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

Correlation With

## *Virginia Standards of Learning*


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# Correlation of the Virginia Standards of Learning with the FULL OPTION SCIENCE SYSTEM (FOSS)

The following correlation of the Virginia Standards of Learning to the Full Option Science System (FOSS) is to show *representative* examples of investigations and activities that address listed standards and their concepts. A citation does *not* reflect all of the investigations or activities from FOSS that might address a particular standard or concept.

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# Kindergarten
# Standards of Learning

| *Science Standard* | *Correlation By Page Numbers* |
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| **K.1 The student will conduct investigations in which:** | |
| a) basic properties of objects are identified by direct observation; | This standard is a focus of ALL FOSS kindergarten modules. See for example:<br>**Wood and Paper**, Investigation 3, Part 1, pgs 8-12<br>**Trees**, Investigation 1, Part 1, pgs 7-14<br>Investigation 2, Parts 2-5, pgs 10-25<br>**Fabric**, Investigation 1, Part 1, pgs 6-11<br>Investigation 2, Parts 1-2, pgs 7-17<br>**Animals Two by Two**, Investigation 1, Parts 1-2, pgs 10-21 |
| b) observations are made from multiple positions to achieve different perspectives; | All FOSS modules are inquiry based and students observe and ask questions throughout. Some examples are:<br>**Trees**, Investigation 2, Parts 1-5, Pgs 6-25<br>**Animals Two by Two**, Investigation 2, Parts 1-4, Pgs 9-24<br>**Wood and Paper**, Investigation 1, Part 3, pgs 20-23<br>Investigation 3, Parts 1 and 2, pgs 8-17<br>**Fabric**, Investigation 2, Parts 2-3, pgs 12-21 |
| c) objects are described both pictorially and verbally; | All FOSS Investigations give students opportunities for discourse and to think reflectively. Students communicate observations and thoughts about objects both verbally in small group and class discussion and through journals and data/response sheets. FOSS teacher guides provide carefully constructed questions to prompt writing and drawing. See for example:<br>**Fabric**, Investigation 1, Part 1, pgs 6-11<br>Home/School Connection, pg 36 (Duplication Master 14)<br>Teacher guide duplication master 13 “Student Journal Questions”<br>**Trees** Investigation 1, Part 1 Page 11 Tree drawing pre- and post-assessment item<br>Home/School Connections 1-3 Pages 33-35<br>Teacher guide duplication master 32 “Student Journal Questions”<br>**Wood and Paper**, Investigation 3, Interdisciplinary Extensions, pgs 26-27<br>Investigation 1, Part 5, pgs 28-32<br>Teacher Duplication Master 19 “Student Journal Questions” |
| d) a set of objects is sequenced according to size; | **Trees**, Investigation 2, Part 3, pgs 16-19<br>**Animals Two by Two**, Investigation 2, Part 4, pgs 22-24 |

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| e) a set of objects is separated into two groups based on a single physical attribute; | **Wood and Paper**, Investigation 1, Part 3, pgs 20-23<br>Investigation 3, Part 4, pgs 22-25<br>**Animals Two by Two**, Investigation 2, Math Extension, pg 26<br>**Fabric**, Investigation 2, Part 1, pgs 8-11 |
| f) nonstandard units are used to measure common objects; | **Trees**, Investigation 1, Parts 2 and 7, pgs 18-19, 32-34<br>Investigation 1, Math Extension, pg 39<br>**Animals Two by Two**, Investigation 2, Math Extension, pg 26<br>**Wood and Paper**, Investigation 1, Parts 4 and 5, pgs 24-32 |
| g) a question is developed from one or more observations; | Students conduct make observations and develop questions in ALL FOSS modules. Careful observations are a particular focus of the kindergarten modules. Some examples include:<br><br>**Wood and Paper**, Investigation 1, Part 3, pgs 20-23<br>Wood and Paper FOSS Science Stories, pg 9<br>Investigation 3, Part 4, pgs 22-25<br>**Fabric**, Investigation 2, Part 1, pgs 7-11<br>**Animals Two by Two**, Investigation 1, Part 3, pgs 22-25<br>Animals Two by Two FOSS Science Stories pages 23-24 |
| h) picture graphs are constructed using 10 or fewer units; | **Wood and Paper**, Investigation 1, Part 5, pgs 28-32<br>**Fabric**, Investigation 2, Part 4, pgs 22-25<br>**Trees**, Investigation 2, Math extension, pg 29 |
| i) an unseen member in a sequence of objects is predicted; and | All FOSS modules provide the opportunity to make predictions and carry out those predictions through the investigations. See for example:<br><br>**Trees**, Investigation 2, Part 5, pgs 22-25 |
| j) unusual or unexpected results in an activity are recognized. | All FOSS modules have students conduct scientific investigations that require reasonable explanations based on observations. Classroom discussion encourages students to share unexpected or unusual results. Some examples include:<br><br>**Animals Two by Two**, Investigation 3, Part 3, pgs 18-20<br>**Trees**, Investigation 3, Home/School Connection, pg 40 |
| **K 2. Students will investigate and understand that humans have senses that allow one to seek, find, take in, and react or respond to information in order to learn about one's surroundings. Key concepts include:** | |
| a) five senses and corresponding sensing organ (taste-tongue, touch-skin, smell-nose, hearing-ears, and sight-eyes); and | All FOSS modules encourage students to use their senses and simple instruments to make observations. Observation using the five senses is a particular focus of kindergarten modules and shows up in many interesting ways. For example, students smell and feel tree bark, hear interesting sounds as crayons rub on corrugated paper and feel subtle differences between fabrics in a "two-hand feely box". See for example: |

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| | **Trees**, Investigation 1, Parts 1-2, pgs 11-19<br>Investigation 2, Parts 1-5, pgs 6-25<br>**Animals Two by Two**, Investigation 3, Parts 1-3, pgs 8-20<br>**Wood and Paper**, Investigation 1, Parts 1-2, pgs 8-19<br>Investigation 3, Part 1, pgs 8-12<br>Wood and Paper FOSS Science Stories, pg 10<br>**Fabric**, Investigation 1, Parts 1-3, pgs 6-19 |
| b) sensory descriptors (sweet, sour, bitter, salty, rough/smooth, hard/soft, cold, warm, hot, loud/soft, high/low, bright/dull). | **Wood and Paper**, Investigation 1, Parts 1-2, pgs 8-19<br>Investigation 3, Parts 1-3, pgs 8-21<br>**Fabric**, Investigation 1, Parts 1-3, pgs 6-19<br>**Trees**, Investigation 1, Parts 1-2, pgs 11-19<br>Investigation 3, Part 2, pgs 12-14 |
| **K 3. The student will investigate and understand that magnets have an effect on some materials, make some things move without touching them, and have useful applications. Key concepts include:** | |
| a) attraction/nonattraction, push/pull, attract/repel, and metal/nonmetal; and | *This standard is addressed in the 1st-2nd grade FOSS module **Balance and Motion** and the FOSS module **Magnetism and Electricity,** designed for Grades 3-4.* |
| b) useful applications (refrigerator magnet, can opener, magnetized screwdriver, and magnetic games). | *This standard is addressed in the 1st-2nd grade FOSS module **Balance and Motion** and the FOSS module **Magnetism and Electricity,** designed for Grades 3-4.* |
| **K 4. The student will investigate and understand that the position, motion, and physical properties of an object can be described. Key concepts include:** | |
| a) colors (red, orange, yellow, green, blue, purple), white, and black; | **Wood and Paper**, Investigation 1, Part 1, pgs 8-14<br>Investigation 3, Parts 1-2, pgs 8-17<br>**Trees**, Investigation 2, Part 1, pgs 6-9<br>**Fabric**, Investigation 1, Part 3, pgs 16-19 |
| b) shapes (circle, triangle, square, and rectangle) and forms (flexible/stiff, straight/curved); | **Trees**, Investigation 2, Parts 1-5, pgs 6-25<br>**Wood and Paper**, Investigation 2, Part 1, pgs 8-11 |
| c) textures (rough/smooth) and feel (hard/soft); | **Fabric**, Investigation 1, Parts 1-3, pgs 6-19<br>**Wood and Paper**, Investigation 1, Parts 1-2, pgs 8-19<br>Investigation 3, Part 2, pgs 14-17<br>**Trees**, Investigation 1, Parts 1-2, pgs 11-19 |
| d) relative size and weight (big/little, large/small, heavy/light, wide/thin, long/short); and | **Wood and Paper**, Investigation 1, Part 1, pgs 8-14<br>**Trees**, Investigation 2, Parts 1-6, pgs 6-28<br>**Animals Two by Two**, Investigation 2, Part 4, pgs 22-24<br>Investigation 3, Part 3, pgs 18-20 |

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| e) position (over/under, in/out, above/below, left/right) and speed (fast/slow). | **Animals Two by Two**, Investigation 1, Part 1, pgs 10-16<br>Investigation 2, Parts 1-3, pgs 9-21<br>**Wood and Paper**, Investigation 1, Part 3-4, pgs 20-27<br>Investigation 3, Part 3, pgs 18-21<br>**Fabric**, Investigation 1, Part 5, pgs 24-28<br>**Trees**, Investigation 3, Part 5, pgs 22-25 |
| **K 5. The student will investigate and understand that water flows and has properties that can be observed and tested. Key concepts include:** | |
| a) water occurs in different states (solid, liquid, gas); | **Wood and Paper**, Investigation 1, Parts 3-5, pgs 20-32<br>Investigation 3, Part 4, pgs 22-25<br>Investigation 4, Parts 1-2, pgs 8-18<br>**Fabric**, Investigation 2, Parts 1-3, pgs 7-21<br>**Trees** FOSS Science Stories, pgs 14-15<br>and Reading Connections folio pgs 12-13 |
| b) the natural flow of water is downhill; and | **Trees** FOSS Science Stories, pg 8<br>and Reading Connections folio pgs 8-9<br>**Fabric** FOSS Science Stories pgs 16-17 |
| c) some materials float in water while others sink. | **Wood and Paper**, Investigation 1, Parts 3-5, pgs 20-32<br>Investigation 2, Part 2, pgs 12-15 |
| **K 6. The student will investigate and understand basic needs and life processes of plants and animals. Key concepts include:** | |
| a) living things change as they grow and need food, water, and air to survive; | **Animals Two By Two**, ALL, such as<br>Investigation 1, Parts 2-3, pgs 17-25<br>Investigation 2, Part 1, pgs 9-13<br>Investigation 5, Parts 1-4, pgs 10-27<br>Animals Two by Two FOSS Science Stories pgs 4-6,10-13,18,20-24<br>**Trees**, Investigation 1, Part 2, pgs 16-19<br>Investigation 3, Parts 3-9, pgs 15-38<br>Trees FOSS Science Stories, pgs 3-24 |
| b) plants and animals live and die (go through a life cycle); and | **Trees**, Investigation 3, Part 3, pgs 15-18<br>Investigation 3, Parts 5-9, pgs 22-38<br>Trees FOSS Science Stories, pgs 14-24<br>**Animals Two by Two**, Investigation 1, Part 4, pgs 26-29<br>Investigation 5, Parts 1-3, pgs 10-24<br>Animals Two by Two FOSS Science Stories pgs 20-24 |
| c) offspring of plants and animals are similar but not identical to their parents and one another. | **Animals Two by Two**, Investigation 1, Part 4, pgs 26-29 (guppies)<br>Investigation 5, Part 1, pgs 10-24<br>Investigation 5, Science Extension, pg 28<br>Investigation 5, Parts 1-3, pgs 10-24<br>Animals Two by Two FOSS Science Stories pgs 20-24<br>**Trees**, Investigation 3, Part 3, pgs 15-18 |

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| | Investigation 3, Parts 5-9, pgs 22-28<br>Trees FOSS Science Stories, pgs 3-24 |
| **K.7 The student will investigate and understand that shadows occur when light is blocked by an object. Key concepts include:** | |
| a) shadows occur in nature when sunlight is blocked by an object; and | **Trees**, Investigation 1, Part 1, pgs 7-14 |
| b) shadows can be produced by blocking artificial light sources. | |
| **K.8 The student will investigate and understand simple patterns in his/her daily life. Key concepts include:** | |
| a) weather observations; | **Trees**, Investigation 3, Parts 3-9, pgs 16-38<br>"Tools for Observing Weather" folio<br>and weather charting Duplication Masters 49-57<br>Trees FOSS Science Stories, pgs 14-23<br>and Reading Connections folio pgs 12-13 |
| b) the shapes and forms of many common natural objects including seeds, cones, and leaves; | **Trees**, Investigation 1, Part 4, pg 23-24<br>Investigation 2, Parts 1-5, pgs 6-25<br>Investigation 3, Part 5, pgs 22-25<br>Reading Connections folio pgs 10,15<br>**Animals Two by Two**, Investigation 2, Part 4, pgs 22-24<br>Animals Two by Two FOSS Science Stories, pgs 5-19 |
| c) animal and plant growth; and | **Animals Two By Two**, Investigation 1, Part 4, pgs 26-29<br>Investigation 5, Parts 1-3, pgs 10-24<br>**Trees**, Investigation 3, Part 5, pgs 22-25<br>Investigation 3, Part 7, pgs 30-31<br>Trees FOSS Science Stories pgs 3-24 |
| d) home and school routines. | **Fabric**, Investigation 1, Part 5, pgs 24-28<br>Fabric FOSS Science Stories, pgs 14-23<br>**Wood and Paper**, Investigation 2, Part 4, pgs 20-23<br>Investigation 3, Part 3, pgs 18-21 |
| **K 9. The student will investigate and understand that change occurs over time, and rates may be fast or slow. Key concepts include:** | |
| a) natural and human-made things may change over time; and | **Trees**, Investigation 3, Part 3, pgs 15-18<br>Investigation 3, Part 6, pgs 26-28<br>Investigation 3, Part 7, pgs 29-31<br>Investigation 3, Part 9, pgs 35-38<br>Trees FOSS Science Stories, pgs 14-23<br>**Wood and Paper**, Investigation 2, Parts 1-4, pgs 8-24<br>Investigation 4, Parts 1-2, pgs 8-20<br>Wood and Paper FOSS Science Stories, pgs 3-8, 13-18 |

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| | **Animals Two by Two**, Investigation 5, Parts 1-3, pgs 10-24<br>**Fabric**, Investigation 2, Part 3, pgs 18-21 |
| b) changes can be noted and measured. | **Trees**, Investigation 3, Part 3, pgs 15-18<br>Investigation 3, Part 6, pgs 26-28<br>Investigation 3, Part 7, pgs 29-31<br>Investigation 3, Part 9, pgs 35-38<br>Trees FOSS Science Stories, pgs 14-23<br>**Animals Two by Two**, Investigation 5, Parts 1-2, pgs 10-19<br>Investigation 1, Science Extension, pg 31 |
| **K 10. The student will investigate and understand that materials can be reused, recycled, and conserved. Key concepts include:** | |
| a) materials and objects can be used over and over again; | **Wood and Paper**, throughout, such as<br>Investigation 4, Parts 1-2, pgs 8-18<br>Investigation 2, Parts 3-4, pgs 16-23 |
| b) everyday materials can be recycled; and | **Wood and Paper**, Investigation 4, Parts 1-2, pgs 8-18<br>Investigation 2, Parts 3-4, pgs 16-23<br>Wood and Paper FOSS Science Stories, pgs 19, 23-24<br>Reading Connections folio, pgs 6-7 |
| c) water and energy conservation at home and in school helps preserve resources for future use. | **Wood and Paper** FOSS Science Stories, pgs 19, 23-24<br>and Reading Connections folio, pgs 6-7<br>*This standard is also addressed in depth in the grades 3-4 FOSS module **Water**.* |

# Grade One
# Standards of Learning

| *Science Standard* | *Correlation By Page Numbers* |
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| **1. 1 Student will conduct investigations in which:** | |
| a) differences in physical properties are observed using the senses; | This standard is addressed throughout the hands-on investigations in ALL FOSS modules. See for example:<br><br>**Pebbles, Sand, and Silt**,<br>Investigation 1, Part 1, pgs 8-12<br>Investigation 1, Part 3, pgs 18-21<br>Investigation 1, Part 5, pgs 26-29<br>Pebbles, Sand and Silt FOSS Science Stories, pgs 3-7<br>**Solids and Liquids**, ALL, such as Investigation 2, Parts 1-2, pgs 8-21<br>**Air and Weather**, Investigation 2, Part 2, pgs 13-16 |
| b) simple tools are used to enhance observations; | This standard is addressed throughout the hands-on investigations in ALL FOSS modules. See for example:<br><br>**Pebbles, Sand and Silt**, throughout, such as<br>Investigation 2, Part 1, pgs 8-13 (hand lenses, screens)<br>**Insects**, ALL, such as Investigation 1, Parts 1-3, pgs 8-25 (hand lenses)<br>**Air and Weather**, Investigation 2, Part 2, pgs 14-19<br>Investigation 2, Part 4, pgs 24-27 (weather tools)<br>**Insects and Plants**, Investigation 1, Parts 1-3, pgs 52-75<br>Investigation 5, Parts 1-3, pgs 206-225 |
| c) objects or events are classified and arranged according to attributes or properties; | **Pebbles, Sand and Silt**, throughout, such as<br>Investigation 2, Part 1, pgs 8-13<br>**Solids and Liquids**, ALL, such as Investigation 1, Parts 1-2, pgs 8-20<br>Investigation 2, Parts 1-2, pgs 8-21<br>**Air and Weather**, Investigation 4, Part 3, pgs 19-24 |
| d) observations and data are communicated orally and with simple graphs, pictures, written statements, and numbers; | This standard is addressed throughout all FOSS modules in journals, data sheets and small group and whole class discussion. See for example:<br><br>**New Plants**, Investigation 1, Parts 1-3, pgs 8-30<br>Investigation 2, Part 3, pgs 20-28<br>Investigation Duplication Masters 2-8<br>New Plants FOSS Science Stories, pgs 16-19 |

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| | **Pebbles, Sand, and Silt**, Investigation 4, Part 3, pgs 10-20<br>Pebbles, Sand and Silt FOSS Science Stories, pgs 24-25<br>**Solids and Liquids**, Investigation 1, Part 3, 21-24<br>Investigation 2, Part 1, pgs 10-14<br>Investigation 3, Part 2, pgs 14-18<br>Solids and Liquids FOSS Science Stories, pgs 3-7<br>**Air and Weather**, Investigation 1, Parts 4-5, pgs 21-33<br>Investigation 4, Part 1, pgs 8-11<br>**Balance and Motion**, Investigation 3, Part 2, pgs 13-18<br>Balance and Motion FOSS Science Stories, pgs. 26-31<br>**Plants and Animals**, Investigation 1, Parts 2-3, pgs 58-72 |
| e) length, mass, and volume are measured using standard and nonstandard units; | **Air and Weather**, Investigation 2, Part 4, pgs 24-27<br>Investigation 2, Science Extension, pg 31<br>**New Plants**, Investigation 1, Part 3, pgs 24-30<br>Math Extension B, Page 14<br>Investigation 2, Part 3, pgs 20-28<br>**Plants and Animals**, Investigation 1, Part 3, pgs 63-72 |
| f) predictions are based on patterns of observation rather than random guesses; | **Balance and Motion**, throughout, such as<br>Investigation 1, Part 2, pgs 14-18<br>Investigation 2, Part 3, pgs 20-25<br>Balance and Motion FOSS Science Stories, pgs 22-29<br>**New Plants** FOSS Science Stories, pgs 8-11,19<br>**Pebbles, Sand, and Silt**, Investigation 4, Part 3, pgs 19-25<br>Pebbles, Sand and Silt FOSS Science Stories, pgs 24-25 |
| g) simple experiments are conducted to answer questions; and | **Solids and Liquids**, Investigation 4, Parts 1-3, pgs 7-27<br>**Pebbles, Sand, and Silt**, Investigation 2, Part 3, pgs 18-23<br>Investigation 4, Part 3, pgs 19-25<br>Pebbles, Sand and Silt FOSS Science Stories, pgs 24-25<br>**Insects**, Investigation 3, Part 1, pgs 8-11<br>**Plants and Animals**, Investigation 1, Parts 2-3, pgs 58-72<br>**Insects and Plants**, Investigation 1, Parts 1-3, pgs 52-75 |
| h) inferences are made and conclusions are drawn about familiar objects and events. | **Pebbles, Sand, and Silt**, Investigation 4, Part 3, pgs 19-25<br>Pebbles, Sand and Silt FOSS Science Stories, pgs 24-25<br>**Solids and Liquids**, Investigation 4, Part 3, pgs 23-27<br>**New Plants**, Investigation 3, Parts 1-3, pgs 8-26<br>New Plants FOSS Science Stories pgs 16-21<br>**Plants and Animals**, Investigation 3, Parts 1-3, pgs 120-140 |
| **1. 2 The student will investigate and understand that moving objects exhibit different kinds of motion. Key concepts include:** | |
| a) objects may have straight, circular, and back and forth motions; | This standard is a focus of **Balance and Motion.** See for example:<br>**Balance and Motion**, Investigation 2, Parts 1-3, pgs 1-28 |

