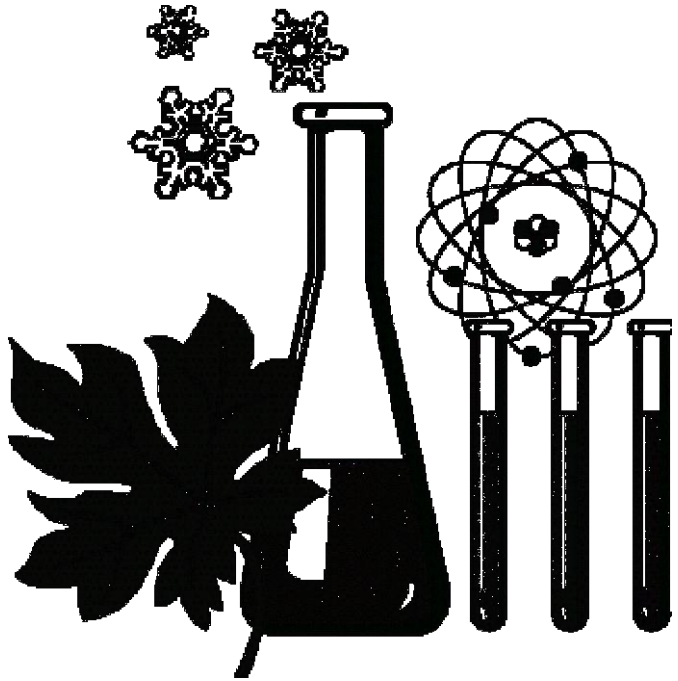
# SCIENCE
# ALIGNED STANDARDS OF LEARNING CURRICULUM FRAMEWORK

## Grade 3



**3S-SI 1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which**

**a) observations and predictions are made and questions formed;**
**b) observations are differentiated from personal interpretation;**
**c) observations are repeated to ensure accuracy;**
**d) two or more characteristics or properties are used to classify items;**
**e) length, volume, mass, and temperature are measured in metric units and standard English units using the proper tools;**
**f) time is measured using the proper tools;**
**g) conditions that influence a change are identified and interferences are made;**
**h) data are collected and recorded, and bar graphs are constructed using numbered axes;**
**i) data are analyzed, and unexpected or unusual quantitative data are recognized;**
**j) conclusions are drawn;**
**k) observations and data are communicated;**
**l) simple physical models are designed and constructed to clarify explanations and show relationships.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • The nature of science refers to the foundational concepts that govern the way scientists formulate explanations about the natural world. The nature of science includes the following concepts:<br>a) the natural world is understandable;<br>b) science is based on evidence, both observational and experimental;<br>c) science is a blend of logic and innovation;<br>d) scientific ideas are durable yet subject to change as new data are collected;<br>e) science is a complex social endeavor; and<br>f) scientists try to remain objective and engage in peer review to help avoid bias.<br>In grade two, an emphasis should be placed on concepts a, b, and e.<br>• Science assumes that the natural world is understandable. Scientific inquiry can provide explanations about nature. This expands students' thinking from just a knowledge of facts to understanding how facts are relevant to everyday life.<br>• Science demands evidence. Scientists develop their ideas based on evidence and they change their ideas when new evidence becomes available or the old evidence is viewed in a different way. | **In order to meet this standard, it is expected that students will**<br>• conduct simple experiments, make predictions, gather data from those experiments, repeat observations to improve accuracy, and draw conclusions.<br>• differentiate among simple observations and personal interpretations.<br>• classify items, using two or more attributes such as size, shape, color, texture, and weight.<br>• use centimeters, meters, liters, degrees Celsius, grams, and kilograms in measurement.<br>• use inches, feet, yards, quarts, gallons, degrees Fahrenheit, ounces, and pounds in measurement.<br>• measure time using both digital and analog clocks.<br>• identify conditions that influence a change in an experiment.<br>• construct and interpret simple models (e.g., weathering and erosion of land surfaces — 2.7). |

