages 228-243 Pages 302-337 Pages 42-45, 58-61
4. The continuity of life is sustained through reproduction and development. Students: • observe and describe the variations in reproductive patterns of organisms, including asexual and	**Environments** Science Stories **Diversity of Life** Investigation 7, Part 1 Resources **Populations and Ecosystems** Resources	 Pages 21-22 Pages 218-223 Pages 26, 40-44, 53-54, 58-59 Pages 50-53

sexual reproduction. • explain the role of sperm and egg cells in sexual reproduction. • observe and describe developmental patterns in selected plants and animals (e.g., insects, frogs, humans, seed-bearing plants). • observe and describe cell division at the microscopic level and its macroscopic effects.		
5. Organisms maintain a dynamic equilibrium that sustains life. Students: • compare the way a variety of living specimens carry out basic life functions and maintain dynamic equilibrium. • describe the importance of major nutrients, vitamins, and minerals in maintaining health and promoting growth and explain the need for a constant input of energy for living organisms.	**Food and Nutrition** Investigation 4, Part 1 Science Stories FOSS Web, Activity: What's for Dinner? **Living Systems** Investigation 3, Parts 1-2 Science Resources **Diversity of Life** Investigation 6, Parts 2-3 Resources CD; Collection: Stomates **Populations and Ecosystems** Investigation 5, Part 2 Resources	 Pages 8-15 Pages 1-4, 21-23, 27-29, 41-43 Pages 118-125 Pages 31-36, 47-48 Pages 193-202 Pages 36-39 Pages 151-155 Pages 8-13, 14-15
6. Plants and animals depend on each other and their physical environment. Students: • describe the flow of energy and matter through food chains and food webs. • provide evidence that green plants make food and explain the significance of this process to other organisms.	**Environments** Science Stories FOSS Web, Activity: Virtual Aquarium **Living Systems** Investigation 3, Parts 1-2 Science Resources **Populations and Ecosystems** Investigation 4, Part 2 Investigation 5, Parts 1-4 Resources CD: Mono Lake, Food Web **Diversity of Life** Resources	 Pages 38-41, 43-45, 53-55, Pages 118-135 Pages 31-36, 47-48 Pages 122-129 Pages 142-169 Pages 14-21 Pages 36-37
7. Human decisions and activities have had a profound impact on the physical and living environment. Students: • describe how living things, including humans, depend upon the living and nonliving environment for their survival.	**Environments** Investigation 3, Parts 1-3 Investigation 5, Parts 1-3 Investigation 6, Parts 1-2 Science Stories FOSS Web, Activity: Virtual Aquarium **Landforms** Science Stories **Diversity of Life**	 Pages 8-22 Pages 8-22 Pages 8-17 Pages 9-17, 27-45 Pages 13-14

• describe the effects of environmental changes on humans and other populations.	Investigation 5, Part 2 Investigation 7, Part 2 Investigation 8, Part 2 Resources **Populations and Ecosystems** Investigation 1, Part 2 Investigation 4, Part 2 Investigation 5, Part 2 Investigation 6, Part 2 Resources CD: Mono Lake, Food Web **Weather and Water** Resources **Earth History** Resources	Pages 157-164 Pages 224-229 Pages 239-252 Pages 46-49, 67-68 Pages 41-46 Pages 122-129 Pages 151-155, 161-169 Pages 187-190 Pages 14-24, 26-29 Pages 63-65 Pages 64-67

Standard 5:

Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs.

Engineering Design

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. Engineering design is an iterative process involving modeling and optimization used to develop technological solutions to problems within given constraints. Students engage in the following steps in a design process: • identify needs and opportunities for technical solutions form an investigation of situations of general or social interests. • locate and utilize a range of printed, electronic, and human information resources to obtain ideas. • consider constraints and generate several ideas for alternative solutions, using group and individual ideation techniques (group discussions, brainstorming, forced connections, role play); defer judgment until a number of ideas have been generated; evaluate (critique ideas; and explain why the chosen	FOSS modules provide the opportunity for students to develop technological solutions to problems. See for example: **Models and Designs** Investigation 2, Parts 1-2 Investigation 3, Parts 1-3 **Variables** Investigation 2, Part 1 **Solar Energy** Investigation 4, Part 3 **Force and Motion** Investigation 8, Part 2 **Electronics** Investigation 9, Part 2	 Pages 8-21 Pages 8-23 Pages 8-13 Pages 24-28 Pages 284-293 Pages 290-297

solution is optimal. • Develop plans, including drawings with measurements and details of construction, and construct a model of the solution, exhibiting a degree of craftsmanship.. • in a group setting test their solution against design specifications, present and evaluate results, describe how the solution might have been modified for different and better results, and discuss tradeoffs that might have to be made.		