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| | Investigation 3, Parts 1-3, pgs 1-28<br>Balance and Motion FOSS Science Stories, pgs 10-35<br>**Air and Weather**, Investigation 1, Part 6, pgs 34-38<br>Investigation 3, Parts 3-5, pgs 17-33<br>Air and Weather FOSS Science Stories, pgs 1-6, 14-17<br>Home/School Connections, pgs 34-36<br>**Pebbles, Sand, and Silt** FOSS Science Stories, pgs 14-19 |
| b) objects may vibrate and produce sound; | **Balance and Motion** FOSS Science Stories, pgs 32-35<br>*Note: this standard is also a focus of **Physics of Sound,** designed for Grades 3-4.*<br>**Solids and Liquids**, Investigation 3, Part 3, pgs 19-23 |
| c) pushes or pulls can change the movement of an object; and | This standard is a focus of **Balance and Motion.** See for example:<br>**Balance and Motion**, Investigation 2, Parts 1-3, pgs 1-28<br>Investigation 3, Parts 1-3, pgs 1-28<br>Balance and Motion FOSS Science Stories, pgs 10-35<br>**Solids and Liquids**, Investigation 2, Part 1, pgs 10-14<br>**Air and Weather,** Investigation 1, Parts 4-6, pgs 21-38<br>Investigation 3, Parts 3–5, pgs 17-33<br>Air and Weather FOSS Science Stories, pgs 3-6, 20-21 |
| d) the motion of objects may be observed in toys and in playground activities. | **Balance and Motion**, Investigation 2, Parts 1-3, pgs 8-25 and Interdisciplinary Extensions, pgs 26-28<br>Investigation 3, Parts 1-3, pgs 6-25 and Interdisciplinary Extensions, pgs 26-28<br>Balance and Motion FOSS Science Stories pgs 7-12,22-31 |
| **1. 3 The student will investigate and understand how different common materials interact with water. Key concepts include:** | |
| a) some liquids will separate when mixed with water, others will not; | **Solids and Liquids**, Investigation 4, Part 2, pgs 17-22<br>Investigation 4, Science Extension, pg 30<br>Solids and Liquids FOSS Science Stories, pg 19 |
| b) some common solids will dissolve in water, others will not; and | **Solids and Liquids**, Investigation 3, Part 1, pgs 7-16<br>Solids and Liquids FOSS Science Stories, pg 19 |
| c) some substances will dissolve more readily in hot water than in cold water. | |
| **1. 4 The student will investigate and understand that plants have life needs and functional parts and can be classified according to certain characteristics. Key concepts include:** | |
| a) needs (food, air, water, light, and a place to grow); | **New Plants**, Investigation 1, Part 2, pgs 13-22<br>Investigation 2, Part 1, pgs 8-14<br>New Plants FOSS Science Stories, pgs 3-7<br>**Plants and Animals**,<br>Investigation 1, Part 1, pgs 47-57<br>Investigation 3, Parts 1-2, pgs 120-134 |

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| | Investigation 4, Parts 1-2, pgs 151-163<br>Plants and Animals FOSS Science Resources, pgs 3-7<br>Video: How Plants Get Food<br>**Insects and Plants**, Investigation 2, Parts 1-3, pgs 91-115 |
| b) parts (seeds, roots, stems, leaves, blossoms, fruits); and | **New Plants**, Investigation 1, Part 3, pgs 23-30<br>Investigation 1, Home/School Connection, pg 32<br>Investigation 2, Part 2, pgs 15-19<br>New Plants FOSS Science Stories, pgs 3-7,8-15,22-39<br>**Plants and Animals**,<br>Investigation 1, Parts 1-3, pgs 47-72<br>Investigation 2, Parts 1-3, pgs 87-108<br>Investigation 4, Parts 1-2, pgs 151-163<br>Plants and Animals FOSS Science Resources, pgs 4-7, 16-19<br>**Insects and Plants**, Investigation 2, Part 3, pgs 105-115<br>Insects and Plants FOSS Science Resources, pgs 15-19 |
| c) characteristics (edible/nonedible, flowering/nonflowering, evergreen/deciduous). | **New Plants**, Investigation 1, Parts 2-3, pgs 13-30<br>Investigation 2, Parts 1-3, pgs 8-28<br>Investigation 4, Part 2, pgs 13-19<br>New Plants FOSS Science Stories, pgs 3-7, 22-37<br>**Plants and Animals**,<br>Investigation 1, Parts 2-3, pgs 58-72<br>Investigation 2, Parts 1-3, pgs 87-108<br>Investigation 4, Parts 1-2, pgs 151-163<br>Plants and Animals FOSS Science Resources, pgs 16-19<br>**Insects and Plants**, Investigation 2, Part 3, pgs 105-115<br>Insects and Plants FOSS Science Resources, pgs 15-19 |
| **1. 5 The student will investigate and understand that animals, including people, have life needs and specific physical characteristics and can be classified according to certain characteristics. Key concepts include:** | |
| a) life needs (air, food, water, and a suitable place to live); | **New Plants** FOSS Science Stories, pgs 22-39 "Plants and Animals Around the World"<br>**Insects**, ALL, such as Investigation 1, Part 1, pgs 8-15<br>Investigation 3, Part 2, pgs 12-20<br>Investigation 5, Part 1, pgs 10-15<br>Insects FOSS Science Stories, pgs 4-7, 16-33, 36-39<br>**Plants and Animals**,<br>Investigation 3, Part 2, pgs 128-140<br>Plants and Animals FOSS Science Resources, pgs 21-23, 29-30, 32, 35-36, 41-42, 44-45<br>**Insects and Plants**,<br>Investigation 1, Part 1, pgs 52-61<br>Investigation 4, Part 2, pgs 170-174, |

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| | Investigation 5, Part 1, pgs 206-211 |
| b) physical characteristics (body coverings, body shape, appendages, and methods of movement); and | **Insects**, Investigation 3, Part 3, pgs 21-26<br>Investigations 4, Part 4, pgs 24-27<br>Investigation 5, Part 1, pgs 10-15<br>Investigation 6, Part 1, pgs 8-13<br>Insects FOSS Science Stories, pgs 8-15, 25-35, 42-45<br>**New Plants** FOSS Science Stories, pgs 40-43 "Animal Teeth"<br>**Insects and Plants**,<br>Investigation 1, Parts 1-3, pgs 52-75<br>Investigation 3, Parts 1-3, pgs 129-151<br>Investigation 5, Parts 1-3, pgs 206-225<br>Insects and Plants FOSS Science Resources, pgs 30-33<br>**Plants and Animals,**<br>Investigation 4, Part 2, pgs, 157-165<br>Plants and Animals FOSS Science Resources, pgs 28-50 |
| c) other characteristics (wild/tame, water homes/land homes). | **Insects**, Investigation 4, Parts 1-5 pgs 10-31<br>Investigation 6, Parts 1-3, pgs 8-22<br>Insects FOSS Science Stories, pgs 8-15,22-35<br>**New Plants** FOSS Science Stories, pgs 22-39, 42-45<br>**Plants and Animals**,<br>Investigation 3, Parts 2-3, pgs 128-140<br>Plants and Animals FOSS Science Resources, pgs 22, 28-50<br>**Insects and Plants**, Investigations 1, 3-5, all parts<br>Insects and Plants FOSS Science Resources, pgs 26-55 |
| **1. 6 The student will investigate and understand the basic relationships between the sun and the Earth. Key concepts include:** | |
| a) the sun is the source of heat and light that warms the land, air, and water; and | **Air and Weather**, Investigation 2, Part 1, pgs 11-13<br>Investigation 4, Part 3, pgs 19-24<br>Investigation 2, Parts 1-2, pgs 8-19<br>Air and Weather FOSS Science Stories, pg 21<br>**New Plants**, Investigation 1, Parts 2-3, pgs 13-30<br>New Plants FOSS Science Stories, pg 6,25,29-31,34 |
| b) night and day are caused by the rotation of the Earth. | *This standard is addressed in readings in **Ideas and Inventions,** designed for Grades 3-4, and with hands-on investigations and readings in **Planetary Science,** designed for Grades 6-8.* |
| **1. 7 The student will investigate and understand the relationship of seasonal change and weather to the activities and life processes of plants and animals. Key concepts include how temperature, light, and precipitation bring about changes in:** | |
| a) plants (growth, budding, falling leaves, and wilting); | **New Plants**, Investigation 2, Science Extension, pg 30<br>New Plants FOSS Science Stories, pgs 3-6, 12-14,16-18, 22-39<br>**Air and Weather** FOSS Science Stories, pgs 18-23<br>**Plants and Animals**, |

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| | Investigation 2, Science Extension, pg 76<br>Plants and Animals FOSS Science Resources, pgs 3-6, 31, 34 |
| b) animals (behaviors, hibernation, migration, body covering, and habitat); and | **Insects** FOSS Science Stories, pgs 7, 26-33,34-41<br>**New Plants** FOSS Science Stories, pgs 10-11<br>**Plants and Animals**,<br>Investigation 1, Parts 2-3, pgs 128-140<br>Plants and Animals FOSS Science Resources, pgs 28-50 |
| c) people (dress, recreation, and work). | **Air and Weather** FOSS Science Stories, pgs 13, 18, 21 |
| **1. 8 The student will investigate and understand that natural resources are limited.<br>Key concepts include:** | |
| a) identification of natural resources (plants and animals, water, air, land, minerals, forests, and soil); | **New Plants**, Investigation 1, Parts 1-3, pgs 1-32<br>Investigation 2, Parts 1-3 and extensions, pgs 8-32 (grass/grain)<br>New Plants FOSS Science Stories, pgs 3-7,16-21, 22-39<br>**Air and Weather**, Investigation 1, Part 1, pgs 8-12<br>Air and Weather FOSS Science Stories, pgs 3-9<br>**Pebbles, Sand, and Silt**, Investigation 3, pgs 1-29<br>Investigation 3, Language Extension, pg 30<br>Investigation 4, Parts 1-3, pgs 8-25<br>Pebbles, Sand and Silt FOSS Science Stories, pgs 16-25<br>**Plants and Animals**,<br>Investigation 1, Parts 1-3, pgs 47-72<br>Plants and Animals FOSS Science Resources, pgs 3-7<br>**Insects and Plants**, Investigation 1, Parts 1-3, pgs 52-75 |
| b) factors that affect air and water quality; and | *This topic is addressed in the grades 3-4 FOSS module:*<br>***Water** FOSS Science Stories, p. 20 and in the Grades 5-6 module **Solar Energy.*** |
| c) recycling, reusing, and reducing consumption of natural resources. | This standard is addressed throughout the FOSS modules as teachers model and teach conservation and recycling of resources whenever possible. FOSS kit materials are chosen to be durable and used repeatedly. Even such common materials as solo cups and paper plates are re-used until they are no longer functional. See for example:<br>**New Plants**,<br>Investigation 1, Part 3, pg 29<br>**Pebbles, Sand, and Silt**, Investigation 1, Parts 1-4, pgs 8-25<br>Investigation 2, Parts 1-2, pgs 8-17<br>**Solids and Liquids,** Investigation 1, Parts 1-2, pgs 8-20<br>**Insects and Plants**, Investigation 2, Part 3, pg 113 |

# Grade Two
# Standards of Learning

| *Science Standard* | *Correlation By Page Numbers* |
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| **2. 1 The student will conduct investigations in which:** | |
| a) observation is differentiated from personal interpretation, and conclusions are drawn based on observations; | **Air and Weather**, Investigation 1, Parts 1-5, pgs 8-33<br>Investigation 2, Parts 1-4, pgs 8-27<br>Investigation 4, Part 3, pgs 19-24<br>**Balance and Motion**, Investigation 1, Part 2, pgs 14-18<br>Investigation 2, Part 3, pgs 20-25<br>Balance and Motion FOSS Science Stories, pgs 22-31<br>**Plants and Animals**,<br>Investigation 1, Part 2, pgs 58-62 |
| b) observations are repeated to ensure accuracy; | **New Plants**, Investigation 2, Part 1, pgs 8-14<br>**Air and Weather**, Investigation 1, Part 4, pgs 21-26<br>**Pebbles, Sand and Silt**, Investigation 4, Part 3, pgs 19-25<br>Pebbles, Sand and Silt FOSS Science Stories, pgs 24-25<br>**Plants and Animals**,<br>Investigation 1, Parts 2-3, pgs 58-72 |
| c) two or more attributes are used to classify items; | **Pebbles, Sand and Silt**, Investigation 1, Parts 1-4, pgs 8-25<br>**Solids and Liquids**, Investigation 1, Parts 1-2, pgs 8-20<br>**Air and Weather**, Investigation 2, Part 3, pgs 20-23 |
| d) conditions that influence a change are defined; | **Air and Weather**, Investigation 1, Part 2, pgs 13-16<br>Investigation 1, Part 6, pgs 34-38<br>**Balance and Motion**, Investigation 3, Parts 1-3, pgs 6-25<br>**New Plants**, Investigation 3, Part 1, pgs 8-13 |
| e) length, volume, mass, and temperature measurements are made in metric (centimeters, meters, liters, degrees Celsius, grams, kilograms) and standard English units (inches, feet, yards, cups, pints, quarts, gallons, degrees Fahrenheit, ounces, pounds); | At the Grades K-2 level, FOSS includes options for using English and/or metric units for measurement. For example, the demonstration thermometer is in degrees Celsius on one side and Fahrenheit on the other and teachers are given the option to use one or the other. After Grade 2, FOSS uses only metric measures. Grades 1-2 teachers are encouraged to use terms such as “half-liter container” with students but metric measure is taught in the *Grade 3 module* ***Measurement*** *and used in all units thereafter*. For examples of English and metric measure (not an exhaustive listing) in Grades 1-2 FOSS, please see:<br>**Solids and Liquids**, Investigation 1, Math Extensions, pg 27<br>**Air and Weather**, Investigation 2, Part 2, pgs 14-19 |

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| | Investigation 4, Part 4, pgs 24-27<br>Investigation 2, Science Extension, pg 32<br>**New Plants,** Investigation 1, Part 3, pgs 24-30<br>Math Extension B, Page 14<br>Investigation 2, Part 3, pgs 20-28<br>**Plants and Animals**,<br>Investigation 1, Part 3, pgs 63-72<br>Investigation 1, Math Extension, pg 116 |
| f) pictures and bar graphs are constructed using numbered axes; | **Air and Weather**, Investigation 4, Part 1, pgs 8-11<br>Investigation 3, Math Extensions, pg 34<br>**Pebbles, Sand, and Silt**, Investigation 2, Math Extension, pg 30<br>**Solids and Liquids**, Investigation 2, Math Extensions, pg 28<br>Investigation 3, Math Extensions, pg 28 |
| g) unexpected or unusual quantitative data are recognized; and | All FOSS investigations are designed so that students collect data and recognize either consistent or unusual data/results. Class discussion during Word Bank/What We Learned time at the end of each lesson gives students an opportunity to share their findings and discuss unexpected results. See for example:<br>**Insects,** Investigation 1, Part 3, pgs 22-25<br>Insects FOSS Science Stories, pgs 36-38<br>Investigation 2, Part 2, pgs 20-24<br>**Balance and Motion,** Investigation 3, Parts 1-2, pgs 6-18 |
| h) simple physical models are constructed. | **Air and Weather**, Investigation 1, Part 3, pgs 17-20<br>Investigation 1, Part 6, pgs 34-38<br>Investigation 2, Part 2, pgs 12-16<br>**Balance and Motion,** Investigation 2, Parts 13-18<br>**Solids and Liquids**, Investigation 1, Part 3, pgs 21-24<br>**Pebbles, Sand, and Silt**, Investigation 3, Part 5, pgs 24-29 |
| **2. 2 The student will investigate and understand that natural and artificial magnets have certain characteristics and attract specific types of metals. Key concepts include:** | |
| a) magnetism, iron, magnetic/nonmagnetic, poles, attract/repel; and | **Balance and Motion,** Investigation 3 Extension pg 28 and "Center Instruction Card – Magnetic Force" Duplication Master 11<br>Balance and Motion FOSS Science Stories, pgs 18-21<br>*This standard is also addressed thoroughly in the 3rd – 4th grade FOSS unit* ***Magnetism and Electricity*****.**<br>**Solids and Liquids**, Investigation 3, Science Extension, pg 31 |
| b) important applications including the magnetic compass. | **Balance and Motion** FOSS Science Stories, pgs 18-21<br>*This standard is also addressed thoroughly in the 3rd – 4th grade FOSS unit* ***Magnetism and Electricity*****.** |

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| **2. 3 The student will investigate and understand basic properties of solids, liquids, and gases. Key concepts include:** | |
| a) mass and volume; and | **Air and Weather**, Investigation 2, Part 4, pgs 24-27<br>**Solids and Liquids**, Investigation 3, Math Extensions, pg 30 |
| b) processes involved with changes in matter from one state to another (condensation, evaporation, melting, and freezing). | **Solids and Liquids**, Investigation 2, Science Extension, pg 31<br>Investigation 4, Science Extension, pg 29<br>Solids and Liquids FOSS Science Stories, pgs 14-17<br>**Air and Weather**, Investigation 2, Science Extension, pg 31 |
| **2. 4 The student will investigate and understand that plants and animals undergo a series of orderly changes in their life cycles. Key concepts include:** | |
| a) some animals (frogs and butterflies) undergo distinct stages during their lives while others generally resemble their parents; and | **Insects**, Investigations 1, pgs 1-28<br>Investigation 2, pgs 1-28<br>Investigation 3, pgs 1-28<br>Investigation 4, pgs 1-32<br>Investigation 5, pgs 1-28<br>Insects FOSS Science Stories, pgs 16-21, 22-33<br>**New Plants** FOSS Science Stories, pgs 22-24<br>**Insects and Plants**, Investigation 1-5, all parts<br>Insects and Plants FOSS Science Resources, pgs 37-55 |
| b) flowering plants undergo many changes from the formation of the flower to the development of the fruit. | **New Plants**, Investigation 1, pgs 1-32 (Brassica life cycle)<br>Investigation 3, Parts 1-3, pgs 8-25<br>Investigation 4, Parts 1-2, pgs 7-19<br>New Plants FOSS Science Stories, pgs 12-15<br>**Plants and Animals**,<br>Investigation 2, Parts 1-3, pgs 87-108<br>Investigation 4, Parts 1-2, pgs 151-163<br>Plants and Animals FOSS Science Resources, pgs 9-12<br>**Insects and Plants**, Investigation 2, Part 3, pgs 105-115<br>Insects and Plants FOSS Science Resources, pgs 15-18 |
| **2. 5 The student will investigate and understand that living things are part of a system. Key concepts include:** | |
| a) living organisms are interdependent with their living and nonliving surroundings; and | **Insects**, ALL, such as Investigation 3, Parts 2-3, pgs 12-26<br>Investigation 5, Parts 2-3, pgs 16-24<br>Investigation 6, Parts 1-3, pgs 8-22<br>Insects FOSS Science Stories, pgs 3-6, 22-33, 36-41<br>**New Plants**, Investigation 1, Part 2, pgs 13-22<br>Investigation 2, Part 1, pgs 8-14<br>New Plants FOSS Science Stories pgs 22-39<br>**Plants and Animals**, |