**3S-SI 1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which**

**a) observations and predictions are made and questions formed;**
**b) observations are differentiated from personal interpretation;**
**c) observations are repeated to ensure accuracy;**
**d) two or more characteristics or properties are used to classify items;**
**e) length, volume, mass, and temperature are measured in metric units and standard English units using the proper tools;**
**f) time is measured using the proper tools;**
**g) conditions that influence a change are identified and interferences are made;**
**h) data are collected and recorded, and bar graphs are constructed using numbered axes;**
**i) data are analyzed, and unexpected or unusual quantitative data are recognized;**
**j) conclusions are drawn;**
**k) observations and data are communicated;**
**l) simple physical models are designed and constructed to clarify explanations and show relationships.**

| **UNDERSTANDING THE STANDARD**<br>**(Background Information for Instructor Use Only)** | **ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES** |
|---|---|
| • Science is a complex social endeavor. It is a complex social process for producing knowledge about the natural world. Scientific knowledge represents the current consensus as to what is the best explanation for phenomena in the natural world. This consensus does not arise automatically, since scientists with different backgrounds from all over the world may interpret the same data differently. To build a consensus, scientists communicate their findings to other scientists and attempt to replicate one another's findings. In order to model the work of professional scientists, it is essential for second-grade students to engage in frequent discussions with peers about their understanding of their investigations.<br>• In order to communicate accurately, it is necessary to provide a clear description of exactly what is observed. There is a difference between what one can observe and what can be interpreted from an observation.<br>• An observation is what you actually see, feel, taste, hear, or smell.<br>• The more times an observation is repeated, the greater the chance of ensuring the accuracy of the observation.<br>• It is easier to see how things are related if objects are classified according to their common characteristics. | • analyze sets of objects, numerical data, or pictures, and create basic categories to organize the data (descriptive or numerical).<br>• judge which, if any, collected data in a small set appear to be unexpected or unusual.<br>• construct and interpret picture and bar graphs with numbered axes depicting the distribution of data.<br>• communicate observations and data. |

**3S-SI 1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which**

**a) observations and predictions are made and questions formed;**
**b) observations are differentiated from personal interpretation;**
**c) observations are repeated to ensure accuracy;**
**d) two or more characteristics or properties are used to classify items;**
**e) length, volume, mass, and temperature are measured in metric units and standard English units using the proper tools;**
**f) time is measured using the proper tools;**
**g) conditions that influence a change are identified and interferences are made;**
**h) data are collected and recorded, and bar graphs are constructed using numbered axes;**
**i) data are analyzed, and unexpected or unusual quantitative data are recognized;**
**j) conclusions are drawn;**
**k) observations and data are communicated;**
**l) simple physical models are designed and constructed to clarify explanations and show relationships.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • By constructing and studying simple models, it is sometimes easier to understand how real things work.<br>• Scientific investigations require standard measures, proper tools (e.g., balance, thermometer, ruler, magnifying glasses), and organized collection and reporting of data. The way the data are displayed can make it easier to interpret important information.<br>• When using any standard measurement scale, measure to the marked increment and estimate one more decimal place. Scientists do not round their measurements as this would be inaccurate.<br>• Students should communicate observations and data publicly. | |

**3S-SI2 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations in which**

**a) observations are made and repeated to ensure accuracy;**
**b) predictions are formulated using a variety of sources of information;**
**c) objects with similar characteristic or properties are classified into at least two sets and two subsets;**
**d) natural events are sequenced chronologically;**
**e) length, volume, mass, and temperature are estimated and measured in metric and standard English units using proper tools and techniques;**
**f) time is measured to the nearest minute using proper tools and techniques;**
**g) questions are developed to formulate hypotheses;**
**h) data are gathered, charted, graphed, and analyzed;**
**i) unexpected or unusual quantitative data are recognized;**
**j) inferences are made and conclusions are drawn;**
**k) data are communicated;**
**l) models are designed and built.**

| UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • The nature of science refers to the foundational concepts that govern the way scientists formulate explanations about the natural world. The nature of science includes the following concepts:<br>a) the natural world is understandable;<br>b) science is based on evidence, both observational and experimental;<br>c) science is a blend of logic and innovation;<br>d) scientific ideas are durable yet subject to change as new data are collected;<br>e) science is a complex social endeavor; and<br>f) scientists try to remain objective and engage in peer review to help avoid bias.<br>In grade three, an emphasis should be placed on concepts a, b, c, and e.<br>• Science assumes that the natural world is understandable. Scientific inquiry can provide explanations about nature. This expands students' thinking from just a knowledge of facts to understanding how facts are relevant to everyday life.<br>• Science demands evidence. Scientists develop their ideas based on evidence and they change their ideas when new evidence becomes available or the old evidence is viewed in a different way. | **In order to meet this standard, it is expected that students will**<br>• make and communicate careful observations.<br>• demonstrate that observations should be repeated to ensure accuracy.<br>• classify objects into at least two major sets and subsets based on similar characteristics, such as predator/prey and herbivore, carnivore, and omnivore.<br>• sequence natural events chronologically (Example: 3.8 — plant and animal life cycles, phases of the moon, the water cycle, and tidal change).<br>• measure length to the nearest centimeter, mass to the nearest gram, volume to the nearest milliliter, temperature to the nearest degree Celsius, and time to the nearest minute, using the appropriate instruments.<br>• develop hypotheses from simple questions. These questions should be related to the concepts in the third-grade standards. Hypotheses should be stated in terms such as: "If an object is cut into smaller pieces, then the physical properties of the object and its smaller pieces will remain the same." |