Tools, Resources, and Technological Processes

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
2. Technological tools, materials, and other resources should be selected on the basis of safety, cost, availability, appropriateness, and environmental impact; technological processes change energy, information, and material resources into more useful forms. Students: • choose and use resources for a particular purpose based upon an analysis and understanding of their properties, costs, availability, and environmental impact. • use a variety of hand tools and machines to change materials into new forms through forming, separating, and combining processes, and processes which cause internal change to occur. • combine manufacturing processes with other technological processes to produce, market, and distribute a product. • process energy into other forms and information into more meaningful information.	FOSS modules provide the opportunity for the teaching of this standard. See for example: **Models and Designs** Investigation 2, Parts 1-2 Investigation 3, Parts 1-3 **Solar Energy** Investigation 4, Parts 1-3 **Force and Motion** Investigation 8, Part 2 **Electronics** Investigation 1, Parts 1-3 Investigation 9, Part 2	 Pages 8-21 Pages 8-23 Pages 8-28 Pages 294-301 Pages 55-70 Pages 290-297

Computer Technology

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
3. Computers, as tools for design, modeling, information processing, communication, and system control, have greatly increased human productivity and knowledge. Students: • assemble a computer system including keyboard, central processing unit and disc drives, mouse, printer, and monitor. • use a computer system to connect to and access needed information form various Internet sites. • use computer hardware and software to draw and dimension prototypical designs. • use a computer as a modeling tool. • use a computer system to monitor and control external events and/or systems.	FOSS encourages the use of computers and supports these computer standards.	

Technological Systems

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
4. Technological systems are designed to achieve specific results and produce outputs, such as products, structures, services, energy, or other systems. Students: • select appropriate technological systems on the basis of safety, function, cost, ease of operation, and quality of post-purchase support. • assemble, operate, and explain the operation of simple open- and closed-loop electrical , electronic, mechanical, and pneumatic systems. • describe how subsystems and system elements	FOSS modules provide the opportunity for the teaching of this standard. See for example: **Models and Designs** Investigation 2, Parts 1-2 Investigation 3, Parts 1-3 **Variables** Investigation 3, Parts 1-3 Investigation 4, Parts 1-3 **Force and Motion** Investigation 8, Part 2 **Electronics** Investigation 1, Parts 1-3 Investigation 9, Part 2	 Pages 8-21 Pages 8-23 Pages 8-23 Pages 8-23 Pages 394-301 Pages 55-70 Pages 290-297

(inputs, processes, outputs) interact within systems. • describe how system control requires sensing information, processing it, and making changes.		

History and Evolution of Technology

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
5. Technology has been the driving force in the evolution of society from an agricultural to an industrial to an information base. Students: • describe how the evolution of technology led to the shift in society from an agricultural base to an industrial base to an information base. • understand the contributions of people of different genders, races, and ethnic groups to technological development. • Describe how new technologies have evolved as a result of combining existing technologies (e.g., photography combined optics and chemistry; the airplane combined kite and glider technology with a lightweight gasoline engine).	**Models and Designs** Science Stories **Variables** Science Stories **Solar Energy** Science Stories **Water Planet** Science Resources **Planetary Science** Resources **Electronics** Resources	 Pages 25-40 Pages 18-28, 32-33 Pages 29-39 Page 15 Pages 74-79, 90-95 Pages 18-21, 34-36

Impact of Technology

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
6. Technology can have positive and negative impacts on individuals, society, and the environment and humans have the capability and responsibility to constrain or promote technological development. Students: • describe how outputs of a technological system can	**Environments** Science Stories **Landforms** Science Stories **Earth History** Resources **Weather and Water** Resources **Populations and Ecosystems** Resources	 Pages 36-37, 43-46 Pages 13-14 Pages 64-67 Pages 63-65 Pages 28-29

be desired, undesired, expected, or unexpected. • describe through examples how modern technology reduces manufacturing and construction costs and produces more uniform products.	**Chemical Interactions** Resources	 Pages 80-83

Management of Technology

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
7. Project management is essential to ensuring that technological endeavors are profitable and that products and systems are of high quality and built safely, on schedule, and within budget. Students: • manage time and financial resources in a technological project. • provide examples of products that are well (and poorly) designed and made, describe their positive and negative attributes, and suggest measures that can be implemented to monitor quality during production. • assume leadership responsibilities within a structured group activity.		