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| | Investigation 3, Parts 1-3, pgs 120-140<br>Plants and Animals FOSS Science Resources, pgs 3-7, 21-25<br>**Insects and Plants**, Investigation 2, Parts 1-3, pgs 91-115<br>Insects and Plants FOSS Science Resources, pgs 6-7, 26-29 |
| b) habitats change over time due to many influences. | **Insects** FOSS Science Stories, pgs 36-41<br>**Pebbles, Sand, and Silt** FOSS Science Stories, pgs 12-13, 20-25<br>**New Plants** FOSS Science Stories pgs 22-39<br>**Air and Weather** FOSS Science Stories, pgs 18-21<br>**Plants and Animals** FOSS Science Resources, pgs 31-34, 37-39<br>**Insects and Plants** FOSS Science Resources, pgs 11-13 |
| **2. 6 The student will investigate and understand basic types, changes, and patterns of weather. Key concepts include:** | |
| a) temperature, wind, precipitation, drought, flood, and storms; and | **Air and Weather**,<br>Investigation 2, Part 1, pgs 8-13<br>Investigation 2, Part 4, pgs 24-27<br>Investigation 3, Part 2, pgs 12-16<br>Investigation 3, Part 4, pgs 22-27<br>Investigation 4, Part 1, pgs 8-11<br>Air and Weather FOSS Science Stories, pgs 7-13, 16-17 |
| b) the uses and importance of measuring and recording weather data. | **Air and Weather**,<br>Investigation 2, Part 2, pgs 14-19<br>Investigation 2, Part 4, pgs 24-27<br>Investigation 3, Parts 2, pgs 12-16<br>Investigation 3, Part 4, pgs 22-27<br>Investigation 4, Part 1, pgs 8-11<br>Air and Weather FOSS Science Stories, pgs 10-17 |
| **2. 7 The student will investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings. Key concepts include:** | |
| a) effects on growth and behavior of living things (migration, hibernation, camouflage, adaptation, dormancy); and | **Insects,** Investigation 5, Parts 1-3, pgs 10-24<br>Insects FOSS Science Stories, pgs 8-11, 36-46<br>**New Plants,** Investigation 1, Parts 1-2, pgs 8-22<br>New Plants FOSS Science Stories, pgs 18-23<br>**Air and Weather** FOSS Science Stories, pgs 18-21<br>**Plants and Animals** FOSS Science Resources, pgs 31-33, 40<br>**Insects and Plants** FOSS Science Resources, pgs 26-29 |
| b) weathering and erosion of the land surface. | **Pebbles, Sand, and Silt**, Investigation 1, Part 1, pgs 8-12<br>Pebbles, Sand and Silt FOSS Science Stories, pgs 3-7, 10-15 |
| **2. 8 The student will investigate and understand that plants produce oxygen and food, are a source of useful products, and provide benefits in nature. Key concepts include:** | |

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| a) important plant products (fiber, cotton, oil, spices, lumber, rubber, medicines, and paper); | **New Plants**, Investigation 2, Home/School Connection, pg 32<br>Investigation 4, Science Extension, pg 21<br>New Plants FOSS Science Stories, pgs 3-7,14-21<br>**Plants and Animals**,<br>Investigation 2, Home/School Connection, pg 77<br>Investigation 4, Science Extension, pg 168<br>Plants and Animals FOSS Science Resources, pgs 9-14<br><br>*Note: this standard is addressed in depth in **Fabric, Trees, and Wood and Paper, all** designed for Kindergarten. There is also an excellent reading about rubber in **Mixtures and Solutions**, designed for Grades 5-6.* |
| b) the availability of plant products affects the development of a geographic area; and | **New Plants** FOSS Science Stories, pgs 16-21, 22-37<br>**Plants and Animals** FOSS Science Resources, pgs 9-14 |
| c) plants provide homes and food for many animals and prevent soil from washing away. | **Insects**, Investigation 3, Parts 1-3, pgs 8-26 sticks and milkweed<br>Investigation 5, Part 3, pgs 20-23 butterfly habitat<br>Investigation 4, Part 2, pgs 14-18 mulberry<br>Insects FOSS Science Stories, pgs 8-9,16-21<br>**Pebbles, Sand and Silt** FOSS Science Stories, pgs 20-25<br>**Plants and Animals** FOSS Science Resources, pgs 22-23, 30-33, 36-45<br>**Insects and Plants**, Investigation 3, Parts 2-3, pgs 134-151<br>Insects and Plants FOSS Science Resources, pgs 7 |

# Grade Three
# Standards of Learning

| *Science Standard* | *Correlation By Page Numbers* |
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| **3. 1 The student will plan and conduct investigations in which:** | |
| a) Predictions and observations are made; | All FOSS investigations provide opportunity to make predictions and observations. See for example:<br>**Magnetism and Electricity**, Investigation 1, Part 4, pgs 30-34<br>**Physics of Sound**, Investigation 2, Parts 1-3, pgs 8-24<br>**Ideas and Inventions**, Investigation 3, Part 2, pgs 14-16<br>**Sun, Moon and Stars**, Investigation 1, Part 2, pgs 56-64<br>**Matter and Energy**, Investigation 3, Part 2, pgs 139-150 |
| b) Objects with similar characteristics are classified into at least two sets and two subsets; | **Ideas and Inventions**, Investigation 2, Part 1, pgs 8-15<br>**Magnetism & Electricity**, Investigation 1, Part 1, pgs 8-17 |
| c) Questions are developed to formulate hypotheses; | Students ask questions and answer them using investigations throughout ALL of the FOSS modules. See for example:<br><br>**Physics of Sound**, Investigation 2, Parts 1-3, pgs 8-24<br>**Earth Materials**, Investigation 3, Part 2, pgs 14-19<br>**Measurement**, Investigation 3, Part 3, pgs 18-21<br>**Human Body**, Investigation 4, Part 1, pgs 8-16<br>**Matter and Energy**, Investigation 4, Part 2, pgs 181-192 |
| d) volume is measured to the nearest milliliter and liter; | **Measurement**, Investigation 3, Parts 1–3, pgs 8-21<br>Measurement FOSS Science Stories, pgs 16-17<br>**Water,** Investigation 3, Parts 1-4, pgs 8-26<br>**Matter and Energy**, Investigation 3, Part 3, pgs 151-160 |
| e) length is measured to the nearest centimeter; | **Measurement,** Investigation 1, Parts 1–3, pgs 8-23<br>Measurement FOSS Science Stories, pg 7<br>**Human Body**, Investigation 4, Part 1, pgs 8-16<br>**Earth Materials**, Investigation 1, Parts 1-2, pgs 8-23 |
| f) mass is measured to the nearest gram; | **Measurement**, Investigation 2, Parts 1–3, pgs 8-21<br>**Earth Materials**, Investigation 1, Parts 1-2, pgs 8-23<br>**Matter and Energy**, Investigation 3, Part 2, pgs 139-150 |
| g) data are gathered, charted, and graphed (line plot, picture graph, and bar graph); | **Magnetism and Electricity,** Investigation 1, Part 3, pgs 23-29<br>Investigation 4, Part 2, pgs 14-18<br>**Measurement**, Investigation 4, Part 2, pgs 14-17<br>**Water,** Investigation 3, Part 2, pgs 12-16 |

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| | **Human Body**, Investigation 4, Parts 2-3, pgs 17-24 |
| h) temperature is measured to the nearest degree Celsius; | **Measurement**, Investigation 4, Parts 1–2, pgs 8-17<br>Measurement FOSS Science Stories, pgs 21-23<br>**Water**, Investigation 3, Part 2, pgs 12-16<br>Investigation 2, Science Extension, pg 26<br>**Matter and Energy**, Investigation 4, Part 1, pgs 174-180 |
| i) time is measured to the nearest minute; | **Human Body**, Investigation 4, Part 3, pgs 20-24 |
| j) inferences are made and conclusions are drawn; and | All FOSS Modules provide opportunity to make inferences and draw conclusions. See for example:<br>**Physics of Sound,** Investigation 2, Parts 1-3, pgs 8-24<br>**Measurement**, Investigation 3, Part 3, pgs 18-21<br>**Earth Materials**, Investigation 3, Part 2, pgs 14-19<br>**Sun, Moon and Stars**, Investigation 1, Parts 1-2, pgs 42-64<br>**Matter and Energy**, Investigation 3, Part 2, pgs 139-150 |
| k) natural events are sequenced chronologically. | **Structures of Life,** Investigation 2, Parts 1-3, pgs 8-22<br>**Water,** Investigation 3, Part 2, pgs 12-16<br>Water FOSS Science Stories, pgs 5-7<br>**Sun, Moon and Stars**, Investigation 2, Parts 1-2, pgs 79-100 |
| **3. 2 The student will investigate and understand simple machines and their uses. Key concepts include:** | |
| a) types of simple machines (lever, screw, pulley, wheel and axle, inclined plane, and wedge); | *Note: This standard is addressed in the FOSS module **Levers and Pulleys** module, designed for Grades 5-6.* |
| b) how simple machines function; | *Note: This standard is addressed in the FOSS module **Levers and Pulleys** module, designed for Grades 5-6. 3rd graders can do the hands-on investigations, but the math calculations for levers and pulleys are challenging.* |
| c) compound machines (scissors, wheelbarrow, and bicycle); and | *Note: This standard is addressed in the FOSS module **Levers and Pulleys** module, designed for Grades 5-6.* |
| d) examples of simple and compound machines found in the school, home, and work environment. | *Note: This standard is addressed in the FOSS module **Levers and Pulleys** module, designed for Grades 5-6.* |
| **3. 3 The student will investigate and understand that objects are made of materials that can be described by their physical properties. Key concepts include:** | |
| a) objects are made of one or more materials; | **Earth Materials,** Investigation 1, Parts 1-3, pgs 8-29<br>Investigation 4, Part 1, pgs 8-13<br>**Water,** Investigation 1, Part 2, pgs 14-18<br>**Measurement** FOSS Science Stories, pgs 30-33 |
| b) materials are composed of parts that are too small to be seen without magnification; and | **Earth Materials**, Investigation 1, Part 3, pgs 24-29<br>Investigation 4, Part 1, pgs 8-13<br>Earth Materials FOSS Science Stories, pg 3<br>**Measurement** FOSS Science Stories, pgs 30-33 |

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| | *Note: This standard is also addressed in the FOSS module **Mixtures and Solutions** module, designed for Grades 5-6.* |
| c) physical properties remain the same as the material is reduced in size. | **Earth Materials**, Investigation 3, Part 2, pgs 14-19<br>**Measurement** FOSS Science Stories, pgs 30-33<br><br>*Note: This standard is also addressed in the FOSS module **Mixtures and Solutions** module, designed for Grades 5-6.* |
| **3. 4 The student will investigate and understand that behavioral and physical adaptations allow animals to respond to life needs. Key concepts include:** | |
| a) methods of gathering and storing food, finding shelter, defending themselves, and rearing young, and | **Structures of Life**, Investigation 1, Part 1, pgs 8-17<br>Investigation 3, Part 1, pgs 8-14<br>Investigation 4, Part 2, pgs 14-19<br>Structures of Life FOSS Science Stories, pgs 3, 17-21, 22-34, 37-40<br>**Water** FOSS Science Stories, pgs 5-7<br>**Human Body** FOSS Science Stories, pgs 9, 11 |
| b) hibernation, migration, camouflage, mimicry, instinct, and learned behavior. | **Structures of Life**, Investigation 3, Parts 1–4, pgs 1-32<br>Structures of Life FOSS Science Stories, pgs 22-34, 35-36, 39-40<br>**Water** FOSS Science Stories, pgs 5-7 |
| **3. 5 The student will investigate and understand relationships among organisms in aquatic and terrestrial food chains. Key concepts include:** | |
| a) producer, consumer, decomposer; | **Water** FOSS Science Stories, pgs 5-7<br><br>*Note: this standard is addressed in depth in the FOSS module **Environments,** designed for Grades 5-6.* |
| b) herbivore, carnivore, omnivore; and | **Structures of Life** FOSS Science Stories, pg 43 |
| c) predator - prey. | **Human Body,** Investigation 1, Part 3, pgs 22-25<br>Human Body FOSS Science Stories, pg 9<br>**Structures of Life** FOSS Science Stories, pg 23 |
| **3. 6 The student will investigate and understand that environments support a diversity of plants and animals that share limited resources. Key concepts include:** | |
| a) water-related environments (pond, marshland, swamp, stream, river, and ocean environments); | **Water** FOSS Science Stories, pgs 5-7<br>**Structures of Life** FOSS Science Stories, pgs 12-16,17-21,24,33-34, 28 |
| b) dry-land environments (desert, grassland, rain forest, and forest environments); and | **Structures of Life**, Investigation 4, Science Extension, pg 31<br>**Structures of Life** FOSS Science Stories, pgs 22-32, 37-39 |
| c) population and community. | **Structures of Life**,<br>Investigation 4, Science Extension, pg 31<br>Structures of Life FOSS Science Stories, pg s 22-34, 43<br>**Water** FOSS Science Stories, pgs 5-7 |

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| **3. 7 The student will investigate and understand the major components of soil, its origin, and importance to plants and animals including humans. Key concepts include:** | |
| a) soil provides the support and nutrients necessary for plant growth; | **Structures of Life** FOSS Science Stories, pgs 2,4-5,10-11,12-16<br>(Note: in **Structures of Life,** students grow beans hydroponically, but the readings provide a contrast with the typical method of planting in soil.)<br><br>*Note: This standard is also addressed in the FOSS Grades 1-2* ***Pebbles, Sand and Silt*** *module.* |
| b) topsoil is a natural product of subsoil and bedrock; | *Note: This standard is addressed in the FOSS Grades 1-2* ***Pebbles, Sand and Silt*** *module.* |
| c) rock, clay, silt, sand, and humus are components of soils; and | *Note: This standard is addressed in the FOSS Grades 1-2* ***Pebbles, Sand and Silt*** *module.* |
| d) soil is a natural resource and should be conserved. | **Water,** Investigation 4, Part 1, pgs 8-13<br><br>*Note: This standard is addressed in the FOSS Grades 1-2* ***Pebbles, Sand and Silt*** *module.* |
| **3. 8 The student will investigate and understand basic patterns and cycles occurring in nature. Key concepts include:** | |
| a) patterns of natural events (day and night, seasonal changes, phases of the moon, and tides); and | **Water** FOSS Science Stories, pgs 14-16<br>FOSS Web, Pictures, Water Cycle<br>**Ideas and Inventions** FOSS Science Stories pgs 33-36<br>**Sun, Moon and Stars**,<br>Investigation 1, Parts 1-2, pgs 42-64<br>Investigation 2, Parts 1-2, pgs 79-100<br>Investigation 3, Part 1, pgs 114-125<br>Sun, Moon and Stars FOSS Science Resources, pgs 1-32 |
| b) animal and plant life cycles. | **Structures of Life**, Investigation 2, Parts 1-3, pgs 8-22<br>Structures of Life FOSS Science Stories, pgs 20-21<br>FOSS Web, Activity: Life Cycles<br><br>*Note: life cycles are a major focus of* ***Insects*** *and* ***New Plants,*** *FOSS modules designed for Grades 1-2.* |
| **3. 9 The student will investigate and understand the water cycle and its relationship to life on Earth. Key concepts include:** | |
| a) the energy from the sun drives the water cycle; | **Water** FOSS Science Stories, pgs 14-16 |
| b) processes involved in the water cycle (evaporation, condensation, precipitation); | **Water,** Investigation 3, Parts 1–4, pgs 8-26<br>**Water** FOSS Science Stories, pgs 12-16 |
| c) water is essential for living things; and | Structures of Life, Investigation 2, Parts 1-3, pgs 8-22<br>Structures of Life FOSS Science Stories, pgs 2, 4, 10-11, 22-34 |

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| | **Water** FOSS Science Stories, pg 17 |
| d) water supply and water conservation. | **Water,** Investigation 3, Social Studies Extension, pg 28<br>Investigation 4, Math Extension, pgs 30-31<br>Investigation 4, Language Extension. Pg 29<br>**Water** FOSS Science Stories, pgs 17-21, 22-23 |
| **3. 10 The student will investigate and understand that natural events and human influences can affect the survival of species. Key concepts include:** | |
| a) the interdependency of plants and animals; | **Structures of Life**, Investigation 3, Part 2, pgs 16-19<br>Structures of Life FOSS Science Stories, pgs 3, 18, 22-26, 43<br>**Water** FOSS Science Stories, pgs 5-7<br>**Human Body**, Investigation 1, Part 3, pgs 21-25<br>Human Body FOSS Science Stories, pg 9 |
| b) human effects on the quality of air, water, and habitat; | **Water** FOSS Science Stories, pgs 17-20, 22-26 |
| c) the effects of fire, flood, disease, and erosion on organisms; and | **Water**, Investigation 1, Science Extension, pg 27<br>**Water** FOSS Science Stories, pgs 22-23<br>**Structures of Life** FOSS Science Stories pgs 35-36,45-48 |
| d) conservation and resource renewal. | Conservation is a major theme is ALL FOSS modules, and every effort is made to instill in students an understanding of the need to use just what is needed and recycle whenever possible. Even such materials as paper plates and solo cups are re-used until they are no longer functional. Conservation and resource renewal are a particular focus of the **Water** module. See for example:<br>**Water**, Investigation 1, Parts 1-3, pgs 8-23<br>Investigation 3, Language Extension, pg 27<br>Investigation 4, Math Extension, pg 30<br>Water FOSS Science Stories, pg 21<br>**Measurement** FOSS Science Stories, pgs 16-17 |
| **3. 11 The student will investigate and understand different sources of energy. Key concepts include:** | |
| a) the sun's ability to produce light and heat energy; | **Water** FOSS Science Stories, pgs 14-16<br>**Physics of Sound** FOSS Science Stories, pgs 22-28<br>**Structures of Life** FOSS Science Stories, pg 43<br>**Sun, Moon and Stars** Foss Science Resources, pgs 1-3<br>**Matter and Energy**, Investigation 1, Part 1, pgs 50-62<br>Matter and Energy FOSS Science Resources, pgs. 1, 5, 18-19<br><br>*This standard is also addressed in depth in the 5th and 6th grade module* ***Solar Energy.*** |
| b) sources of energy (sunlight, water, wind); | **Water**, Investigation 4, Part 2, pgs 14-18<br>Water FOSS Science Stories, pgs 22-23 |

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| | **Physics of Sound**, Investigation 3, Parts 1-2, pgs 8-19<br>Physics of Sound FOSS Science Stories, pgs 14, 19-20, 22-28<br>**Magnetism and Electricity**, Investigation 1, Parts 1-4, pgs 7-34<br>Investigation 2, Parts 1-4, pgs 8-29<br>Magnetism and Electricity FOSS Science Stories, pgs 1-7, 19<br>**Sun, Moon and Stars** FOSS Science Resources, pgs 1-3<br>**Matter and Energy**, Investigation 1, Parts 1-3, pgs 50-82<br>Matter and Energy FOSS Science Resources, pgs. 1-7<br><br>*This standard is also addressed in depth in the 5th and 6th grade module* ***Solar Energy.*** |
| c) fossil fuels (coal, oil, natural gas) and wood; and | **Physics of Sound** FOSS Science Stories, pgs 22-28<br>**Matter and Energy** FOSS Science Resources, pgs. 2-3, 9-10<br><br>*This standard is addressed in depth in readings from the 5th and 6th grade module* ***Solar Energy.*** |
| d) renewable and nonrenewable energy resources. | **Water**, FOSS Web, Activity: Match the Resource<br><br>*This standard is addressed in depth in the 5th and 6th grade module* ***Solar Energy.*** |