**3S-SI2 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations in which**

- **a) observations are made and repeated to ensure accuracy;**
- **b) predictions are formulated using a variety of sources of information;**
- **c) objects with similar characteristic or properties are classified into at least two sets and two subsets;**
- **d) natural events are sequenced chronologically;**
- **e) length, volume, mass, and temperature are estimated and measured in metric and standard English units using proper tools and techniques;**
- **f) time is measured to the nearest minute using proper tools and techniques;**
- **g) questions are developed to formulate hypotheses;**
- **h) data are gathered, charted, graphed, and analyzed;**
- **i) unexpected or unusual quantitative data are recognized;**
- **j) inferences are made and conclusions are drawn;**
- **k) data are communicated;**
- **l) models are designed and built.**

| UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • Science uses both logic and innovation. Innovation has always been an important part of science. Scientists draw upon their creativity to visualize how nature works, using analogies, metaphors, and mathematics.<br>• Science is a complex social activity. It is a complex social process for producing knowledge about the natural world. Scientific knowledge represents the current consensus as to what is the best explanation for phenomena in the natural world. This consensus does not arise automatically, since scientists with different backgrounds from all over the world may interpret the same data differently. To build a consensus, scientists communicate their findings to other scientists and attempt to replicate one another's findings. In order to model the work of professional scientists, it is essential for third-grade students to engage in frequent discussions with peers about their understanding of their investigations.<br>• Questions frequently arise from observations. Hypotheses can be developed from those questions. Data gathered from an investigation may support a hypothesis. A hypothesis is a statement written in a manner that describes the cause and effect relationship between the independent and dependent variables in an experiment. At the third- grade level, a method for helping students understand how to develop a hypothesis is to have them build "if/then" statements (e.g., If heat is added to ice, then the ice will melt.). | • analyze data that have been gathered and organized.<br>• communicate results of investigations by displaying data in the form of tables, charts, and graphs. Students will construct bar and picture graphs and line plots to display data (Example: 3.7 — comparison of types of soil and their effect on plant growth).<br>• communicate any unexpected or unusual quantitative data that are noted.<br>• make and communicate predictions about the outcomes of investigations.<br>• design and build a model to show experimental results. |

**3S-SI2 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations in which**

- **a) observations are made and repeated to ensure accuracy;**
- **b) predictions are formulated using a variety of sources of information;**
- **c) objects with similar characteristic or properties are classified into at least two sets and two subsets;**
- **d) natural events are sequenced chronologically;**
- **e) length, volume, mass, and temperature are estimated and measured in metric and standard English units using proper tools and techniques;**
- **f) time is measured to the nearest minute using proper tools and techniques;**
- **g) questions are developed to formulate hypotheses;**
- **h) data are gathered, charted, graphed, and analyzed;**
- **i) unexpected or unusual quantitative data are recognized;**
- **j) inferences are made and conclusions are drawn;**
- **k) data are communicated;**
- **l) models are designed and built.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • Complete observations are made using all of the senses. Simple instruments can help extend the senses (e.g., magnifying glass enhances the vision of an item).<br>• Predictions are statements of what is expected to happen in the future based on past experiences and observations.<br>• In order for data from an investigation to be most useful, it must be organized so that it can be examined more easily.<br>• Charts and graphs are powerful tools for reporting and organizing data.<br>• It is sometimes useful to organize objects according to similarities and differences. By organizing objects in sets and subsets, it may be easier to determine a specific type of characteristic.<br>• An inference is a tentative explanation based on background knowledge and available data.<br>• A conclusion is a summary statement based on the results of an investigation.<br>• Putting natural events in a sequence allows us to notice change over time. | |