Standard 6:

Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning.

System Thinking

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1.Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions. Students: • observe and describe	**Environments** FOSS Web, Activity: Virtual Aquarium **Food and Nutrition** Science Stories **Variables** Investigation 3, Parts 1-3 Investigation 4, Parts 1-3 **Levers and Pulleys**	 Pages 6-9, 44-50 Pages 8-23 Pages 8-23

interactions among components of simple systems. • identify common things that can be considered to be systems (e.g., a plant population, a subway system, human beings).	Investigation 3, Parts 1-2 Investigation 4, Parts 1-2 **Water Planet** Investigation 1, Part 1 Investigation 4, Part 1 **Living Systems** Investigation 1, Parts 1-3 **Human Brain and Senses** Investigation 2, Parts 2-3 **Electronics** Investigation 1, Part 1-3 **Populations and Ecosystems** Investigation 4, Part 2 CD: Mono Lake, Food Web	Pages 8-20 Pages 8-20 Pages 50-58 Pages 184-197 Pages 51-70 Pages 73-83 Pages 55-70 Pages 122-129

Models

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
2. Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design. Students: • select an appropriate model to begin the search for answers or solutions to a question or problem. • use models to study processes that cannot be studied directly (e.g., when the real process is too small, too fast or too dangerous for direct observation). • demonstrate the effectiveness of different models to represent the same thing and the same model to represent different things.	**Models and Designs** Investigation 2, Parts 1-3 Investigation 3, Parts 1-3 Investigation 4, Parts 1-2 **Solar Energy** Investigation 4, Parts 1-3 **Landforms** Investigation 1, Parts 1-3 Investigation 2, Parts 1-2 Investigation 4, Parts 1-3 **Water Planet** Investigation 1, Part 1 **Living Systems** Investigation 2, Part 1 **Chemical Interactions** Investigation 9, Part 1 **Human Brain and Senses** Investigation 3, Part 3 **Weather and Water** Investigation 3, Part 2 **Planetary Science** Investigation 3, Parts 1-2 Investigation 5, Parts 2-3 Investigation 9, Part 2	 Pages 8-24 Pages 8-23 Pages 8-15 Pages 8-28 Pages 8-24 Pages 8-22 Pages 8-24 Pages 50-58 Pages 85-98 Pages 280-287 Pages 106-110 Pages 97-102 Pages 89-98 Pages 158-167 Pages 288-292

Magnitude and Scale

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
3. The grouping of magnitudes of size, time, frequency, and pressures or other units of measurement into a series of relative order provides a useful way to deal with the immense range and the changes in	**Landforms** Investigation 4, Parts 1-3 **Earth History** Investigation 6, Part 3 **Planetary Science** Investigation 6, Parts 2-3 Investigation 7, Part 2	 Pages 8-24 Pages 215-219 Pages 197-205 Pages 222-229

scale that affect the behavior and design of systems. Students: • cite examples of how different aspects of natural and designed systems change at different rates with changes in scale. • use powers of ten notation to represent very small and very large numbers.	**Weather and Water** Investigation 3, Part 3	Pages 103-110

Equilibrium and Stability

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
4. Equilibrium is a state of stability due either to a lack of changes (static equilibrium) or a balance between opposing forces (dynamic equilibrium). Students: • describe how feedback mechanisms are used in both designed and natural systems to keep changes within desired limits. • describe changes within equilibrium cycles in terms of frequency or cycle length and determine the highest and lowest values and when they occur.	**Levers and Pulleys** Investigation 1, Parts 2-3 **Variables** Investigation 2, Part 2 **Populations and Ecosystems** Investigation 10, Parts 1and 3 **Diversity of Life** Investigation 6, Part 2 **Weather and Water** Investigation 4, Part 2	Pages 18-28 Pages 14-18 Pages 302-310, 315-317 Pages 193-197 Pages 131-139