# Grade Four
# Standards of Learning

| *Science Standard* | *Correlation By Page Numbers* |
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| **4.1 The student will plan and conduct investigations in which:** | |
| a) distinctions are made among observations, conclusions, inferences, and predictions; | Students conduct investigations in each FOSS module that allow them to make observations, predictions, inferences, and conclusions. Some examples are:<br><br>**Magnetism and Electricity**, Investigation 1, Parts 3-4, pgs 23-34<br>**Measurement**, Investigation 2, Parts 1-3, pgs 8-21<br>**Water**, Investigation 1, Parts 1-3, pgs 8-23<br>**Ideas and Inventions**, Investigation 2, Parts 1-3, pgs 8-22<br>**Physics of Sound,** Investigation 3, Parts 1-2, pgs 8-19<br>**Sun, Moon and Stars**, Investigation 1, Part 2, pgs 56-64<br>**Matter and Energy**, Investigation 3, Part 2, pgs 139-150 |
| b) hypotheses are formulated based on cause and effect relationships; | Students develop questions, form hypotheses based on cause and effect relationships, make predictions and seek answers to the questions by experimentation throughout the FOSS units. Some examples are:<br><br>**Structures of Life**, Investigation 3, Part 3, pgs 20-23<br>Investigation 5, Parts 1-3, pgs 8-24<br>**Physics of Sound**, Investigation 2, Parts 1-2, pgs 8-19<br>**Earth Materials**, Investigation 3, Parts 1-2, pgs 8-19<br>**Human Body**, Investigation 4, Parts 2-3, pgs 17-24<br>**Matter and Energy**, Investigation 4, Part 2, pgs 181-192 |
| c) variables that must be held constant in an experimental situation are defined; | The term "variable" is introduced in the **Variables** module, designed for Grades 5-6. However, students conduct experiments in which they change one variable at a time throughout the Grades 3-4 FOSS modules. Some examples include:<br><br>**Magnetism and Electricity**, Investigation 4, Parts 2, pgs 14-18<br>**Water**, Investigation 1, Part 2, pgs 14-18<br>Investigation 3, Parts 2-3, pgs 12-20<br>**Physics of Sound**, Investigation 2, Parts 2-3, pgs 13-14 |
| d) appropriate instruments are selected to measure linear distance, volume, mass, and temperature; | This standard is introduced in the **Measurement** module for Grades 3-4 and then reinforced throughout all FOSS modules from Grade 3 on. See for example: |

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| | **Measurement**, Investigation 1, Parts 1-3, pgs 8-24 (length)<br>Investigation 2, Parts 1-3, pgs 8-21 (mass)<br>Investigation 3, Parts 1-3, pgs 8-21 (volume and capacity)<br>Investigation 4, Parts 1-2, pgs 8-17 (temperature)<br>Measurement FOSS Science Stories pgs 5-29<br>**Structures of Life**, Investigation 1, Part 3, pgs 28-33 (mass)<br>Investigation 2, Part 3, pgs 18-22 (length)<br>**Water**, Investigation 2, Part 3, pgs 19-24 (temperature)<br>Investigation 3, Parts 1-4, pgs 8-26 (volume)<br>**Earth Materials,** Investigation 1, Parts 1-2, pgs 8-23 (length, mass)<br>**Matter and Energy**, Investigation 3, Part 2, pgs 139-150 (mass)<br>Investigation 4, Part 1, pp. 174-180 (temperature) |
| e) appropriate metric measures are used to collect, record, and report data; | This standard is introduced in the **Measurement** module for Grades 3-4 and then reinforced throughout all FOSS modules from Grade 3 on. See for example:<br>**Measurement**, Investigation 1, Parts 1-3, pgs 8-24 (length)<br>Investigation 2, Parts 1-3, pgs 8-21 (mass)<br>Investigation 3, Parts 1-3, pgs 8-21 (volume and capacity)<br>Investigation 4, Parts 1-2, pgs 8-17 (temperature)<br>Measurement FOSS Science Stories pgs 5-29<br>**Structures of Life**, Investigation 1, Part 3, pgs 28-33 (mass)<br>Investigation 2, Part 3, pgs 18-22 (length)<br>**Water**, Investigation 2, Part 3, pgs 19-24 (temperature)<br>Investigation 3, Parts 1-4, pgs 8-26 (volume)<br>**Earth Materials,** Investigation 1, Parts 1-2, pgs 8-23 (length, mass)<br>**Matter and Energy**, Investigation 3, Part 2, pgs 139-150 (mass)<br>Investigation 4, Part 1, pp. 174-180 (temperature) |
| f) data are displayed using bar and basic line graphs; | **Magnetism and Electricity**, Investigation 1, Part 3, pgs 23-29<br>Investigation 4, Part 2, pgs 14-18<br>**Measurement,** Investigation 4, Part 2, pgs 14-17<br>**Structures of Life**, Investigation 1, Parts 1-3, pgs 8-33<br>Investigation 2, Part 3, pgs 18-22 |
| g) numerical data that are contradictory or unusual in experimental results are recognized; and | This standard is intentionally addressed in the first part of each new investigation in **Measurement,** to help students understand why a standard unit of measure is needed. See for example:<br><br>**Measurement**, Investigation 1, Part 1, pgs 8-15<br>Investigation 2, Part 1, pgs 8-13<br>Investigation 3, Part 1, pgs 8-13<br>Investigation 4, Part 1, pgs 8-13 |

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| | Students can encounter contradictory or unusual data in any experiments involving numerical data. Results of ALL FOSS investigations are shared and recognized in class discussion during the "Word Bank" and "Content/Inquiry Bank" time. See for example:<br>**Human Body**, Investigation 4, Parts 1-3, pgs 8-24<br>**Magnetism and Electricity**, Investigation 1, Part 3, pgs 23-29<br>**Structures of Life**, Investigation 1, Parts 1-3, pgs 8-33<br>**Matter and Energy**, Investigation 3, Part 2, pgs 139-150 |
| h) predictions are made based on data from picture graphs, bar graphs, and basic line graphs. | Students make predictions based on data from graphs throughout many FOSS investigations. Some examples are:<br><br>**Magnetism and Electricity,** Investigation 1, Part 3, pgs 23-29<br>Investigation 4, Part 2, pgs 23-29<br>**Structures of Life**, Investigation 2, Part 3, pgs 18-22<br>**Measurement**, Investigation 4, Part 2, pgs 1-24 |
| **4.2 The student will investigate and understand characteristics and interaction of moving objects. Key concepts include:** | |
| a) motion is described by an object's direction and speed; | *This standard is addressed in the 5th – 6th grade FOSS module* ***Levers and Pulleys.*** |
| b) forces cause changes in motion; | *This standard is addressed in the 5th – 6th grade FOSS module* ***Levers and Pulleys.*** |
| c) friction is a force that opposes motion; and | *This standard is addressed in the 5th – 6th grade FOSS module* ***Levers and Pulleys.*** |
| d) moving objects have kinetic energy. | **Physics of Sound** FOSS Science Stories pgs 22-28<br><br>*This standard is also addressed in the 5th – 6th grade FOSS module* ***Levers and Pulleys.*** |
| **4.3 The student will investigate and understand the characteristics of electricity. Key concepts include:** | |
| a) conductors and insulators; | **Magnetism and Electricity,** Investigation 2, Parts 3-4, pgs 20-29<br>Investigation 2, Language Extension, pg 30 |
| b) basic circuits (open/closed, parallel/series); | **Magnetism and Electricity**, Investigation 2, Parts 1-2, pgs 8-19<br>Investigation 3, Parts 1-3, pgs 1-26 |
| c) static electricity; | **Magnetism and Electricity FOSS Science Stories**, pgs 10-11, 12-13 |
| d) the ability of electrical energy to be transformed into heat, light, and mechanical energy; | **Magnetism and Electricity,** Investigation 2, Parts 1-2, pgs 8-19<br>Investigation 4, Part 1, pgs 8-13<br>Investigation 5, Parts 1-2, pgs 8-20<br>Magnetism and Electricity FOSS Science Stories pgs 12-13,14-19, 28-33<br>**Matter and Energy**, Investigation 1, Parts 1-3, pgs 50-82 |

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| | Matter and Energy FOSS Science Resources, pp. 6-7, 14 |
| e) simple electromagnets and magnetism: and | **Magnetism and Electricity,** Investigation 1, Parts 1-4, pgs 1-34<br>Investigation 4, Parts 1-3, pgs 8-22<br>Investigation 5, Parts 1-2, pgs 8-20<br>Magnetism and Electricity FOSS Science Stories pgs 1-6, 24-27, 28-33 |
| f) historical contributions in understanding electricity. | **Magnetism and Electricity,** Investigation 5, Parts 1-2, pgs 8-20<br>Magnetism and Electricity FOSS Science Stories, pgs 12-15, 16-19, 21-27,34-37 |
| **4.4 The student will investigate and understand basic plant anatomy and life processes. Key concepts include:** | |
| a) the structures of typical plants (leaves, stems, roots, and flowers); | **Structures of Life**, Investigation 2 Parts 1-3, pgs 8-22<br>Structures of Life FOSS Science Stories, pgs 1-5,10-11,12-16,25,29 |
| b) processes and structures involved with reproduction (pollination, stamen, pistil, sepal, embryo, spore, and seed); | **Structures of Life**, Investigation 2, Part 3, pgs 11-22<br>Investigation 2, Science Extension, pg 24<br>Structures of Life FOSS Science Stories, pgs 1-5 |
| c) photosynthesis (sunlight, chlorophyll, water, carbon dioxide, oxygen, and sugar); and | Matter and Energy FOSS Science Resources, pgs. 5, 19<br><br>*This standard is addressed in a reading in **Environments,** designed for Grades 5-6 and in hands-on investigations and readings in **Populations and Ecosystems,** designed for Grades 6-8.* |
| d) dormancy. | **Structures of Life**, Investigation 1, Part 3, pgs 28-33<br>Structures of Life FOSS Science Stories, pg 2 |
| **4.5 The student will investigate and understand how plants and animals in an ecosystem interact with one another and the nonliving environment. Key concepts include:** | |
| a) behavioral and structural adaptations; | This standard is a major focus of the life science modules for Grades 3-4. See for example:<br>**Structures of Life**, Investigation 3, Parts 1–4, pgs 8-30<br>Investigation 4, Parts 1-3, pgs 8-24<br>Structures of Life FOSS Science Stories, pgs 17-21, 22-34,41-42<br>**Human Body**, Investigation 2, Parts 1-3, pgs 8-22<br>Structures of Life FOSS Science Stories, pgs 1-3, 10-13 |
| b) organization of communities; | **Structures of Life** FOSS Science Stories, pg 43<br>**Water** FOSS Science Stories, pgs 5-7 |
| c) flow of energy through food webs; | **Structures of Life** FOSS Science Stories, pg 43 |
| d) habitats and niches; | **Structures of Life,** Investigation 3, Parts 1–4, pgs 8-30<br>Investigation 4, Part 1, pgs 8-15<br>Investigation 5, Parts 1-3, pgs 8-24<br>Structures of Life FOSS Science Stories, pgs 22-34,37-38<br>**Water** FOSS Science Stories, pgs 5-7 |
| e) life cycles; and | **Structures of Life**, Investigation 2, Part 3, pgs 18-22 |

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| | Structures of Life FOSS Science Stories, pgs 20-21,40<br>FOSS Web, Activity: Life Cycles |
| f) influence of human activity on ecosystems. | **Water** FOSS Science stories, pgs 17-20, 22-23 |
| **4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. Key concepts include:** | |
| a) weather measurements and meteorological tools (air pressure-barometer, wind speed-anemometer, rainfall-rain gauge, and temperature-thermometer); | *This standard is addressed in the FOSS module **Air and Weather,** designed for Grades 1-2, in a reading in **Solar Energy,**, designed for Grades 5-6, and in **Weather and Water,** designed for Grades 6-8.* |
| b) weather phenomena (fronts, clouds, and storms). | *This standard is addressed in the FOSS module **Air and Weather,** designed for Grades 1-2, in a reading in **Solar Energy,**, designed for Grades 5-6, and in **Weather and Water,** designed for Grades 6-8.* |
| **4.7 The student will investigate and understand the relationships among the Earth, moon, and sun. Key concepts include:** | |
| a) the motions of the Earth, moon, and sun (revolution and rotation); | **Ideas and Inventions** FOSS Science Stories pgs 33-36<br>**Sun, Moon and Stars**,<br>Investigation 1, Parts 1-2, pgs 42-64<br>Investigation 2, Part 2, pgs 89-100<br>Investigation 3, Part 1, pgs 114-125<br>Sun, Moon and Stars FOSS Science Resources, pgs 1-3, 5-7, 10-11, 20-24, 30-31<br><br>*This standard is addressed in greater depth in the FOSS module **Planetary Science**, designed for Grades 6-8.* |
| b) the causes for the Earth's seasons and phases of the moon; | **Ideas and Inventions** FOSS Science Stories pgs 33-36<br>**Sun, Moon and Stars**, Investigation 2, Parts 1-2, pgs 79-100<br>Sun, Moon and Stars FOSS Science Resources, pgs 7-8, 10-11, 19-24, 30-32<br><br>*This standard is addressed in greater depth in the FOSS modules **Weather and Water** (for seasons) and **Planetary Science**, (for moon phases) both designed for Grades 6-8.* |
| c) the relative size, position, age, and makeup of the Earth, moon, and sun; and | **Sun, Moon and Stars** FOSS Science Resources, pgs 16-17, 20-23<br><br>*This standard is addressed in the FOSS module **Solar Energy**, designed for Grades 5-6 and in **Planetary Science**, designed for Grades 6-8.* |
| d) historical contributions in understanding the Earth-moon-sun system. | **Sun, Moon and Stars** FOSS Science Resources, pg 40<br><br>*This standard is addressed in the FOSS module **Models and Designs**, designed for Grades 5-6 and in **Planetary Science**, designed for* |

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| | *Grades 6-8.* |
| **4.8 The student will investigate and understand important Virginia natural resources. Key concepts include:** | |
| a) watershed and water resources; | **Water** FOSS Science Stories, pgs 1-2, 4-7, 17<br>**Structures of Life** FOSS Science Stories pgs 22-24, 35-36<br>*Note that locally available curriculum materials such as those from the Department of Natural Resources will be able to extend these concepts to local Virginia watersheds and other water resources.* |
| b) animals and plants; | **Water** FOSS Science Stories, pgs 5-7<br>**Structures of Life**, Investigation 1, Part 1, pgs 8-17<br>Investigation 3, Parts 1-3, pgs 8-23<br>Investigation 4, Parts 1-2, pgs 8-19<br>Investigation 5, Parts 1-3, pgs 8-24<br>Structures of Life FOSS Science Stories, pgs 1-3, 17-21, 22-24, 35-36<br><br>*Note that locally available resources such as those from the Department of Natural Resources will be able to extend these concepts to local species of animals and plants.* |
| c) minerals, rocks, ores, and energy sources; and | **Earth Materials**, Investigation 2, Part 1, pgs 8-13<br>Investigation 3, Part 1, pgs 8-13<br>Investigation 4, Part 1, pgs 8-13<br>Earth Materials FOSS Science Stories, pgs 12-15<br><br>*Note that locally available curriculum materials such as those from the Department of Natural Resources will be able to extend these concepts to local rock, mineral and other resources.* |
| d) forests, soil, and land. | **Earth Materials** FOSS Science Stories, pgs 1-7<br>**Structures of Life** FOSS Science Stories, pgs 22-24, 35-36<br><br>*Note that locally available curriculum materials such as those from the Department of Natural Resources will be able to extend these concepts to local forests, soil and land.* |

# Grade Five
# Standards of Learning

| *Science Standard* | *Correlation By Page Numbers* |
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| **5.1 The student will plan and conduct investigations in which:** | |
| a) rocks, minerals, and organisms are identified using a classification key; | *This standard is addressed in the FOSS Middle School modules. See for example:*<br>***Earth History****, Investigation 7, Part 1, pgs 234-239*<br>*Earth History Resources, pgs 38-41* |
| b) estimations of length, mass, and volume are made; | This standard is addressed throughout all FOSS modules from Grade 3 on. See for example:<br>**Variables,** Investigation 2, Parts 1-3, pgs 8-23<br>**Mixtures and Solutions,** Investigation 2, Parts 1-4, pgs 8-28<br>**Models and Designs**, Investigation 3, Parts 2-3, pgs 14-23 |
| c) appropriate instruments are selected and used for making quantitative observations of length, mass, volume, and elapsed time; | This standard is addressed throughout all FOSS modules from Grade 3 on. See for example:<br>**Levers and Pulleys**, Investigation 3, Parts 1-3, pgs 8-24<br>Investigation 4, Parts 1-2, pgs 8-20<br>**Solar Energy,** Investigation 2, pgs 1-24<br>Investigation 3, Parts 1-2, pgs 8-23<br>**Models and Designs**, Investigation 3, Part 2, pgs 13-19<br>**Variables**, Investigation 1, Parts 1-2, pgs 8-22<br>Investigation 3, Parts 2-3, pgs 14-19<br>**Food and Nutrition**, Investigation 2, Parts 1-2, pgs 8-21<br>**Water Planet**, Investigation 3, Part 1, pgs 125-135<br>**Living Systems**, Investigation 2, Part 1, pgs 85-98<br>Investigation 3, Part 3, pp. 136-141 |

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| d) accurate measurements are made using basic tools (thermometer, meter stick, balance, graduated cylinder); | This standard is addressed throughout all FOSS modules from Grade 3 on. See for example:<br><br>**Levers and Pulleys**, Investigation 3, Parts 1-3, pgs 8-24<br>Investigation 4, Parts 1-2, pgs 8-20<br>**Solar Energy**, Investigation 2, pgs 1-24<br>Investigation 3, Parts 1-2, pgs 8-23<br>**Models and Designs**, Investigation 3, Part 2, pgs 13-19<br>**Variables**, Investigation 1, Parts 1-2, pgs 8-22<br>Investigation 3, Parts 2-3, pgs 14-19<br>**Food and Nutrition**, Investigation 2, Parts 1-2, pgs 8-21<br>**Mixtures and Solutions**, Investigation 2, Parts 1-3, pgs 8-25<br>**Water Planet**, Investigation 3, Part 1, pgs 125-135<br>**Living Systems**, Investigation 2, Part 1, pgs 85-98 |
| e) data are collected, recorded, and reported using the appropriate graphical representation (graphs, charts, diagrams); | This standard is addressed in lab notebooks and data sheets throughout all FOSS modules. See for example:<br>**Variables**, Investigation 1, Parts 2-3, pgs 16-27<br>Investigation 2, Parts 3-4, pgs 20-27<br>Investigation 4, Part 3, pgs 18-23<br>**Environments**, Investigation 2, Part 4, pgs 26-30<br>Investigation 3, Parts 1-3, pgs 8-22<br>Investigation 5, Part 2, pgs 14-18<br>Investigation 6, Parts 1-2, pgs 8-17<br>**Mixtures and Solutions**, Investigation 1, Parts 1-2, pgs 8-19<br>Investigation 3, Part 1, pgs 8-14<br>**Landforms**, Investigation 1,Parts 2-3, pgs 16-24<br>Investigation 3, Parts 1-2, pgs 8-19<br>Investigation 4, Part 2, pgs 16-20<br>**Food and Nutrition**, Investigation 3, Part 3, pgs 21-25<br>**Levers and Pulleys**, Investigation 1, Parts 2-3, pgs 18-28<br>Investigation 4, Part 1 pgs 8-13<br>**Solar Energy**, Investigation 2, pgs 1-24<br>Investigation 3, pgs 8-23<br>Investigation 4, Part 2, pgs 20-23<br>**Water Planet**, Investigation 3, Part 1, pgs 125-135<br>**Living Systems**, Investigation 2, Part 1, pgs 85-98 |
| f) predictions are made using patterns, and simple graphical data are extrapolated; | **Variables**, Investigation 1, Part 3, pgs 23-27<br>Investigation 2, Part 3, pgs 19-23<br>**Models and Designs**, Investigation 1, Parts 1-2, pgs 8-21 |
| g) manipulated and responding variables are identified; and | This standard is addressed throughout ALL FOSS Grades 5-8 modules. It is a particular focus of **Variables,** designed for Grades 5-6, and all |