**3S-SI2 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations in which**

- **a) observations are made and repeated to ensure accuracy;**
- **b) predictions are formulated using a variety of sources of information;**
- **c) objects with similar characteristic or properties are classified into at least two sets and two subsets;**
- **d) natural events are sequenced chronologically;**
- **e) length, volume, mass, and temperature are estimated and measured in metric and standard English units using proper tools and techniques;**
- **f) time is measured to the nearest minute using proper tools and techniques;**
- **g) questions are developed to formulate hypotheses;**
- **h) data are gathered, charted, graphed, and analyzed;**
- **i) unexpected or unusual quantitative data are recognized;**
- **j) inferences are made and conclusions are drawn;**
- **k) data are communicated;**
- **l) models are designed and built.**

| **UNDERSTANDING THE STANDARD**<br>**(Background Information for Instructor Use Only)** | **ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES** |
|---|---|
| • Metric measures, including centimeters, grams, milliliters, and degrees Celsius, are a standard way to record measurements. The metric system is recognized everywhere around the world.<br>• When using any standard measurement scale, measure to the marked increment and estimate one more decimal place. Scientists do not round their measurements as this would be inaccurate.<br>• A bar graph can be horizontal or vertical, and it compares amounts. Both the X- and Y-axis need to be identified.<br>• A line plot shows the spread of data. *(See Grade 3 Mathematics Curriculum Framework, Standard 3.17, page 31.)*<br>• A picture graph is similar to a bar graph except that it uses symbols to represent quantities.<br>• Scientists use a variety of modes to communicate about their work. Examples of ways they communicate include oral presentations; graphs and charts created to visualize, analyze and present information about their data; and written reports. | |

**3S-SI2 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations in which**

- **a) observations are made and repeated to ensure accuracy;**
- **b) predictions are formulated using a variety of sources of information;**
- **c) objects with similar characteristic or properties are classified into at least two sets and two subsets;**
- **d) natural events are sequenced chronologically;**
- **e) length, volume, mass, and temperature are estimated and measured in metric and standard English units using proper tools and techniques;**
- **f) time is measured to the nearest minute using proper tools and techniques;**
- **g) questions are developed to formulate hypotheses;**
- **h) data are gathered, charted, graphed, and analyzed;**
- **i) unexpected or unusual quantitative data are recognized;**
- **j) inferences are made and conclusions are drawn;**
- **k) data are communicated;**
- **l) models are designed and built.**

| UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|

- In science, it is important that experiments and the observations recorded are replicable. There are two different types of data – qualitative and quantitative. Qualitative data deal with descriptions and data that can be observed, but not measured precisely. Quantitative data are data that can be counted or measured and the results can be recorded using numbers. Quantitative data can be represented visually in graphs and charts. Quantitative data define, whereas qualitative data describe. Quantitative data are more valuable in science because they allow direct comparisons between observations made by different people or at different times.

**Example of Qualitative Data vs. Quantitative Data**

**Third-Grade Class**

| Qualitative Data | Quantitative Data |
|---|---|
| • Friendly | • 25 students |
| • Like science | • 10 girls, 15 boys |
| • Positive about schoolwork | • 68 percent have perfect attendance |

**3S-FME1 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, magnet/nonmagnetic, poles attract/repel;**

**b) important applications of magnetism.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • Magnets have a north and a south pole.<br>• Unlike magnetic poles attract and like poles repel. The north pole of one magnet attracts the south pole of a second magnet, while the north pole of one magnet repels the other magnet's north pole.<br>• A magnet creates an invisible area of magnetism all around it called a magnetic field.<br>• The north end of a magnetic compass always points roughly toward Earth's North Pole and the south end of the compass needle always points toward Earth's South Pole. That is because Earth itself contains magnetic materials and behaves like a gigantic magnet.<br>• When a magnetized metal, such as a compass needle, is allowed to swing freely, it displays the interesting property of aligning with Earth's magnetic fields.<br>• A magnet is strongest at its poles.<br>• The farther away the magnetic poles are from each other, the weaker the magnetic force.<br>• If you cut a bar magnet in half, you get two new, smaller magnets, each with its own north and south pole.<br>• Magnets can attract objects made of iron, nickel, or cobalt.<br>• Magnets can be artificially made from special metals or can occur naturally. Naturally occurring magnets are composed of a mineral called magnetite or lodestone.<br>• Magnets have important applications and uses in everyday life. | **In order to meet this standard, it is expected that students will**<br>• identify the north and south magnetic poles of magnets.<br>• use magnetic compasses to determine the directions of north and south poles.<br>• predict which materials will be attracted to magnets, test the predictions, and create a chart that shows the results, classifying materials as to whether they are attracted to magnets or not.<br>• conduct an investigation to determine how the different poles of magnets react to the poles of other magnets.<br>• identify important applications of magnets in everyday life:<br>- refrigerator magnets and chalkboard letters<br>- toys<br>- door latches<br>- paper clip holders<br>- computers<br>- motors<br>- credit card magnetic strips.<br>• compare natural magnets (lodestone or magnetite) and artificial magnets.<br>• create a new application for using a magnet. |