Pattern of Changes

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
5. Identifying patterns of change is necessary for making predictions about future behavior and conditions. Students: • use simple linear equations to represent how a parameter changes with time. • observe on what might happen in the future.	**Variables** Investigation 1, Parts 2-3 **Levers and Pulleys** Investigation 4, Parts 1-2 **Environments** Investigation 5, Parts 1-3 **Force and Motion** Investigation 5, Part 3 Investigation 7, Parts 2-3 **Weather and Water** Investigation 3, Parts 1-2 **Planetary Science** Investigation 9, Parts 1-4	Pages 16-27 Pages 8-20 Pages 8-22 Pages 187-193 Pages 262-272 Pages 93-102 Pages 283-301

Optimization

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
6. In order to arrive at the best solution that meets criteria within constraints, it is often necessary to make trade-offs. Students: • determine the criteria and constraints and make trade-offs to determine the best decision. • use graphs of information for a decision making problem to determine the optimum solution.	**Models and Designs** Investigation 3, Part 3 Investigation 4, Part 1 **Variables** Investigation 2, Part 3 Investigation 3, Part 2 Investigation 4, Part 3 **Levers and Pulleys** Investigation 4, Part 2 **Environments** Investigation 3, Parts 1-3 **Human Brain and Senses** Investigation 3, Parts 2-3 **Force and Motion** Investigation 2, Part 3 Investigation 8, Part 2	 Pages 20-23 Pages 6-10 Pages 19-23 Pages 14-19 Pages 18-23 Pages 14-20 Pages 8-22 Pages 101-110 Pages 89-99 Pages 294-301

Standard 7:

Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life problems and make informed decisions.

Connections

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
1. The knowledge and skills of mathematics, science, and technology are used together to make informed decisions and solve problems, especially those relating to issues of science/technology/society, consumer decision making, design, and inquiry into phenomena. Students: • analyze science/technology/society problems and issues at the local level and plan and carryout a remedial course of action. • make informed consumer decisions by seeking answers to appropriate questions about products, services, and systems; determining the cost/benefit and risk/benefit tradeoffs; and applying this knowledge to a potential purchase.	**Environments** Investigation 4, Language Extension Investigation 6, Language Extension **Solar Energy** Investigation 4, Part 1-3 Investigation 3, Home/School Connection Investigation 4, Science Extension **Food and Nutrition** Investigation 2, Part 2 Investigation 3, Part 3 Investigation 4, Part 1 **Living Systems** Investigation 3, Part 3 **Populations and Ecosystems** Investigation 7 Resources CD: Ecoscenarios **Weather and Water** Investigation 9, Part 4 Resources	 Page 23 Pages 23 Pages 8-28 Page 28 Page 36 Pages 18-21 Pages 21-25 Pages 8-15 Pages 136-141 Pages 210-215 Pages 30-41 Pages 315-318 Pages 63-66

• design solutions to real-world problems of general social interest related to home, school, or community using scientific experimentation to inform the solution and applying mathematical concepts and reasoning to assist in developing a solution. • describe and explain phenomena by designing and conducting investigations involving systematic observations, accurate measurements, and the identifications and control of variables; by inquiring into relevant mathematical ideas; and by using mathematical and technological tools and procedures to assist in the investigation.		

Strategies

CONTENT STANDARDS/ PERFORMANCE INDICATORS	*FOSS INVESTIGATION*	*PAGE NUMBER(S)*
2. Solving interdisciplinary problems involves a variety of skills and strategies, including effective work habits; gathering and processing information; generating and analyzing ideas; realizing ideas; making connections among the common themes of mathematics, science, and technology; and presenting results. Students participate in an extended, culminating mathematics, science, and technology project. The project would require students to: • work effectively • gather and process information • generate and analyze ideas • observe common themes • realize ideas • present results	FOSS modules for grades 5 and 6 include a culminating activity for students. See for example: **Environments** Investigation 6, Part 3 **Landforms** Investigation 5, Part 4 FOSS modules also provide interdisciplinary problems at the end of each investigation. See for example: **Models and Designs** Investigation 4, Language Extension **Solar Energy** Investigation 4, Science Extension Investigation 3, Home/School Connection **Human Brain and Senses** **Weather and Water** See also: **Food and Nutrition** Investigation 4, Parts 1 and 2 **Living Systems**	 Pages 18-22 Pages 27-31 Page 21 Page 36 Page 28 Pages 144, 231, 253 Pages 82, 320 Pages 8-20

	Investigation 3, Part 3 **Force and Motion** Investigation 8, Part 2 **Planetary Science** Investigation 10, Parts 2-3	Pages 136-141 Pages 284-293 Pages 318-324