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| | other modules build on the skills and content introduced in that module. See for example:<br>**Variables**, Investigation 1, Parts 1-3, pgs 8-27<br>Investigation 2, Parts 1-2, pgs 8-17<br>Investigation 3, Parts 2-4, pgs 14-27<br>Investigation 4, Part 3, pgs 18-23<br>Variables FOSS Science Stories, pgs 1-3, 10-11,29-31,34-37<br>**Environments**, Investigation 3, Parts 1-3, pgs 8-22<br>Investigation 5, Parts 1-3, pgs 8-22<br>Investigation 6, Parts 1-2, pgs 8-17<br>**Landforms**, Investigation 3, Parts 1-2, pgs 8-19<br>**Solar Energy**, Investigation 2, Parts 1-2, pgs 8-24<br>**Water Planet**, Investigation 2, Parts 2-3, pgs 86-100 |
| h) an understanding of the nature of science is developed and reinforced. | FOSS modules are inquiry based and developing an understanding of science is a focus of the program, particularly in the "Scientific Reasoning" strand of modules for Grades 3-6. See for example:<br><br>**Variables**, Investigation 1, Parts 1-3, pgs 8-27<br>Variables FOSS Science Stories, pgs 1-14, 29-31,34-37<br>**Mixtures and Solutions** FOSS Science Stories pgs 4-10,24,29-36<br>**Living Systems**, Investigation 3, Part 3, pgs 136-141<br>**Models and Designs** FOSS Science Stories pgs 1-10, 11-16, 29-40<br>FOSS Web Site: www.fossweb.com "Careers" |
| **5.2 The student will investigate and understand how sound is transmitted and is used as a means of communication. Key concepts include:** | |
| a) frequency, waves, wavelength, vibration; | *These concepts are addressed with hands-on investigations and readings in the grades 3-4 module **Physics of Sound**. See for example:*<br>***Physics of Sound** Investigation 2, Parts 1-3, pgs 8-24*<br>*Physics of Sound FOSS Science Stories, pgs 9-21* |
| b) the ability of different media (solids, liquids, and gases) to transmit sound; and | *These concepts are addressed with hands-on investigations and readings in the grades 3-4 module **Physics of Sound**. See for example:*<br>***Physics of Sound** Investigation 3, Parts 1-2, pgs 8-21*<br>*Physics of Sound FOSS Science Stories, pgs 19-21,26* |
| c) uses and applications (voice, sonar, animal sounds, and musical instruments). | *These concepts are addressed with hands-on investigations and readings in the grades 3-4 module **Physics of Sound**. See for example:*<br>***Physics of Sound** Investigation 4, Parts 1-2, pgs 8-24*<br>*Physics of Sound FOSS Science Stories, pgs 1-10,11-13,15-16,29-31,32-36* |

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| **5.3 The student will investigate and understand basic characteristics of visible light and how it behaves. Key concepts include:** | |
| a) the visible spectrum and light waves; | **Variables** FOSS Science Stories pgs 4-5<br><br>*This standard is also addressed in the FOSS Middle School module* ***Human Brain and Senses.*** |
| b) refraction of light through water and prisms; | **Variables** FOSS Science Stories, pgs 4-5 |
| c) reflection of light from reflective surfaces (mirrors); | *This standard is also addressed in the FOSS module* ***Matter and Energy,*** *designed for Grades 3-4 See* ***Matter and Energy****, Investigation 2, Part 1, pgs 93-102*<br>*This standard is also addressed in the FOSS module* ***Ideas and Inventions,*** *designed for Grades 3-4. See* ***Ideas and Inventions,*** *Investigation 4, Parts 1-3 pgs 8-21 and Ideas and Inventions FOSS Science Stories pgs 23-25,28-32* |
| d) opaque, transparent, and translucent; and | *This standard is addressed in* ***Solids and Liquids****, designed for Grades 1-2. It is also in a reading in* ***Earth Materials*** *FOSS Science Stories, pg 31, designed for Grades 3-4.* |
| e) historical contributions in understanding light. | **Variables** FOSS Science Stories, pgs 4-5 |
| **5.4 The student will investigate and understand that matter is anything that has mass; takes up space; and occurs as a solid, liquid, or gas. Key concepts include:** | |
| a) atoms, elements, molecules, and compounds; | **Mixtures and Solutions** FOSS Science Stories, pgs 3-6, 8, 11-12, 25-28, 32-36, 37-42 |
| b) mixtures including solutions; and | **Mixtures and Solutions**<br>Investigation 1, pgs 8-29<br>Investigation 2, pgs 8-28<br>Investigation 3, pgs 8-24<br>Investigation 4, pgs 8-28<br>Mixtures and Solutions FOSS Science Stories, pgs 1-3, 13-16, 18-19, 20-22<br>FOSS Web, Activity: Solution or Mixture |
| c) effect of heat on the states of matter. | **Solar Energy,** Investigation 2, pgs 8-24<br>Investigation 3, pgs 8-23<br>**Solar Energy** FOSS Science Stories, pgs 2, 22-25,29-37<br>**Mixtures and Solutions** FOSS Science Stories, pgs 18-19, 24<br>Investigation 2, Science Extension, p.31 |
| **5.5 The student will investigate and understand that organisms are made of cells and have distinguishing characteristics. Key concepts include:** | |
| a) basic cell structures and functions; | **Living Systems**, Investigation 1, Part 1, pgs 51-59<br>**Living Systems** FOSS Science Resources, pgs 1-3<br>**Food and Nutrition** FOSS Science Stories pgs 41-43 “Living Cells” |

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| | *These concepts are also addressed thoroughly with hands-on investigations and readings in the grades 6-8 module* ***Diversity of Life****.* |
| b) kingdoms of living things; | *These concepts are addressed thoroughly with hands-on investigations and readings in the grades 6-8 module* ***Diversity of Life****.* |
| c) vascular and nonvascular plants; and | **Living Systems**, Investigation 2, Part 1, pgs 85-98<br>**Living Systems** FOSS Science Resources, pgs 16-20<br><br>*These concepts are addressed thoroughly with hands-on investigations and readings in the grades 6-8 module* ***Diversity of Life****.* |
| d) vertebrates and invertebrates. | *These concepts are addressed with hands-on investigations and readings in the grades 6-8 module* ***Diversity of Life****.* |
| **5.6 The student will investigate and understand characteristics of the ocean environment. Key concepts include:** | |
| a) geological characteristics (continental shelf, slope, rise); | **Landforms** FOSS Science Stories pgs 22-24 |
| b) physical characteristics (depth, salinity, major currents); and | **Environments** FOSS Science Stories, pgs 31-35<br>**Solar Energy** FOSS Science Stories, pgs 22-25<br>**Weather and Water** Resources, pgs 45-47, 53-55 |
| c) biological characteristics (ecosystems). | **Environments** FOSS Science Stories, pgs 31-35, 38-41 |
| **5.7 The student will investigate and understand how the Earth's surface is constantly changing. Key concepts include:** | |
| a) the rock cycle including the identification of rock types; | *This standard is addressed in readings in* ***Earth Materials,*** *designed for Grades 3-4. Please see:*<br>***Earth Materials*** *FOSS Science Stories pgs 34-37*<br><br>*It is also addressed in depth in a FOSS Middle School module designed for Grades 6-8:*<br>***Earth History****, Investigation 4, Parts 5-6, pgs 150-162*<br>*Investigation 8, Part 1, pgs 254-258*<br>*Investigation 8, Part 3, pgs 266-272*<br>*Resources, pgs 93-97*<br>*CD, Geology Lab: Rock Data Base, Formation of Metamorphic, Sedimentary, and Igneous rocks* |
| b) Earth history and fossil evidence; | **Models and Designs** FOSS Science Stories pgs 11-16<br><br>*This standard is addressed in depth in a FOSS Middle School module designed for Grades 6-8:*<br>***Earth History****, Investigation 6, Parts 1-4, pgs 205-224*<br>*Investigation 7, Parts 1-2, pgs 234-243* |

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| | *Resources, pgs 37-41, 73-88*<br>*CD, Geology Lab: Fossilization Process*<br>*CD, Time Room* |
| c) the basic structure of the Earth's interior; | **Landforms** FOSS Science Stories, pgs 22-24<br>***Earth History** Resources, pgs 100-103 (designed for Grades 6-8)* |
| d) plate tectonics (earthquakes and volcanoes); | **Landforms** FOSS Science Stories, pgs 22-24, 30-32<br>FOSS Web, Videos: Volcanic Eruption<br><br>***Earth History** Resources, pgs 100-103 (designed for Grades 6-8)*<br>*CD, Earth Processes: Volcanoes* |
| e) weathering and erosion; and | **Landforms**, Investigation 2, pgs 8-22<br>Investigation 3, Parts 1-3, pgs 8-24<br>Landforms FOSS Science Stories, pgs 15-17, 25-27<br>***Earth History**, Investigation 4, Parts 3-4, pgs 138-149 (designed for Grades 6-8)*<br>*CD, Earth Processes: Stream Tables, Formation of Monument Valley* |
| f) human impact. | **Landforms** FOSS Science Stories, pgs 13-21, 37-42, 43-44<br>**Enviroments** FOSS Science Stories, pgs 8-17,30-37,43-46,52<br>***Earth History** Resources, pgs 64-67 (designed for Grades 6-8)* |

# Grade Six
# Standards of Learning

*Note that the Grade Six correlation includes modules from two FOSS programs: the Grades 5-6 modules from the original K-6 FOSS program and the FOSS Middle School modules designed for Grades 6-8. The Grades 5-6 modules are listed first unless the FOSS Middle School module is a significantly more complete match to the standard as written.*

| *Science Standard* | *Correlation By Page Numbers* |
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| **6.1 The student will plan and conduct investigations in which:** | |
| a) observations are made involving fine discrimination between similar objects and organisms; | **Food and Nutrition**, Investigation 1, Parts 1-2, pgs 8-20<br>**Water Planet**, Investigation 1, Part 1, pgs 50-58<br>**Living Systems**, Investigation 2, Part 2, pgs 99-106<br>**Solar Energy**, Investigation 1, Part 2, pgs 14-21<br>Investigation 2, Part 2, pgs 16-20<br>**Environments**, Investigation 5, Parts 2–3, pgs 14-22<br>Investigation 6, Parts 1-2, pgs 8-17<br>**Mixtures and Solutions**, Investigation 4, Parts 1-3, pgs 8-24<br>**Planetary Science**, Investigation 5, Parts 2-3, pgs 158-167<br>**Weather and Water**, Investigation 5, Part 1, pgs 152-162 |
| b) a classification system is developed based on multiple attributes; | **Levers and Pulleys**, Investigation 4, Parts 1-2, pgs 8-20<br>**Living Systems**, Investigation 2, Part 2, pgs 99-106<br>**Planetary Science**, Investigation 5, Part 4, pgs 168-173<br>**Earth History,** Investigation 4, Parts 1-2, pgs 127-137 |
| c) precise and approximate measures are recorded; | **Mixtures and Solutions**, Investigation 2, Parts 1-3, pgs 8-25<br>**Levers and Pulleys**, Investigation 1, Parts 1-3, pgs 1-28<br>Investigation 3, Part 1, pgs 8-15<br>Investigation 4, Parts 1-2, pgs 8-20<br>**Solar Energy**, Investigation 2, Part 2, pgs 16-24<br>Investigation 3, Parts 1-2, pgs 8-23<br>**Water Planet**, Investigation 3, Part 1, pgs 125-135<br>**Living Systems**, Investigation 2, Part 1, pgs 85-98<br>Investigation 3, Part 3, pgs 136-141<br>**Variables**, Investigation 1, Part 2, pgs 16-22<br>Investigation 3, Parts 2-3, pgs 14-232<br>**Weather and Water**, Investigation 5, Part 1, pgs 152-162<br>**Diversity of Life,** Investigation 6, Parts 1-3, pgs 186-203<br>**Planetary Science**, Investigation 5, Parts 2-3, pgs 158-167<br>**Chemical Interactions**, Investigation 5, Parts 1, 3, pgs 153-158, 165- |

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| d) scale models are used to estimate distance, volume, and quantity; | **Landforms,** Investigation 1, Parts 1-3, pgs 8-25<br>Investigation 2, Parts 1-2, pgs 8-22<br>Investigation 3, Parts 1-2, pgs 8-19<br>Investigation 4, Parts 1-3, pgs 8-24<br>**Solar Energy,** Investigation 4, Parts 1-3, pgs 8-28<br>**Water Planet**, Investigation 1, Part 1, pgs 50-58<br>**Models and Designs**, Investigation 4, Parts 1-3, pgs 8-28<br>**Planetary Science**, Investigation 5, Parts 2-4, pgs 158-173<br>Investigation 6, Parts 1-3, pgs 192-205<br>Investigation 7, Parts 1-5, pgs 218-237 |
| e) hypotheses are stated in ways that identify the independent (manipulated) and dependent (responding) variables; | This standard is addressed throughout ALL FOSS Grades 5-8 modules. It is a particular focus of **Variables,** designed for Grades 5-6, and all other modules build on the skills and content introduced in that module. See for example:<br>**Variables**, Investigation 1, Part 2, pgs 16-22<br>Investigation 4, Part 3, pgs 18-23<br>**Environments**, Investigation 2, Parts 2-4, pgs 16-30<br>Investigation 3, Part 1, pgs 8-13<br>Investigation 5, Part 1, pgs 8-13<br>**Landforms**, Investigation 3, Parts 1-3, pgs 8-24<br>**Levers and Pulleys**, Investigation 1, Parts 2-3, pgs 18-28<br>**Solar Energy**, Investigation 2, Part 2, pgs 16-24<br>**Diversity of Life** Investigation 6, Parts 1-3, pgs 186-203<br>Investigation 8, Parts 1-3, pgs 239-260<br>**Planetary Science**, Investigation 5, Parts 2-3, 158-167 |
| f) a method is devised to test the validity of predictions and inferences; | **Variables**, Investigation 1, Parts 1-3, pgs 8-27<br>Investigation 3, Part 2, pgs 14-19<br>Variables FOSS Science Stories pgs 1-7,10-11,12-14, 34-37<br>**Models and Designs**, Investigation 1, Parts 1-2, pgs 8-21<br>Investigation 2, Part 1, pgs 8-16<br>**Water Planet**, Investigation 2, Parts 2-3, pgs 86-100<br>**Living Systems**, Investigation 3, Part 3, pgs 136-141<br>**Environments**, Investigation 2, Parts 2-3, pgs 16-25<br>**Mixtures and Solutions**, Investigation 2, Part 3, pgs 21-25<br>**Landforms**, Investigation 3, Parts 1-2, pgs 8-19<br>**Levers and Pulleys**, Investigation 1, Parts 2-3, pgs 18-28<br>**Diversity of Life** Investigation 6, Parts 1-3, pgs 186-203<br>Investigation 8, Parts 1-3, pgs 239-260<br>**Weather and Water**, Investigation 4, Part 2. pgs 131-139 |
| g) one variable is manipulated over time with many repeated | This standard is a focus of **Variables,** and is reinforced throughout all |

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| trials; | other Grades 5-8 FOSS modules. See for example:<br>**Variables**, Investigation 1, Part 2, pgs 16-22<br>Investigation 3, Part 2, pgs 14-19<br>Investigation 4, Part 3, pgs 18-23<br>Variables FOSS Science Stories pgs 1-7,10-11,12-14<br>**Solar Energy**, Investigation 2, Part 2, pgs 16-24<br>**Models and Designs**, Investigation 3, Parts 1-3, pgs 8-23<br>**Environments**, Investigation 5, Parts 1-3, pgs 8-22<br>Investigation 6, Parts 1-2, pgs 8-17<br>**Levers and Pulleys**, Investigation 1, Parts 2-3, pgs 18-28<br>**Diversity of Life** Investigation 6, Parts 1-3, pgs 186-203<br>Investigation 8, Parts 1-3, pgs 239-260<br>**Planetary Science**, Investigation 5, Parts 2-3, pgs 158-167 |
| h) data are collected, recorded, analyzed, and reported using appropriate metric measurement; | This standard is addressed throughout ALL FOSS modules from Grades 3-8. Some examples appropriate to Grade 6 are:<br>**Levers and Pulleys**, Investigation 1, pgs 8-28<br>Investigation 2, Parts 1-3, pgs 8-22<br>Investigation 3, Parts 1-2, pgs 8-20<br>Investigation 4, Part 1, pgs 8-13<br>**Environments**, Investigation 3, Parts 2-3, pgs 14-22<br>Investigation 4, pgs 1-24<br>**Water Planet**, Investigation 3, Part 1, pgs 125-135<br>**Living Systems**, Investigation 2, Part 1, pgs 85-98<br>**Food and Nutrition**, Investigation 2, Parts 1-2, pgs 8-21<br>**Solar Energy**, Investigation 2, pgs 8-28<br>Investigation 3, Parts 1-2, pgs 8-25<br>**Models and Designs**, Investigation 3, Part 3, pgs 20-23<br>**Mixtures and Solutions**, Investigation 1, Parts 1-3, pgs 8-24<br>Investigation 2, Parts 1-3, pgs 8-25<br>**Weather and Water**, Investigation 4, Part 1, pgs 121-130 |
| i) data are organized and communicated through graphical representation (graphs, charts, and diagrams); | **Solar Energy**, Investigation 4, Part 2, pgs 20-23<br>Investigation 3, Parts 1-2, pgs 8-23<br>**Environments**, Investigation 6, Parts 1-2, pgs 8-24<br>**Levers and Pulleys**, Investigation 1, Parts 2-3, pgs 18-28<br>Investigation 4, Part 1, pgs 8-13<br>**Water Planet**, Investigation 3, Part 1, pgs 125-135<br>**Living Systems**, Investigation 2, Part 1, pgs 85-98<br>**Landforms,** Investigation 3, Parts 1-2, pgs 8-19<br>Investigation 4, Part 2, pgs 16-20<br>**Variables**, Investigation 1, Parts 2-3, pgs 16-27<br>Investigation 2, Parts 2-3, pgs 20-27 |