**3S-FME2 The student will investigate and understand basic properties of solids, liquids, and gases. Key concepts include**
**a) identification of distinguishing characteristics of solids, liquids, and gases;**
**b) measurement of the mass and volume of solids and liquids;**
**c) changes in phases of matter with the addition or removal of energy.**

| UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • All substances are made of matter.<br>• Matter is anything that has mass and takes up space.<br>• Solids have a defined shape and volume.<br>• Liquids have a definite volume and take the shape of the container.<br>• Gases will completely fill any closed container (take the shape of its container) and assume the volume of its container. (e.g., Helium gas put into a balloon takes the shape of the balloon because the balloon defines its shape.)<br>• Mass is a measure of the amount of matter.<br>• Weight is the measure of the gravitational pull on an object.<br>• Volume is the measure of the amount of space occupied by matter.<br>• Matter most commonly occurs in three phases: solids, liquids, and gases.<br>• Matter can change from one phase to another.<br>• When matter changes from one phase to another, these changes are referred to as physical changes.<br>• Changes from solid to liquid to gas require the addition of energy. | **In order to meet this standard, it is expected that students will**<br>• classify materials as to whether they are liquids, solids, or gases.<br>• describe and identify examples of condensation, evaporation, melting, and freezing of water.<br>• measure the mass of solids and the volume of liquids in metric and standard English units.<br>• examine and describe the transformation of matter from one phase to another, i.e., solid water (ice) to liquid (water) to gas (water vapor).<br>• conduct an investigation to observe the condensation of water.<br>• design and conduct an investigation to determine basic factors that affect the evaporation of water.<br>identify the phases of water and the uses of water in its various phases in the home and at school. |

**3S-FME3 The student will investigate and understand simple machines and their uses. Key concepts include**

**a) purpose and function of simple machines;**
**b) types of simple machines;**
**c) compound machines;**
**d) examples of simple and compound machines found in the school, home, and work environments.**

| UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • Simple machines are tools that make work easier. Examples of tasks made easier include lifting a heavy weight, moving a heavy object over a distance, pushing things apart, changing the direction of a force, or holding an object together.<br>• The six simple machines are the lever, inclined plane, wedge, wheel and axle, screw, and pulley.<br>• The lever is a stiff bar that moves about a fixed point (fulcrum). It is a simple machine that is used to push, pull, or lift things. Examples include a seesaw, crowbar, and shovel.<br>• The inclined plane is a flat surface that is raised so one end is higher than the other. The inclined plane helps move heavy objects up or down. An example is a ramp.<br>• The wedge is wide at one end and pointed at the other to help cut or split other objects. Examples include a knife or ax.<br>• The wheel and axle consists of a rod attached to a wheel. A wheel and axle makes it easier to move or turn things. Examples include bicycle wheels, roller skates, and a door knob.<br>• The screw is an inclined plane wrapped around a cylinder or cone. A common use of the screw is to hold objects together. Examples include a jar lid and wood screw.<br>• The pulley is a wheel that has a rope wrapped around it. Pulleys can be used to lift heavy objects by changing the direction or amount of the force. Examples include a flagpole.<br>• A compound machine is a combination of two or more simple machines. Examples include scissors, wheelbarrow, and bicycle. | **In order to meet this standard, it is expected that students will**<br>• identify and differentiate the six types of simple machines: lever, screw, pulley, wheel and axle, inclined plane, and wedge.<br>• differentiate and classify specific examples of simple machines found in school and household items. These include a screwdriver, nutcracker, screw, flagpole pulley, ramp, and seesaw.<br>• analyze the application of and explain the function of each of the six types of simple machines. An example would be that an inclined plane is a ramp to make it easier for a heavy object to be moved up or down.<br>• identify and classify the simple machines which compose a compound machine, such as scissors, wheelbarrow, and bicycle.<br>• design and construct an apparatus that contains a simple machine. |

**3S-FME4 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;**

**b) physical properties remain the same as the material is changed in visible size;**

**c) visible physical changes are identified.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • Objects are made of one or more materials (e.g., toys, shoes, and furniture).<br>• Physical properties (e.g., color, texture, phase, temperature, ability to dissolve in water) remain the same even if the visible material (e.g., plastic, paper, metal, ice) is reduced in size.<br>• Nanotechnology is the study of materials at the molecular (atomic) scale. Items at this scale are so small they are no longer visible with the naked eye. Nanotechnology has shown that the behavior and properties of some substances at the nanoscale (a nanometer is one-billionth of a meter) contradict how they behave and what their properties are at the visible scale. | **In order to meet this standard, it is expected that students will**<br>• explain that physical properties are observable characteristics that enable one to differentiate objects.<br>• infer that objects are made of one or more materials based on observations of the physical properties that are common to each individual object.<br>• compare the physical properties of smaller, visible pieces of a material to those physical properties of the entire material.<br>• conclude that materials have their own set of physical properties that are observable.<br>• design an investigation to determine if the physical properties of a material will remain the same if the material is reduced in size. |

**3S-LPS1 The student will investigate and understand that plants and animals undergo a series of orderly changes as they mature and grow. Key concepts include**

**a) animal life cycles;**

**b) plant life cycles.**

| UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • Throughout their lives, plants and animals undergo a series of orderly and identifiable changes.<br>• Changes in organisms over time occur in cycles and differ among the various plants and animals.<br>• Some animals, such as mealworms, pill bugs, frogs, and butterflies go through distinct stages as they mature to adults. Other animals, such as crickets, praying mantises, gray squirrels, and white-tailed deer, resemble their parents from birth to maturity and do not have distinct stages.<br>• White-tailed deer are the largest herbivores in Virginia. They are found in all areas of Virginia including forests, open fields, mountain tops, coastal islands, and in cities and towns. Their diet consists of grasses, leaves, nuts, fruits, and fungi. Virginia's white-tailed deer have few predators. Fawns may be taken by bobcat. Other mortality factors include hunting, motor vehicles, poaching, and trains.<br>• Newborn white-tailed deer are called fawns. They become yearlings at 14 to 18 months of age. As adults, males are called bucks and females are called does. White-tailed deer are tan or reddish brown in the summer and grayish brown in the winter. The underside and throat are white, and the tail is brown above and white below.<br>• A white-tailed deer's lifespan averages eight years.<br>• Of the more than 200,000 kinds of vascular plants in the world today over 95 percent flower at some time in their lives. The best-known flowers are bright and colorful but others, like those of grasses, are small and inconspicuous.<br>• The basic stages in the life cycle of flowering plants include: seeds, germination of the seed, growth of the stem and roots, growth of leaves, growth of flowers, fertilization (pollination) of the flowers, production of fruit/new seeds, and death. | **In order to meet this standard, it is expected that students will**<br>• describe changes in the life cycles of a butterfly and a white-tailed deer.<br>• compare and contrast life cycles of a butterfly and a white-tailed deer.<br>• identify the stages in the life cycle of a flowering plant.<br>• construct and interpret models/diagrams of animal and plant life cycles. |

**3S-LPS2 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;**
**b) an animal's habitat includes adequate food, water, shelter or cover, and space;**
**c) habitats change over time;**
**d) fossils provide information about living systems that were on Earth years ago.**

| UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • Living organisms are dependent on other living organisms and their nonliving surroundings for survival.<br>• All of the interactions between and among living organisms and their nonliving surroundings are referred to as a system.<br>• Shelter may be living (coral, tree) or nonliving (caves, houses).<br>• The habitat of an animal includes adequate food, water, shelter or cover, and space. If any of the basic elements of an animal's habitat are absent, the animal's survival is threatened. The animal may adapt or leave the area.<br>• The habitats of living organisms, such as forests, grasslands, rivers, and streams, change due to many human or natural influences (e.g., forest fires, hurricanes, and droughts). Habitats change from season to season.<br>• Fossils found provide scientists with information about plants and animals that lived on Earth many years ago. (e.g., The rise and fall of sea level is recorded in the richly fossiliferous rocks of Virginia's coastal plain. An abundance of marine fossils – fossil clams, snails, sand dollars, shark's teeth, and whalebones – can be found in Virginia's coastal plains.)<br>• Virginia's state fossil, *Chesapecten jeffersonius*, is a large extinct species of scallop that dates to approximately 4.5 million years ago. It was the first fossil ever described in North America and is named after Thomas Jefferson, one of our founding fathers, and an amateur paleontologist. | **In order to meet this standard, it is expected that students will**<br>• classify objects as to whether they are living or nonliving.<br>• describe the basic components of an animal habitat (food, water, shelter or cover, and space).<br>• classify the parts of an animal's habitat as living or nonliving.<br>• construct and interpret simple models of different kinds of habitats, including a forest and a stream.<br>• predict and describe seasonal changes in habitat and their effects on plants and animals, for example, how trees change through the seasons and how animals respond to changes in the seasons.<br>• describe how animals are dependent on their surroundings, for example, how squirrels and other animals are affected by the loss of forest habitat.<br>• describe how scientists use the study of fossils to show past weather/climate conditions and environmental characteristics. |