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| | **Mixtures and Solutions**, Investigation 3, Part 1, pgs 8-14<br>**Diversity of Life,** Investigation 10, Parts 1-2, pgs 302-316<br>**Weather and Water,** Investigation 6, Part 5, pgs 214-220<br>**Planetary Science**, Investigation 5, Parts 2-3, pgs 158-167<br>**Chemical Interactions**, Investigation 7, Part 4, pgs 222-228 |
| j) models are designed to explain a sequence; and | This standard is a focus of **Models and Designs** and is reinforced in other Grades 5-8 modules. See for example:<br>**Models and Designs**, Investigation 1, Parts 1-2, pgs 8-21<br>Investigation 2, Parts 1-2, pgs 8-19<br>Investigation 4, Parts 1-2, pgs 6-15<br>**Solar Energy** Investigation 4, Parts 1-3, pgs 8-28<br>**Water Planet**, Investigation 4, Part 1, pgs 184-197<br>**Variables**, Investigation 3, Parts 1-3, pgs 1-32<br>**Environments**, Investigation 4, Part 1, pgs 8-12<br>Investigation 5, Parts 1-2, pgs 8-18<br>**Landforms**, Investigation 2, Parts 1-2, pgs 8-22<br>Investigation 3, Parts 1-2, pgs 8-19<br>Investigation 4, Part 1, pgs 8-15<br>**Levers and Pulleys,** Investigation 1, Parts 2-3, pgs 18-28<br>Investigation 4, Part 2, pgs 14-20<br>**Planetary Science**, Investigation 2, Part 2, pgs 71-77<br>Investigation 3, Part 1, pgs 89-93 |
| k) an understanding of the nature of science is developed and reinforced. | FOSS modules are inquiry based and developing an understanding of the nature science is a focus of the whole program. See for example:<br>**Models and Designs**, Investigation 1, Parts 1-2, pgs 8-21<br>Investigation 2, Parts 1-2, pgs 8-19<br>Models and Designs FOSS Science Stories pgs 1-16<br>**Variables**, Investigation 1, Parts 1-3, pgs 8-25<br>Variables FOSS Science Stories, pgs 1-7,10-11,12-14<br>**Water Planet**, Investigation 2, Parts 2-3, pgs 86-100<br>**Living Systems**, Investigation 3, Part 3, pgs 136-141<br>**Solar Energy** Investigation 2, Parts 1-2, pgs 8-24<br>Solar Energy FOSS Science Stories pgs 26-37<br>**Weather and Water,** Investigation 5, Parts 1-3, pgs 152-175<br>**Diversity of Life** Investigation 6, Parts 1-3, pgs 186-203<br>Investigation 8, Parts 1-3, pgs 239-260 |
| **6.2 The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include:** | |
| a) potential and kinetic energy; | **Models and Designs**, Investigation 3, Parts 2-3, pgs 13-22<br>Investigation 4, Parts 1-2, pgs 6-15<br>**Variables**, Investigation 1, Parts 1-2, pgs 8-22 |

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| | Investigation 3, Parts 1-3, pgs 8-23<br>Investigation 4, Parts 1-3, pgs 8-23<br>**Weather and Water** Resources, pgs 22-23 |
| b) the role of the sun in the formation of most energy sources on Earth; | **Solar Energy** FOSS Science Stories, pgs 1-3, 16-17,22-25,38-39<br>**Populations and Ecosystems,** Investigation 5, Parts 1-4, pgs 142-169<br>Populations and Ecosystems Resources pgs |
| c) nonrenewable energy sources (fossil fuels, including petroleum, natural gas, and coal); | **Solar Energy** FOSS Science Stories, pgs 1-3, 22-25,38-39<br>Solar Energy, FOSS Web, Activity: Resource Identification<br>**Weather and Water** Resources, pgs 63-68<br>**Populations and Ecosystems** Resources pgs 8-13,14-20 |
| d) renewable energy sources (wood, wind, hydro, geothermal, tidal, and solar); and | **Solar Energy** FOSS Science Stories, pgs 1-2, 22-25,29-39<br>FOSS Web, Activity: Resource Identification<br>**Weather and Water,** Resources, pgs 53-62 |
| e) energy transformations (heat/light to mechanical, chemical, and electrical energy). | **Solar Energy**, Investigation 2, Parts 1-2, pgs 8-24<br>Investigation 3, Parts 1-2, pgs 8-23<br>**Solar Energy** FOSS Science Stories, pgs 1-3, 22-25,38-39<br>**Living Systems**, Investigation 3, Part 1, pgs 118-125<br>Living Systems FOSS Science Resources, pgs 31-34, 47-48<br>**Models and Designs**, Investigation 4, Parts 2-3, pgs 13-22<br>Models and Designs FOSS Science Stories, pgs 22-27<br>**Variables**, Investigation 3, Parts 1-3, pgs 8-23<br>Variables FOSS Science Stories, pgs 8-9<br>**Populations and Ecosystems,** Investigation 5, Parts 1-4, pgs 142-169<br>Populations and Ecosystems Resources pgs 14-20<br>**Electronics,** Investigation 1, Parts 1-2, pgs 55-65<br>Electronics FOSS Science Stories pgs 1-2,12-14 |
| **6.3 The student will investigate and understand the role of solar energy in driving most natural processes within the atmosphere, the hydrosphere, and on the Earth's surface. Key concepts include:** | |
| a) the Earth's energy budget; | *The term "energy budget" is not used in FOSS, though related concepts are addressed in the following readings:*<br>**Solar Energy** FOSS Science Stories, pgs 1-3, 22-25,38-39<br>**Weather and Water** Resources, pgs 63-68<br>**Populations and Ecosystems** Resources pgs 8-13,14-20 |
| b) the role of radiation and convection in the distribution of energy; | **Solar Energy,** Investigation 3, Parts 1-2, pgs 8-23<br>Investigation 4, Parts 1-3, pgs 8-28<br>Solar Energy FOSS Science Stories, pgs 16-17, 22-25, 29-31<br>**Water Planet**, Investigation 3, Parts 1-2, pgs 125-144<br>Water Planet FOSS Science Resources, pgs 42-51<br>**Weather and Water,** Investigation 4, Part 1, pgs 122-130<br>Investigation 5, Parts 2-3, pgs 163-175<br>Weather and Water Resources, pgs 22-24, 32-33 |

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| c) the motion of the atmosphere and the oceans; | **Solar Energy** FOSS Science Stories, pgs 18-21, 22-25<br>**Water Planet**, Investigation 3, Part 2, pgs 136-144<br>Water Planet FOSS Science Resources, pgs 46-51<br>**Weather and Water**, Investigation 8, Part 2, pgs 265-270<br>Weather and Water Resources, pgs 33, 53-62 |
| d) cloud formation; and | **Solar Energy** FOSS Science Stories, pgs 18-21, 22-25<br>**Mixtures and Solutions** FOSS Science Stories pgs 20-22<br>**Weather and Water**, Investigation 6, Part 4, pgs 206-213<br>Weather and Water Resources, pgs 37-42<br>CD, Resources: Cloud in a Bottle |
| e) the role of heat energy in weather-related phenomena including thunderstorms and hurricanes. | **Solar Energy** FOSS Science Stories, pgs 22-25<br>**Water Planet**, Investigation 4, Part 2, pgs 198-203<br>Water Planet FOSS Science Resources, pgs 71-79<br>**Weather and Water**, Investigation 1, Part 1, pgs 43-47<br>Weather and Water Resources, pgs 63-66, 71-74 |
| **6.4 The student will investigate and understand that all matter is made up of atoms.<br>Key concepts include:** | |
| a) atoms are made up of electrons, protons, and neutrons; | **Earth History** Resources, pgs 88<br>**Chemical Interactions** Resources, pgs 80-81 |
| b) atoms of any element are alike but are different from atoms of other elements; | **Mixtures and Solutions** FOSS Science Stories, pgs 3-6, 25-26, 32-42<br>**Earth History** Resources, pgs 88-89<br>**Chemical Interactions** Resources, pgs 80-81, 96 |
| c) elements may be represented by chemical symbols; | **Mixtures and Solutions** FOSS Science Stories, pgs 3-6, 8,28, 32-36<br>**Weather and Water** Resources, pgs 6-7<br>**Earth History** Resources, pgs 88-89<br>**Populations and Ecosystems**, Investigation 5, Parts 1-4, pgs 142-169<br>Populations and Ecosystems Resources pgs 14-20<br>**Chemical Interactions**, Investigation 2, Parts 1-2, pgs 70-80<br>Chemical Interactions Resources, pgs 3-6, 14-15, 63-67, 90-95 |
| d) two or more atoms may be chemically combined; | **Mixtures and Solutions** FOSS Science Stories, pgs 8, 28<br>**Earth History** Resources, pgs 88-89<br>**Populations and Ecosystems**, Investigation 5, Parts 1-4, pgs 142-169<br>Populations and Ecosystems Resources pgs 14-20<br>**Chemical Interactions**, Investigation 9, Parts 1-2, pgs 280-297<br>Chemical Interactions Resources, pgs 63-67, 96 |
| e) compounds may be represented by chemical formulas; | **Populations and Ecosystems**, Investigation 5, Parts 1-4, pgs 142-169<br>Populations and Ecosystems Resources pgs 14-20<br>**Weather and Water** Resources, pgs 63-66<br>**Earth History** Resources, pgs 68, 89<br>**Chemical Interactions**, Investigation 9, Parts 1-2, pgs 280-297<br>Chemical Interactions Resources, pgs 63-67, 96 |

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| f) chemical equations can be used to model chemical changes; and | **Populations and Ecosystems**, Investigation 5, Parts 1-4, pgs 142-169<br>Populations and Ecosystems Resources pgs 14-20<br>**Chemical Interactions**, Investigation 9, Parts 1-2, pgs 280-297<br>Chemical Interactions Resources, pgs 63-67, 96 |
| g) a limited number of elements comprise the largest portion of the solid Earth, living matter, the oceans, and the atmosphere. | **Mixtures and Solutions** FOSS Science Stories, pgs 3-4,11-12,20-22<br>**Weather and Water** Resources, pgs 6-7<br>**Chemical Interactions** Resources, pgs 10-12 |
| **6.5 The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include:** | |
| a) water as the universal solvent; | **Mixtures and Solutions,** ALL,<br>such as Investigation 1, Parts 1-4, pgs 8-29<br>Mixtures and Solutions FOSS Science Stories pgs 2,11-12<br>**Weather and Water,** Investigation 5, Parts 1-2, pgs 152-162<br>Weather and Water Resources, pgs 6-7 |
| b) the properties of water in all three states; | This standard is addressed throughout **Weather and Water**. See for example:<br>**Weather and Water**, Investigation 5, Parts 1-2, pgs 152-168<br>Investigation 6, Parts 1-4, pgs 190-213,<br>Investigation 7, Parts 1-2, pgs 232-244<br>Weather and Water Resources, pgs 6-7, 34-42,45-47<br>Weather and Water CD-ROM |
| c) the action of water in physical and chemical weathering; | **Landforms**, Investigation 2, Parts 1-2, pgs 8-22<br>Investigation 3, Parts 1-2, pgs 8-19<br>Landforms FOSS Science Stories, pgs 39-42, 43-44<br>**Environments** FOSS Science Stories, pg 33<br>**Earth History,** Investigation 4, Parts 3-4, pgs 138-149 |
| d) the ability of large bodies of water to store heat and moderate climate; | **Solar Energy**, Investigation 3, Parts 1-2, pgs 8-23<br>Solar Energy FOSS Science Stories, pgs 22-25<br>**Water Planet**, Investigation 4, Part 2, pgs 198-203<br>Water Planet FOSS Science Resources, pg 79<br>**Weather and Water,** Investigation 4, Parts 1-2, pgs 121-140<br>Weather and Water Resources, pgs 53-55<br>Video, The Weather Machine |
| e) the origin and occurrence of water on Earth; | **Environments** FOSS Science Stories, pgs 27-35<br>**Water Planet**, Investigation 4, Part 4, pgs 212-216<br>Water Planet FOSS Science Resources, pgs 63-64<br>**Earth History** Resources, pgs 60-63<br>**Weather and Water** Resources, pgs 45-47 |
| f) the importance of water for agriculture, power generation, and public health; and | **Water Planet** FOSS Science Resources, pgs 65-66<br>**Weather and Water** Resources, pgs 45-47, 60-63<br>**Populations and Ecosystems** Investigation 4, Part 1, pgs 119-121 |

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| | Investigation 7, pgs 210-218<br>Populations and Ecosystems Resources, pgs 8-13, 25-29, 31-41<br>Populations and Ecosystems CD-ROM |
| g) the importance of protecting and maintaining water resources. | **Environments** FOSS Science Stories, pgs 35-37, 39-41<br>**Water Planet**, Investigation 4, Part 4, pgs 212-216<br>Water Planet FOSS Science Resources, pgs 65-66<br>**Weather and Water** Resources, pgs 45-47, 60-63<br>**Populations and Ecosystems** Investigation 4, Part 1, pgs 119-121<br>Investigation 7, pgs 210-218<br>Populations and Ecosystems Resources, pgs 8-13, 25-29, 31-41<br>Populations and Ecosystems CD-ROM |
| **6.6 The student will investigate and understand the properties of air and the structure and dynamics of the Earth's atmosphere. Key concepts include:** | |
| a) air as a mixture of gaseous elements and compounds; | **Mixtures and Solutions** FOSS Science Stories, pgs 2, 20-22<br>**Solar Energy** FOSS Science Stories, pgs 18-21<br>**Weather and Water,** Investigation 2, Parts 1-2, Pgs 69-82<br>Weather and Water Resources, pgs 6-7 |
| b) air pressure, temperature, and humidity; | **Solar Energy** FOSS Science Stories, pgs 18-21<br>**Water Planet**, Investigation 3, Part 3, pgs 145-150<br>Water Planet FOSS Science Resources, pgs 52-57<br>**Weather and Water**, throughout, such as<br>Investigation 6, Parts 1-3, pgs 190-205<br>Investigation 8, Parts 1-4, pgs 258-280<br>Weather and Water Resources, pgs 8-11, 22-24, 34-36, 48-52 |
| c) how the atmosphere changes with altitude; | **Mixtures and Solutions** FOSS Science Stories, pgs 20-22<br>**Solar Energy** FOSS Science Stories, pgs 18-21<br>**Water Planet**, Investigation 3, Part 3, pgs 145-150<br>Water Planet FOSS Science Resources, pgs 52-57<br>**Weather and Water,** Investigation 2, Parts 1-2, pgs 69-82<br>Weather and Water Resources, pgs 8-11 |
| d) natural and human-caused changes to the atmosphere; | **Weather and Water,** Investigation 2, Parts 1-2, pgs 69-82<br>Weather and Water Resources, pgs 8-11, 63-66<br>**Populations and Ecosystems** Resources, pgs 8-13 |
| e) the relationship of atmospheric measures and weather conditions; | **Weather and Water**, Investigation 1, Parts 1-2, pgs 48-56<br>**Solar Energy** FOSS Science Stories, pgs 26-28 |
| f) basic information from weather maps including fronts, systems, and basic measurements; and | **Water Planet**, Investigation 4, Part 3, pgs 204-211<br>Water Planet FOSS Science Resources pgs 80-88<br>**Weather and Water,** Investigation 1, Part 2, pgs 48-53<br>Investigation 1, Extension 3, Track Weather Reports<br>**Solar Energy** FOSS Science Stories, pgs 26-28 |
| g) the importance of protecting and maintaining air quality. | **Weather and Water** Resources, pgs 63-66 |

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| | **Mixtures and Solutions** FOSS Science Stories, pgs 20-22<br>**Populations and Ecosystems** Investigation 7, pgs 210-218<br>Populations and Ecosystems Resources, pgs 8-13<br>Populations and Ecosystems CD_ROM |
| **6.7 The student will investigate and understand the natural processes and human interactions that affect watershed systems. Key concepts include:** | |
| a) the health of ecosystems and the abiotic factors of a watershed; | **Environments,** Investigation 1, Parts 1-2, pgs 8-19 ("abiotic factors")<br>Investigation 4, Parts 1-3, pgs 8-22 (aquatic environments)<br>Environments FOSS Science Stories pgs 27-37, 38-41, 43-46<br>**Populations and Ecosystems,** Investigation 4, Part 1, pgs 119-121<br>Investigation 7, pgs 210-218<br>Populations and Ecosystems CD-ROM<br>Populations and Ecosystems Resources, pgs 25-29, 31-39 |
| b) the location and structure of Virginia's regional watershed systems; | *Locally available curriculum materials such as those from the Department of Natural Resources will be able to extend the general concepts addressed in FOSS to local Virginia watersheds and other water resources.* |
| c) divides, tributaries, river systems, and river and stream processes; | **Landforms**, Investigation 2, Parts 1-2, pgs 8-22<br>Landforms FOSS Science Stories, pgs 15-19 |
| d) wetlands; | **Populations and Ecosystems,** Investigation 4, Parts 1-2, pgs 119-129<br>Investigation 7, pgs 210-218<br>Populations and Ecosystems CD-ROM<br>Populations and Ecosystems Resources, pgs 34,36 |
| e) estuaries; | **Landforms** FOSS Science Stories, pg 17<br>**Populations and Ecosystems,** Investigation 7, pgs 210-218<br>Populations and Ecosystems CD-ROM<br>Populations and Ecosystems Resources, pgs 34,36 |
| f) major conservation, health, and safety issues associated with watersheds; and | **Weather and Water** Resources, pgs 45-47<br>**Populations and Ecosystems,** Investigation 3, Parts 1-3, pgs 90-107<br>Investigation 4, Parts 1-2, pgs 119-129<br>Investigation 7, pgs 210-218<br>Populations and Ecosystems CD-ROM<br>Populations and Ecosystems Resources, pgs 25-29, 31-39 |
| g) water monitoring and analysis using field equipment including hand-held technology. | |
| **6.8 The student will investigate and understand the organization of the solar system and the relationships among the various bodies that comprise it. Key concepts include:** | |
| a) the, sun, moon, Earth, other planets and their moons, meteors, asteroids, and comets; | **Models and Designs** FOSS Science Stories, pgs 5-9<br>**Solar Energy** FOSS Science Stories, pgs 1-5, 40-44<br>FOSS Web Picture – Solar System |

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| | **Water Planet**, Investigation 1, Part 1, pgs 50-58<br>Water Planet FOSS Science Resources, pgs 1-13<br>**Planetary Science**, Investigation 4, pgs 120-140<br>Investigation 5, pgs 154-182<br>Investigation 6, pgs 192-205<br>Investigation 7, pgs 218-237<br>Investigation 8, pgs 250-270<br>Investigation 10, pgs 312-324<br>Planetary Science Resources, pgs 80-89, 90-94, 101-103<br>CD, Notebook: Solar System, Sun, Moon |
| b) relative size of and distance between planets; | **Solar Energy** FOSS Science Stories, pgs 40-44<br>FOSS Web Picture – Solar System<br>**Water Planet**, Investigation 1, Part 1, pgs 50-58<br>**Planetary Science**, Investigation 10, Part 2, pgs 318-321<br>Planetary Science Resources, pgs 35,84-89<br>CD, Notebook: Solar System |
| c) the role of gravity; | **Models and Designs** FOSS Science Stories, pg 10<br>**Water Planet**, Investigation 1, Part 2, pgs 59-66<br>Water Planet FOSS Science Resources, pgs 16-17<br>**Solar Energy** FOSS Science Stories, pgs 43-44<br>**Planetary Science** Resources, pgs 69-70, 84-89 |
| d) revolution and rotation; | **Solar Energy** FOSS Science Stories, pgs 1-2, 43-44<br>**Planetary Science**, Investigation 3, Parts 1-2, pgs 89-98<br>Investigation 9, Pages 1-4, pgs 283-301<br>**Weather and Water**, Investigation 3, Part 2, pgs 97-102<br>Weather and Water Resources, pgs 17-19 |
| e) the mechanics of day and night and phases of the moon; | **Planetary Science**, Investigation 3, Parts 1-2, pgs 89-98<br>Investigation 9, Parts 1-4, pgs 283-301<br>CD, Day-Night, Phases of the Moon |
| f) the unique properties of Earth as a planet; | **Mixtures and Solutions** FOSS Science Stories, pgs 20-22<br>**Solar Energy** FOSS Science Stories, pgs 1-3, 42<br>**Water Planet**, Investigation 1, Part 1, pgs 50-58<br>Water Planet FOSS Science Resources, pg 6<br>**Weather and Water,** Investigation 7, Parts 1-2, pgs 232-244<br>Weather and Water Resources, pgs 45-47<br>**Earth History** Resources, pgs 60-63<br>**Planetary Science** Resources, pgs 85-87<br>CD, Notebook: Earth |
| g) the relationship of the Earth's tilt and seasons; | **Weather and Water**, Investigation 3, Parts 1-2, 93-102<br>Weather and Water Resources, pgs 17-19<br>CD, Cycles: Seasons |