**3S-LPS3 The student will investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings. Key concepts include**

**a) effects of weather and seasonal changes on the growth and behavior of living things.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • Living organisms respond to weather and seasonal changes. This can be reflected in changes in growth and behavior.<br>• Adverse conditions of weather may slow the growth and development of plants and animals, whereas optimal weather conditions may accelerate the growth and development of plants and animals.<br>• Dormancy is a state of reduced metabolic activity adopted by many organisms (both plants and animals) under conditions of environmental stress or when such stressful conditions are likely to appear, such as in winter.<br>• Many trees produce new leaves in the spring and lose them in the fall due to seasonal changes in temperature and light.<br>• The outward coloration and coloration patterns of many animals are similar in appearance to the plants in the places in which they live. This similarity to background is referred to as camouflage, and it enables animals to hide and avoid those that may eat or harm them.<br>• Some animals (e.g., geese, monarch butterflies, tundra swans) travel from one place to another and back again (migration) in search of a new temporary habitat because of climate, availability of food, season of the year, or reproduction.<br>• Some animals (e.g., groundhogs, black bears) go into a deep sleep (hibernation) due to seasonal changes. Hibernation is a condition of biological rest or inactivity where growth, development, and metabolic processes slow down.<br>• Some animals undergo physical changes (e.g., thickening of dog fur in the winter and shedding in the summer) from season to season. | **In order to meet this standard, it is expected that students will**<br>• identify growth and behavioral responses of plants and animals to weather and seasonal changes. Examples of responses that are adaptive include migration, hibernation, camouflage, and dormancy.<br>• identify animals that migrate, hibernate, or show other changes throughout the seasons or in the presence of adverse environmental conditions.<br>• evaluate the usefulness of camouflage in an animal's habitat (for example, coloration patterns of frogs).<br>• compare and contrast the responses of plants and animals to weather and seasonal changes. |

**3S-LPS4 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**

**a) important plant products are identified and classified;**
**b) the availability of plant products affects the development of a geographic area;**
**c) plants provide oxygen, homes, and food for many animals;**
**d) plants can help reduce erosion.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • Plants provide many useful products and materials, which benefit human beings as well as other living organisms.<br>• Plant products include such essentials as oxygen and food, as well as materials useful for clothing and shelter.<br>• Plants may grow well in certain geographic areas, thus enabling the production of plant products that allow humans to live in and thrive in those areas.<br>• Some examples of plants that grow in Virginia's geographic regions include:<br>- Coastal Plains (Tidewater): peanuts, cotton, soybeans;<br>- Piedmont: apples, tobacco, cabbage;<br>- Blue Ridge Mountains: evergreens, apples, corn;<br>- Valleys and Ridges: evergreens, apples, corn; and<br>- Appalachian Plateau: tobacco.<br>• Plants provide homes and food sources for many animals.<br>• Plants are important in the prevention of soil erosion.<br>• Products from plants include, but are not limited to, cinnamon from the bark of trees; fiber from reeds, grasses and trees; cotton from a cotton plant; spices from various plant parts; lumber from wood; rubber from rubber trees; and medicines (e.g., aloe vera from the aloe plant, quinine from the bark of Cinchona trees found in South America to treat malaria). | **In order to meet this standard, it is expected that students will**<br>• understand that plants produce oxygen and food.<br>• classify and identify the sources and uses of plant products, such as fiber, cotton, oil, spices, lumber, rubber, medicines, and paper.<br>• describe how the availability of certain plant products in a geographic area would affect the development of that area.<br>• describe plant products grown in Virginia that are useful to people, including wood, fruits, and vegetables. List and classify plant products (e.g., peanuts, cotton, soybeans, apples, evergreens).<br>• compare and contrast different ways animals use plants as homes and shelters.<br>• construct and interpret a chart illustrating the plant foods consumed by different animals.<br>• construct and interpret a model that demonstrates how plants reduce soil erosion. |