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| h) the cause of tides; and | |
| i) the history and technology of space exploration. | **Models and Designs** FOSS Science Stories, pgs 17-20<br>**Water Planet** FOSS Science Resources, pg 96<br>**Planetary Science**, Investigation 7, Parts 1-5, pgs 218-237<br>Investigation 8, Parts 1-2, pgs 250-270<br>Planetary Science Resources, pgs 74-82, 90-96<br>CD, Notebook: Space Exploration<br>**Earth History** Resources, pgs 60-63 |
| **6.9 The student will investigate and understand public policy decisions relating to the environment. Key concepts include:** | |
| a) management of renewable resources (water, air, soil, plant life, animal life); | **Landforms** FOSS Science Stories, pgs 13-14, 19-21, 37-46<br>**Environments** FOSS Science Stories, pgs 8,10-14,30, 34-37, 43-48<br>**Water Planet** FOSS Science Resources, pg 97<br>**Weather and Water,** Investigation 9, Parts 1-2, pgs 311-320<br>Weather and Water Resources, pgs 45-47, 63-66<br>**Populations and Ecosystems,** Investigation 4, Part 1, pgs 119-121<br>Investigation 7, pgs 210-218<br>Populations and Ecosystems CD-ROM<br>Populations and Ecosystems Resources, pgs 8-13, 25-29, 31-39 |
| b) management of nonrenewable resources (coal, oil, natural gas, nuclear power, mineral resources); | **Weather and Water** Resources, pgs 63-66<br>**Populations and Ecosystems** Resources, pgs 8-13 |
| c) the mitigation of land-use and environmental hazards through preventive measures; and | **Environments** FOSS Science Stories, pgs 8,10-14,30,34-37, 43-48<br>**Weather and Water,** Investigation 9, Parts 1-2, pgs 311-320<br>Weather and Water Resources, pgs 45-47, 63-66<br>**Populations and Ecosystems,** Investigation 4, Part 1, pgs 119-121<br>Investigation 7, pgs 210-218<br>Populations and Ecosystems CD-ROM<br>Populations and Ecosystems Resources, pgs 8-13, 25-29, 31-39 |
| d) cost/benefit tradeoffs in conservation policies. | **Landforms** FOSS Science Stories, pgs 13-14, 19-21<br>**Environments** FOSS Science Stories, pgs 8,10-14,30,34-37, 43-48<br>**Populations and Ecosystems,** Investigation 4, Part 1, pgs 119-121<br>Investigation 7, pgs 210-218<br>Populations and Ecosystems CD-ROM<br>Populations and Ecosystems Resources, pgs 8-13, 25-29, 31-39 |

# Life Science
# Standards of Learning

| *Science Standard* | *Correlation By Page Numbers* |
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| **LS.1 The student will plan and conduct investigations in which:** | |
| a) data are organized into tables showing repeated trials and means; | **Human Brain and Senses**, Investigation 6, Part 1, pgs 186-192<br>Investigation 7, Part 2, pgs 219-225<br>Investigation 8, Part 1, pgs 240-245<br>**Populations and Ecosystems,** Investigation 6, Parts 1-3, pgs 179-197 |
| b) variables are defined; | **Diversity of Life,** Investigation 6, Parts 1-2, pgs 186-197<br>Investigation 8, Part 2, pgs 244-252<br>Investigation 9, Part 2 student worksheets<br>**Populations and Ecosystems,** Investigation 6, Parts 1-3, pgs 179-197 |
| c) metric units (SI - International System of Units) are used; | Metric units (SI) are used throughout the FOSS program beginning in Grade 3. Some examples from modules that also address the other Virginia Life Science standards are:<br>**Human Brain and Senses**, Investigation 7, Parts 1-2, pgs 211-225<br>Investigation 3, Part 2, pgs 101-105<br>**Diversity of Life**, Investigation 2, Part 2, pgs 79-84<br>**Populations and Ecosystems,** Investigation 5, Part 1, pgs 142-150 |
| d) models are constructed to illustrate and explain phenomena; | **Diversity of Life**, Investigation 3, Part 2, pgs 108-115<br>Model Paramecium Feeding, pg 123<br>**Human Brain and Senses**, throughout, such as<br>Investigation 3, Part 3, pgs 107-110<br>Investigation 5, Part 3, pgs 165-168<br>**Populations and Ecosystems**, Investigation 3, Parts 1-3, pgs 81-107<br>(Model terrestrial and aquatic ecosystems) |
| e) sources of experimental error are identified; | Each FOSS investigation includes a class discussion of experimental results. Sources of experimental error are identified and discussed here. See for example:<br>**Diversity of Life**, Investigation 6, Parts 1-2, pgs 186-197<br>**Human Brain and Senses**, Investigation 4, Parts 1-3, pgs 120-143 |
| f) dependent variables, independent variables, and constants are identified; | **Diversity of Life**, Investigation 6, Parts 1-2, pgs 186-197 |
| g) variables are controlled to test hypotheses and trials are repeated; | **Diversity of Life**, Investigation 8, Part 2, pgs 244-252<br>Investigation 9, Part 2, pgs 278-285<br>**Populations and Ecosystems**, Investigation 5, Part 1, pgs 142-150<br>**Human Brain and Senses**, Investigation 7, Part 2, pgs 219-225 |

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| | Investigation 8, Part 1, pgs 240-245 |
| h) continuous line graphs are constructed, interpreted, and used to make predictions; | **Diversity of Life,** Investigation 10, Part 2, pgs 310-316<br>**Human Brain and Senses**, Investigation 7, Part 3, pgs 226-230<br>**Populations and Ecosystems**, Investigation 6, Parts 1-3, pgs 179-197 |
| i) interpretations from the same set of data are evaluated and defended; and | **Human Brain and Senses**, Investigation 7, Part 2, pgs 219-225<br>**Populations and Ecosystems**, Investigation 6, Part 3, pgs 192-197<br>Investigation 10, Part 1, pgs 302-310 |
| j) an understanding of the nature of science is developed and reinforced. | FOSS modules are inquiry based and developing an understanding of science is a focus of the entire program. See for example:<br>**Diversity of Life**, Investigation 6, Parts 1-2, pgs 186-197<br>**Populations and Ecosystems** Resources, pgs 8-13, 46-63 |
| **LS.2 The student will investigate and understand that all living things are composed of cells.**<br>**Key concepts include:** | |
| a) cell structure and organelles (cell membrane, cell wall, cytoplasm, vacuole, mitochondrion, endoplasmic reticulum, nucleus and chloroplast); | **Diversity of Life**, Investigation 3, Part 1, pgs 103-107<br>Investigation 4, pgs 125-142<br>Diversity of Life Resources, pgs 27-30<br>CD, Lab: Cells and the Ribbon of Life |
| b) similarities and differences between plant and animal cells; | **Diversity of Life**, Investigation 3, pgs 93-124<br>Investigation 4, pgs 125-142<br>Investigation 5, pgs 143-172<br>Diversity of Life Resources, pgs 27-30, 32, 37-38<br>CD, Database |
| c) development of cell theory; and | **Diversity of Life** Resources, pgs 27-29 |
| d) cell division (mitosis and meiosis). | **Diversity of Life** Resources, pg 26, 66-67<br>**Populations and Ecosystems**, Investigation 9, Parts 1-2, pgs 262-273<br>Populations and Ecosystems Resources, pgs 53-54 |
| **LS.3 The student will investigate and understand that living things show patterns of cellular organization.**<br>**Key concepts include:** | |
| a) cells, tissues, organs, and systems; and | **Human Brain and Senses**, Investigation 2, pgs 61-84<br>Human Brain and Senses Resources, pgs 29-30, 36-38, 60-62, 63-74<br>CD Video: Cow Eye Dissection<br>**Diversity of Life**, Investigation 3, Part 1, pgs 102-107<br>Investigation 4, Parts 1-2, pgs 133-141<br>Investigation 5, pgs 143-171<br>Investigation 6, Part 2, pgs 193-197<br>CD, Cells and the Ribbon of Life |
| b) life functions and processes of cells, tissues, organs, and systems (respiration, removal of wastes, growth, reproduction, digestion, and cellular transport). | **Diversity of Life**, Investigation 5, Part 3, pgs 165-170<br>Investigation 6, pgs 173-204<br>Investigation 7, pgs 205-230<br>Diversity of Life Resources, pgs 24-26, 31-45, 51-59 |

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| | **Populations and Ecosystems**, Investigation 5, Part 2, pgs 151-155<br>Populations and Ecosystems Resources, pgs 3-5 |
| **LS.4 The student will investigate and understand that the basic needs of organisms must be met in order to carry out life processes. Key concepts include:** | |
| a) plant needs (light and energy sources, water, gases, nutrients); | **Diversity of Life**, Investigation 5, pgs 143-172<br>Investigation 6, pgs 173-204<br>Investigation 7, pgs 205-230<br>Diversity of Life Resources, pgs 31-50<br>**Populations and Ecosystems**, Investigation 3, Parts 1-3, pgs 90-107<br>Investigation 5, Parts 1-2, pgs 142-155<br>Populations and Ecosystems Resources, pgs 14-15 |
| b) animal needs (food, water, gases, shelter, space); and | **Diversity of Life**, Investigation 8, Parts 1-2, pgs 239-252<br>Diversity of Life Resources, pgs 51-64<br>**Populations and Ecosystems**, Investigation 1, Part 2, pgs 48-54<br>Investigation 3, Parts 1-3, pgs 90-107<br>Populations and Ecosystems Resources, pgs 3-5, 14-16 |
| c) factors that influence life processes. | **Diversity of Life**, Investigation 1, Parts 1-2, pgs 43-64<br>Investigation 7, pgs 205-224<br>Investigation 9, Part 3, pgs 286-289<br>Diversity of Life Resources, pgs 22-23, 31-50<br>**Human Brain and Senses**, Investigation 2, Part 1, pgs 67-72<br>Investigation 7, Part 1, pgs 210-218<br>Human Brain and Senses Resources, pgs 39-42, 63-74<br>**Populations and Ecosystems,** Investigation 3, pgs 81-107<br>Investigation 4, Part 1, pgs 119-121<br>Investigation 5, Part 4, pgs 161-169<br>Investigation 6, pgs 171-198<br>Populations and Ecosystems Resources, pgs 22-29 |
| **LS.5 The student will investigate and understand how organisms can be classified. Key concepts include:** | |
| a) distinguishing characteristics among kingdoms of organisms; | **Diversity of Life**, Investigation 3, Parts 2-3, pgs 108-124 (Protists)<br>Investigation 7, Parts 1-2, pgs 218-229 (Plants)<br>Investigation 8, Part 1, pgs 239-243 (Animals)<br>Investigation 10, Parts 1-3, pgs 302-321 (Monerans and Fungi)<br>Diversity of Life Resources, pgs 16-17, 65-70 |
| b) distinguishing characteristics of major animal and plant phyla; and | **Diversity of Life** Resources, pgs 16-17<br>Diversity of Life CD, Database |
| c) the characteristics of the species. | **Diversity of Life**, Investigation 3, Parts 2-3, pgs 108-124 (Protists)<br>Investigation 7, Parts 1-2, pgs 218-229 (Plants)<br>Investigation 8, Part 1, pgs 239-243 (Animals) |

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| | Investigation 10, Parts 1-3, pgs 302-321 (Monerans and Fungi)<br>Diversity of Life Resources, pgs 4-14,16-17, 24-30, 31-54,55-70<br>**Populations and Ecosystems**, Investigation 1, Part 3, pgs 55-59<br>Populations and Ecosystems Resources, pg 5 |
| **LS.6 The student will investigate and understand the basic physical and chemical processes of photosynthesis and its importance to plant and animal life. Key concepts include:** | |
| a) energy transfer between sunlight and chlorophyll; | Populations and Ecosystems, Investigation 5, Part 2, pgs 151-155<br>Populations and Ecosystems Resources, pgs 14-16, 17-21<br>**Diversity of Life** Resources, pg 36 |
| b) transformation of water and carbon dioxide into sugar and oxygen; and | **Populations and Ecosystems**, Investigation 5, Part 2, pgs 151-155<br>Populations and Ecosystems Resources, pgs 14-15<br>**Diversity of Life** Resources, pg 36 |
| c) photosynthesis as the foundation of virtually all food webs. | **Populations and Ecosystems**, Investigation 5, Parts 2-4, pgs 151-169<br>Populations and Ecosystems Resources, pgs 14-16, 17-21 |
| **LS.7 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of the environment. Key concepts include:** | |
| a) the carbon, water, and nitrogen cycles; | **Weather and Water,** Investigation 7, Parts 1-2, pgs 232-244<br>Weather and Water Resources, pgs 45-47<br>**Populations and Ecosystems,** Investigation 6, Parts 2-3, pgs 187-197 |
| b) interactions resulting in a flow of energy and matter throughout the system; | **Populations and Ecosystems**, Investigation 5, Parts 2-3, pgs 151-160<br>Populations and Ecosystems Resources, pgs 17-21, 23-24 |
| c) complex relationships within terrestrial, freshwater, and marine ecosystems; and | **Populations and Ecosystems**, Investigation 4, Part 1, pgs 119-121<br>Investigation 7, pgs 210-217<br>Populations and Ecosystems Resources, pgs 25-29, 31-41 |
| d) energy flow in food webs and energy pyramids. | **Populations and Ecosystems**, Investigation 4, Part 2, pgs 122-129<br>Investigation 5, Parts 2-4, pgs 151-169<br>Investigation 7, pgs 210-218<br>Populations and Ecosystems Resources, pgs 17-21<br>Populations and Ecosystems CD-ROM "Ecoscenarios" |
| **LS.8 The student will investigate and understand that interactions exist among members of a population. Key concepts include:** | |
| a) competition, cooperation, social hierarchy, territorial imperative; and | **Populations and Ecosystems**, Investigation 2, Parts 1-2, pgs 70-79<br>Investigation 6, Parts 2-3, pgs 187-197<br>Populations and Ecosystems Resources, pgs 3-5, 8-13, 22-24<br>**Diversity of Life** Resources, pgs 55-64 |
| b) influence of behavior on a population. | **Populations and Ecosystems**, Investigation 2, Part 2, pgs 76-79<br>Investigation 6, Parts 2-3, pgs 187-197<br>Populations and Ecosystems Resources, pgs 3-5, 8-13, 22-24<br>**Diversity of Life** Resources, pgs 55-64 |

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| **LS.9 The student will investigate and understand interactions among populations in a biological community. Key concepts include:** | |
| a) the relationship among producers, consumers, and decomposers in food webs; | **Populations and Ecosystems**, Investigation 4, Part 2, pgs 122-129<br>Investigation 5, Parts 2-4, pgs 151-169<br>Investigation 7, pgs 210-218<br>Populations and Ecosystems Resources, pgs 17-21<br>Populations and Ecosystems CD-ROM "Ecoscenarios" |
| b) the relationship of predators and prey; | Populations and Ecosystems, Investigation 4, Parts 1-2, pgs 122-129<br>Investigation 6, Parts 2-3, pgs 187-197<br>Populations and Ecosystems Resources, pgs 17-21, 31-39 |
| c) competition and cooperation; | **Populations and Ecosystems** Resources, pgs 23-24<br>**Diversity of Life** Resources, pgs 46-50 |
| d) symbiotic relationships; and | **Diversity of Life** Resources, pg 42 |
| e) niches. | **Diversity of Life** Resources, pgs 42-43 |
| **LS.10 The student will investigate and understand how organisms adapt to biotic and abiotic factors in an ecosystem. Key concepts include:** | |
| a) differences between ecosystems and biomes; | **Populations and Ecosystems**, Investigation 2, Parts 1-2, pgs 70-79<br>Investigation 3, Parts 1-3, pgs 90-107<br>Investigation 7, pgs 210-217<br>Populations and Ecosystems Resources, pgs 6-7, 8-13, 25-29<br>Populations and Ecosystems CD-ROM "Ecoscenarios" |
| b) characteristics of land, marine, and freshwater ecosystems; and | **Populations and Ecosystems**, Investigation 3, Parts 1-3, pgs 90-107<br>Investigation 7, pgs 210-217<br>Populations and Ecosystems Resources, pgs 6-7, 25-29, 31-41<br>Populations and Ecosystems CD-ROM "Ecoscenarios" |
| c) adaptations that enable organisms to survive within a specific ecosystem. | **Populations and Ecosystems**, Investigation 8, Parts 1-2, pgs 230-242<br>Investigation 10, Parts 1-3, pgs 302-317<br>Populations and Ecosystems Resources pgs 42-45, 60-61<br>Video, Strangers in Paradise<br>CD, Octopus Color Change<br>**Diversity of Life**, Investigation 9, pgs 262-290<br>Diversity of Life Resources, pgs 35-36, 38-39, 46-49 |
| **LS.11 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic and change over time (daily, seasonal, and long term). Key concepts include:** | |
| a) phototropism, hibernation, and dormancy; | **Diversity of Life**, Investigation 1, Part 2, pgs 52-62<br>Investigation 5, Part 1, pgs 151-156<br>Diversity of Life Resources, pgs 31-32, 53 |
| b) factors that increase or decrease population size; and | **Populations and Ecosystems**, Investigation 6, Parts 1-3, pgs 180-197<br>Investigation 7, pgs 210-217<br>Investigation 8, Parts 1-2, pgs 230-243 |

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| | Populations and Ecosystems Resources, pgs 28-29, 32-38, 40, 41 |
| c) eutrophication, climate change, and catastrophic disturbances. | **Populations and Ecosystems** Resources, pgs 58-61<br>**Weather and Water,** Investigation 9, Parts 3-4, pgs 311-320<br>Weather and Water Resources, pgs 45-47, 60-63 |
| **LS.12 The student will investigate and understand the relationships between ecosystem dynamics and human activity. Key concepts include:** | |
| a) food production and harvest; | **Populations and Ecosystems** Resources, pgs 33, 38, 40 |
| b) change in habitat size, quality, and structure; | **Populations and Ecosystems**, Investigation 4, Parts 1-2, pgs 119-129<br>Investigation 7, pgs 210-217<br>Populations and Ecosystems Resources, pgs 28-29, 35, 36, 38, 40, 41<br>Populations and Ecosystems CD-ROM "Ecoscenarios" |
| c) change in species competition; | **Populations and Ecosystems**, Investigation 8, Parts 1-2, pgs 230-243<br>Video, Strangers in Paradise<br>Populations and Ecosystems Resources, pgs 39, 40, 41 |
| d) population disturbances and factors that threaten and enhance species survival; and | **Populations and Ecosystems**, Investigation 6, Parts 1-3, pgs 180-197<br>Investigation 7, pgs 210-217<br>Investigation 8, Parts 1-2, pgs 230-243<br>Investigation 10, Parts 1-3, pgs 302-317<br>Populations and Ecosystems Resources, pgs 28-29, 32-28, 40, 41<br>Populations and Ecosystems CD-ROM "Ecoscenarios" |
| e) environmental issues (water supply, air quality, energy production, and waste management). | **Populations and Ecosystems**, Investigation 4, Part 1, pgs 119-121<br>Investigation 6, Part 3, pgs 191-197<br>Investigation 7, pgs 210-217<br>Populations and Ecosystems Resources, pgs 8-13, 25-29,32-38, 40, 41<br>Populations and Ecosystems CD-ROM "Ecoscenarios"<br>**Weather and Water,** Investigation 9, Parts 3-4, pgs 311-320<br>Weather and Water Resources, pgs 45-47, 60-63 |
| **LS.13 The student will investigate and understand that organisms reproduce and transmit genetic information to new generations. Key concepts include:** | |
| a) the role of DNA; | **Populations and Ecosystems**, Investigation 9, Parts 1-4, pgs 262-291<br>Populations and Ecosystems Resources, pgs 50-52 |
| b) the function of genes and chromosomes; | **Populations and Ecosystems**, Investigation 9, Parts 1-3, pgs 262-286<br>Populations and Ecosystems Resources, pgs 49-54 |
| c) genotypes and phenotypes; | **Populations and Ecosystems**, Investigation 9, Parts 2-4, pgs 268-291<br>Investigation 10, Parts 1-3, pgs 302-317<br>Populations and Ecosystems Resources, pgs 52-54<br>Populations and Ecosystems CD-ROM "Punnett Squares" |
| d) factors affecting the expression of traits; | **Populations and Ecosystems**, Investigation 9, Parts 1-4, pgs 262-291<br>Investigation 10, Parts 1-3, pgs 302-317<br>Populations and Ecosystems Resources, pgs 46-54 |

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| | Populations and Ecosystems CD-ROM "Punnett Squares" |
| e) characteristics that can and cannot be inherited; | **Populations and Ecosystems**, Investigation 9, Part 1, pgs 262-266<br>Investigation 10, Parts 1-3, pgs 302-317<br>Populations and Ecosystems Resources, pgs 46-49, 52-54 |
| f) genetic engineering and its applications; and | **Populations and Ecosystems** Resources, pgs 54-55, 58-59 |
| g) historical contributions and significance of discoveries related to genetics. | **Populations and Ecosystems**, Investigation 9, Part 1, pgs 262-266<br>Populations and Ecosystems Resources, pgs 46-55 |
| **LS.14 The student will investigate and understand that organisms change over time.**<br>**Key concepts include:** | |
| a) the relationships of mutation, adaptation, natural selection, and extinction; | **Populations and Ecosystems**, Investigation 8, Parts 1-2, pgs 230-243<br>Investigation 10, Parts 1-2, pgs 302-314<br>Populations and Ecosystems Resources, pgs 42-45, 58-61<br>Video, Voyage to the Galapagos |
| b) evidence of evolution of different species in the fossil record; and | **Earth History,** Investigation 7, Parts 1-2, pgs 234-244<br>Earth History Resources, pgs 37-41, 79-88<br>Earth History CD-ROM<br>**Populations and Ecosystems** Resources, pgs 59-61 |
| c) how environmental influences, as well as genetic variation, can lead to diversity of organisms. | **Populations and Ecosystems,** Investigation 8, Parts 1-2, pgs 230-243<br>Investigation 10, Parts 1-3, pgs 302-317<br>Populations and Ecosystems Resources, pgs 58-61, 62-63 |

# Physical Science
# Standards of Learning

| *Science Standard* | *Correlation By Page Numbers* |
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| **PS 1. The student will plan and conduct investigations in which:** | |
| a) chemicals and equipment are used safely; | Student and teacher safety is top priority in FOSS. All FOSS modules include a safety feature in the Overview section of the teacher's guide. Safety alerts are provided in the text of the lesson plans where appropriate. See for example:<br>**Electronics**, Overview, p. 25<br>Investigation 1, Part 1, pg 58<br>Electronics Resources pgs 12-14<br>**Human Brain and Senses**, Overview, pg. 19<br>Investigation 2, Part 1, pg 71<br>**Earth History,** Overview, pg 19<br>Investigation 5, Parts 1-2, pgs 175-182<br>**Chemical Interactions**, Investigation 9, Parts 2-4, pgs 288-312<br>Chemical Interactions Resources, pg 89 |
| b) length, mass, volume, density, temperature, weight, and force are accurately measured and reported using the International System of Units (SI - metric); | Metric units (SI) are used throughout the FOSS program beginning in Grade 3. Some examples from modules that also address other Virginia Physical Science standards are:<br>**Weather and Water**, Investigation 4, Part 1, pgs 121-130<br>Investigation 5, Part 1, pgs 152-162<br>**Planetary Science**, Investigation 5, Parts 2-3, pgs 158-167<br>**Earth History**, Investigation 6, Part 3, pgs 215-219<br>**Chemical Interactions**, Investigation 5, Parts 1, 3, pgs 153-158, 165-171 |
| c) conversions are made among metric units applying appropriate prefixes; | **Earth History**, Investigation 6, Part 3, pgs 215-219<br>**Planetary Science**, Investigation 7, Parts 2-5, pgs 222-237 |
| d) triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, and spring scales are used to gather data; | **Weather and Water**, Investigation 4, Part 1, pgs 121-130<br>Investigation 5, Part 1, pgs 152-162<br>**Planetary Science**, Investigation 5, Parts 2-3, pgs 158-167<br>Investigation 8, Parts 3-4, pgs 260-270<br>**Human Brain and Senses**, Investigation 7, Parts 1-2, pgs 210-225<br>**Chemical Interactions**, Investigation 5, Parts 1, 3, pgs 153-158, 165-171 |
| e) numbers are expressed in scientific notation where appropriate; | **Planetary Science**, Investigation 10, Parts 1-3, pgs 312-324 |

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| f) research skills are utilized using a variety of resources; | This standard is addressed in ALL FOSS Middle School modules. Students conduct research using hands-on investigations, readings, images and graphs in the Resources books, the CD-ROMS included for EACH module, and Internet web sites where feasible and useful. See for example:<br>**Earth History,** Investigation 4,Part 6, pg 163<br>Earth History Resources, pgs 68-75<br>Earth History CD-ROM<br>**Planetary Science**, Investigation 10, Part 2, pgs 318-321<br>Planetary Science Resources, pgs 35,38, 83-89<br>Planetary Science CD-ROM<br>**Human Brain and Senses**, Investigation 9, Part 2, pgs 270-275<br>Investigation 7, pg 231<br>Human Brain and Senses Resources, pgs 1-20,31-38 |
| g) independent and dependent variables, constants, controls, and repeated trials are identified; | **Planetary Science**, Investigation 5, Parts 2-3, pgs 158-167<br>**Force and Motion**, ALL, such as<br>Investigation 3, Parts 1-2, pgs 112-123<br>Force and Motion Resources, pgs 27-31<br>Force and Motion CD-ROM<br>**Diversity of Life**, Investigation 8, Part 2, pgs 244-252<br>Investigation 9, Part 2, pgs 278-285 |
| h) data tables showing the independent and dependent variables, derived quantities, and the number of trials are constructed and interpreted; | **Planetary Science,** Investigation 5, Parts 2-3, pgs 158-167<br>**Force and Motion**, ALL, such as<br>Investigation 3, Parts 1-2, pgs 112-123<br>Investigation 7, Part 2, pgs 262-266<br>Force and Motion Resources, pgs 27-40<br>Force and Motion CD-ROM<br>**Weather and Water**, Investigation 4, Part 1,pgs 121-130 |
| i) data tables for descriptive statistics showing specific measures of central tendency, the range of the data set, and the number of repeated trials are constructed and interpreted; | **Weather and Water**, Investigation 5, Part 1, pgs 152-162<br>**Electronics**, Investigation 8, Part 3, pgs 261-264 |
| j) frequency distributions, scattergrams, line plots, and histograms are constructed and interpreted; | **Human Brain and Senses**, Investigation 7, Parts 1-2, pgs 210-225<br>**Planetary Science**, Investigation 10, Part 1, pgs 312-317 |
| k) valid conclusions are made after analyzing data; | This standard is addressed throughout ALL FOSS modules. See for example:<br>**Weather and Water**, Investigation 4, Part 1, pgs 121-130<br>**Force and Motion**, ALL, such as<br>Investigation 5, Parts 1-4, pgs 169-201<br>**Planetary Science**, Investigation 5, Parts 1-4, pgs 154-173<br>**Electronics**, Investigation 8, Parts 2-3, pgs 256-264 |

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| l) research methods are used to investigate practical problems and questions; | **Force and Motion**, ALL, such as<br>Investigation 6, Parts 1-4, pgs 218-244<br>Force and Motion CD-ROM<br>**Earth History**, Investigation 8, Parts 3-4, pgs 254-275<br>**Planetary Science**, Investigation 10, Part 2, pgs 318-321<br>**Human Brain and Senses**, Investigation 9, Part 2, pgs. 270-275<br>Investigation 7, Part 3, pg. 231<br>Human Brain and Senses CD-Rom "Optics Bench" |
| m) experimental results are presented in appropriate written form; and | This standard is addressed in data sheets and lab notebook or journal entries throughout ALL FOSS Middle School modules. See for example:<br>**Force and Motion,** Investigation 2, Parts 1-3, pgs 78-99<br>Force and Motion Lab Notebook pages 13-23<br>**Diversity of Life**, Investigation 8, Part 2, pgs 244-252<br>Investigation 9, Part 2, pgs 278-285<br>**Electronics,** Investigation 8, Part 4, pgs 265-271<br>Electronics Lab Notebook pages 46-47<br>**Earth History**, Investigation 4, Part 3, pgs 138-146 |
| n) an understanding of the nature of science is developed and reinforced. | FOSS modules are inquiry based and an understanding of the nature science is developed throughout the entire program in the hands-on investigations, teacher background, videos, student readings and CD-ROMS. See for example:<br>**Planetary Science**, Investigation 5, Parts 1-3, pgs 154-167<br>**Force and Motion,** Investigation 7, Parts 1-3, pgs 256-272<br>**Electronics,** Investigation 4, Part 1, pgs 149-152<br>Investigation 8, Parts 3-4, pgs 261-273 |
| **PS.2 The student will investigate and understand the basic nature of matter. Key concepts include:** | |
| a) the particle theory of matter; | **Earth History** Resources pgs 88-89<br>**Chemical Interactions**,<br>Investigation 3, Parts 1-3, pgs 92-107<br>Investigation 4, Parts 1-3, pgs 122-141<br>Chemical Interactions Resources, pgs 14-58 |
| b) elements, compounds, mixtures, acids, bases, and salts; | *This standard is addressed in* ***Mixtures and Solutions,*** *a FOSS module designed for Grades 5-6.*<br>**Chemical Interactions**,<br>Investigation 2, Parts 1-2, pgs 70-80<br>Investigation 8, Parts 1-3, pgs 248-268<br>Investigation 9, Parts 2-4, pgs 288-312<br>Investigation 10, Parts 1-2, pgs 323-336<br>Chemical Interactions Resources, pgs 3-13, 49-62, 63-67. |
| c) solids, liquids, and gases; | **Weather and Water,** CD, Matter and Energy: Molecules in Solids and |

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| | Liquids and Gases<br>**Chemical Interactions**,<br>Investigation 7, Parts 1-5, pgs 204-234<br>Chemical Interactions Resources, pgs 16-22, 42-48 |
| d) characteristics of types of matter based on physical and chemical properties; | **Earth History,** Investigation 5, Parts 1-2, pgs 175-182<br>Earth History Resources. pgs 68-72<br>**Planetary Science**, Investigation 8, Parts 1-4, pgs 250-270<br>**Chemical Interactions**,<br>Investigation 1, Parts 1-2, pgs 41-58<br>Investigation 3, Parts 1-2, pgs 92-107<br>Investigation 4, Parts 1-3, pgs 122-141<br>Chemical Interactions Resources, pgs 42-48. |
| e) physical properties (shape, density, solubility, odor, melting point, boiling point, color); and | **Weather and Water,** Investigation 5, Part 1, pgs 152-162<br>Weather and Water Resources, pgs. 27-31<br>**Planetary Science**, Investigation 8, Parts 1-4, pgs 250-270<br>**Chemical Interactions**,<br>Investigation 1, Parts 1-2, pgs 41-58<br>Investigation 7, Parts 1-5, pgs 204-234<br>Investigation 8, Parts 1-3, pgs 248-255 |
| f) chemical properties (acidity, basicity, combustibility, reactivity). | **Earth History,** Investigation 5, Parts 1-2, pgs 175-182<br>**Chemical Interactions**,<br>Investigation 9, Parts 2-4, pgs 288-312<br>Investigation 10, Parts 1-2, pgs 323-336<br>Chemical Interactions Resources, pgs 63-67 |
| **PS. 3 The student will investigate and understand the modern and historical models of atomic structure. Key concepts include:** | |
| a) the contributions of Dalton, Thomson, Rutherford, and Bohr in understanding the atom; and | *This standard is addressed in **Mixtures and Solutions,** a FOSS module designed for Grades 5-6.*<br>**Chemical Interactions** Resources, pg 80 |
| b) the modern model of atomic structure. | **Chemical Interactions** Resources, pg 80 |
| **PS.4 The student will investigate and understand the organization and use of the periodic table of elements to obtain information. Key concepts include** | |
| a) symbols, atomic number, atomic mass, chemical families (groups), and periods; | *This standard is addressed in **Mixtures and Solutions,** a FOSS module designed for Grades 5-6.*<br>**Chemical Interactions**,<br>Investigation 2, Parts 1-2, pgs 70-80<br>Chemical Interactions Resources, pgs 3-6, 63-67, 90-93 |
| b) classification of elements as metals, metalloids, and nonmetals; and | *This standard is addressed in **Mixtures and Solutions,** a FOSS module designed for Grades 5-6*<br>**Chemical Interactions** Resources, pgs 4-6, 90-91 |

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| c) simple compounds (formulas and nature of bonding). | **Populations and Ecosystems,** Investigation 5, Parts 1-2, pgs 142-155 (photosynthesis/glucose)<br>**Earth History** Resources. pgs 68-72, 88-89 (calcium carbonate, NaCl)<br>**Chemical Interactions**,<br>Investigation 9, Parts 1-2, pgs 280-297<br>Chemical Interactions Resources, pgs 63-67 |
| **PS. 5 The student will investigate and understand changes in matter and the relationship of these changes to the Law of Conservation of Matter and Energy. Key concepts include:** | |
| a) physical changes; | **Earth History**, Investigation 4, Parts 3-4, pgs 138-149<br>**Planetary Science**, Investigation 5, Parts 2-3, pgs 158-167<br>**Chemical Interactions**,<br>Investigation 1, Parts 1-2, pgs 41-58<br>Investigation 7, Parts 1-5, pgs 204-234<br>Investigation 8, Parts 1-3, pgs 248-255 |
| b) nuclear reactions (products of fusion and fission and their effects on human beings and the environment); and | |
| c) chemical changes (types of reactions, reactants and products, and balanced equations). | **Chemical Interactions**,<br>Investigation 9, Parts 2-4, pgs 288-312<br>Investigation 10, Parts 1-2, pgs 323-336<br>Chemical Interactions Resources, pgs 63-67 |
| **PS. 6 The student will investigate and understand states and forms of energy and how energy is transferred and transformed. Key concepts include:** | |
| a) potential and kinetic energy; | **Weather and Water** Resources, pgs 22-26 "Heating the Atmosphere"<br>**Chemical Interactions**,<br>Investigation 4, Parts 1-3, pgs 122-141<br>This standard could be addressed in:<br>**Force and Motion,** Investigation 5, Parts 1-4, pgs 169-201 "Acceleration" |
| b) mechanical, chemical, and electrical energy; and | **Electronics**, ALL, such as Investigation 1, Part 1, pgs 55-60<br>Electronics Resources, pgs 12-14, 23-25<br>CD, Tech Manual: Static Electricity; Current Electricity<br>**Force and Motion**, throughout, such as<br>Investigation 2, Parts 1-3, pgs 78-99"Speed" |
| c) heat, light, and sound. | **Electronics,** throughout, such as Investigation 4, Part 2, pgs 149-152<br>Investigation 6, Part 2, pgs 190-194<br>Electronics Resources, pgs 1-2, 12-14, 23-25, 34-36<br>**Weather and Water**, Investigation, 4, Parts 1-2, pgs 121-139<br>Weather and Water Resources, pgs 22-26, 60-63<br>CD, Matter and Energy: Heat and Energy |

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| **PS. 7 The student will investigate and understand temperature scales, heat, and heat transfer. Key concepts include:** | |
| a) Celsius and Kelvin temperature scales and absolute zero; | **Weather and Water**, Investigation 4, Part 1, pgs 121-130<br>Weather and Water Resources, pgs 2, 20-21, 25-26<br>CD, Matter and Energy: Thermometers |
| b) phase change, freezing point, melting point, boiling point, vaporization, and condensation; | **Weather and Water,** Investigation 6, Parts 3-4, pgs 200-213<br>Investigation 7, Parts 1-2, pgs 232-244<br>Weather and Water Resources, pgs 20, 34-36<br>Weather and Water CD-ROM<br>**Chemical Interactions**,<br>Investigation 5, Parts 1-3, pgs 153-171<br>Investigation 7, Parts 1-5, pgs 204-234<br>Chemical interactions Resources, pgs 42-48 |
| c) conduction, convection, radiation, and | **Weather and Water**, Investigation 4, Parts 1-2, pgs 121-139<br>Investigation 5, Parts 2-3, pgs 162-174<br>Weather and Water Resources, pgs 22-24, 32-33<br>CD, Matter and Energy: Heat and Energy<br>Video, Conduction Through Metals |
| d) applications of heat transfer (heat engines, thermostats, refrigeration, and heat pumps). | **Weather and Water** Resources, pgs 20-21 |
| **PS. 8 The student will investigate and understand characteristics of sound and technological applications of sound waves. Key concepts include:** | |
| a) wavelength, frequency, speed, and amplitude; | |
| b) resonance; | |
| c) the nature of mechanical waves; and | |
| d) technological applications of sound. | |
| **PS. 9 The student will investigate and understand the nature and technological applications of light. Key concepts include:** | |
| a) the wave behavior of light (reflection, refraction, diffraction, and interference); | **Human Brain and Senses** Resources, pgs 31-35<br>Human Brain and Senses CD-ROM "Optics Bench" |
| b) images formed by lenses and mirrors; and | **Human Brain and Senses**, Investigation 1, Part 1, pgs 37-40<br>Investigation 3, Parts 1-3, pgs 85-110<br>Human Brain and Senses Resources, pgs 31-35<br>Human Brain and Senses CD-ROM "Optics Bench" |
| c) the electromagnetic spectrum. | |
| **PS. 10 The student will investigate and understand scientific principles and technological applications of work, force, and motion. Key concepts include:** | |
| a) speed, velocity, and acceleration; | **Force and Motion,** ALL, such as<br>Investigation 2, Parts 1-3, pgs 78-99 "Speed"<br>Investigation 5, Parts 1-4, pgs 169-201 "Acceleration" |

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| | Force and Motion Resources, pgs 3-6,7-10,17-65<br>Force and Motion CD-ROM |
| b) Newton's laws of motion; | **Force and Motion,**<br>Investigation 6, Parts 1-4, pgs 218-254<br>Note also the teacher background, pgs 203-217<br>Force and Motion Resources, pgs 50-52<br>Force and Motion CD-ROM Multimedia Force Bench |
| c) work, force, mechanical advantage, efficiency, and power; and | **Force and Motion**, throughout, such as<br>Investigation 6, Parts 1-4, pgs 218-254<br>Investigation 7, Parts 1-3, pgs 256-272<br>Force and Motion Resources, pgs 50-76<br>Force and Motion CD-ROM |
| d) applications (simple machines, compound machines, powered vehicles, rockets, and restraining devices). | **Force and Motion**<br>Investigation 5, Parts 1-4, pgs 169-201<br>Investigation 8, Parts 1-2, pgs 284-301<br>Force and Motion Resources, pgs 50-76<br>Force and Motion CD-ROM |
| **PS. 11 The student will investigate and understand basic principles of electricity and magnetism. Key concepts include:** | |
| a) static, current, circuits; | **Electronics**, throughout, such as<br>Investigation 1, Parts 1, 3, 5, pgs 55-60, 66-70, 76-79<br>Electronics Resources, pgs 12-13<br>Electronics CD-ROM, Tech Manual: Static Electricity; Current Electricity; Circuits |
| b) magnetic fields and electromagnets; and | **Electronics** Resources, pg 13<br><br>*Note: this standard is addressed in depth with hands-on investigations in the module **Magnetism and Electricity,** designed for Grades 3-4.* |
| c) motors and generators. | **Electronics** Resources, pg 13<br><br>*Note: this standard is also addressed in the module **Magnetism and Electricity,** designed for Grades 3-4.* |