**3S-LPS5 The student will investigate and understand that adaptations allow animals to satisfy life needs and respond to the environment.**

**Key concepts include**

**a) behavioral adaptations;**

**b) physical adaptations.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • In order to survive, animals act in different ways to gather and store food, find shelter, defend themselves, and rear their young.<br>• Physical adaptations help animals survive in their environment (e.g., camouflage, mimicry).<br>• Various animals possess adaptations which help them blend into their environments to protect themselves from enemies (camouflage). Camouflage is the means by which animals escape the notice of predators, usually because of a resemblance to their surroundings using coloration or outer coverage patterns.<br>• Mimicry occurs when a species has features similar to another species. Either one or both are protected when a third species cannot tell them apart. (Mimicry happens in both animal and plant species.) Some animals look like other animals to avoid being eaten (mimicry). This adaptation helps protect them from their predators. (For example, the viceroy butterfly tastes good to birds, but the monarch butterfly tastes bad. Because the viceroy looks like the monarch butterfly, it is safer from predators.) Mimicry can also occur as mimicked behaviors, mimicked sounds, or mimicked scents.<br>• Behavioral adaptations allow animals to respond to life needs. Examples include hibernation, migration, dormancy, instinct, and learned behavior.<br>• Some animals (e.g., groundhogs, black bears) go into a deep sleep in which their body activities slow down due to seasonal changes and they can live off stored food (hibernation). Hibernation is a condition of biological rest or inactivity where growth, development, and metabolic processes slow down.<br>• Some animals (e.g., geese, monarch butterflies, tundra swans) go on a long-distance journey from one place to another (migration) in search of a new temporary habitat because of climate, availability of food, season of the year, or reproduction.<br>• Dormancy is a state of reduced metabolic activity adopted by many organisms (both plants and animals) under conditions of environmental stress or, when such stressful conditions are likely to appear, as in winter. | **In order to meet this standard, it is expected that students will**<br>• give examples of methods that animals use to gather and store food, find shelter, defend themselves, and rear young.<br>• describe and explain the terms camouflage, mimicry, hibernation, migration, dormancy, instinct, and learned behavior.<br>• explain how an animal's behavioral adaptations help it live in its specific habitat.<br>• distinguish between physical and behavioral adaptations of animals.<br>• compare the physical characteristics of animals, and explain how the animals are adapted to a certain environment.<br>• compare and contrast instinct and learned behavior.<br>• create (model) a camouflage pattern for an animal living in a specific dry-land or water-related environment. (Relates to 3.6.)<br>• design and construct a model of a habitat for an animal with a specific adaptation. |

**3S-LPS5 The student will investigate and understand that adaptations allow animals to satisfy life needs and respond to the environment. Key concepts include**

**a) behavioral adaptations;**

**b) physical adaptations.**

| UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • Some animals are born with natural behaviors that they need in order to survive in their environments (instincts). These behaviors are not learned but are instinctive, such as a beaver building a dam or a spider spinning a web.<br>• Some behaviors need to be taught in order for the animal to survive, such as a bear cub learning to hunt (learned behavior). | |

**3S-LPS6 The student will investigate and understand relationships among organisms in aquatic and terrestrial food chains. Key concepts include**

**a) producer, consumer, decomposer;**
**b) herbivore, carnivore, omnivore;**
**c) predator and prey.**

| UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • A food chain shows a food relationship among plants and animals in a specific area or environment.<br>• Terrestrial organisms are found on land habitats such as deserts, grasslands, and forests. Aquatic organisms are found in water habitats such as ponds, marshes, swamps, rivers, and oceans.<br>• A green plant makes its own food using sunlight, air, and water. Green plants are producers.<br>• A consumer is an animal that eats living organisms (plant or animal).<br>• Certain organisms break down decayed plants and animals into smaller pieces that can be used again by other living organisms. These organisms are decomposers.<br>• A food chain, which shows part of a food web, can have an animal that eats only plants (herbivore). It can have an animal that eats only other animals (carnivore). It can also have an animal that eats both plants and animals (omnivore).<br>• An animal can hunt other animals to get its food (predator).<br>• An animal can be hunted by another animal for food (prey). | **In order to meet this standard, it is expected that students will**<br>• differentiate between predators and prey.<br>• distinguish among producers, consumers, herbivores, omnivores, carnivores, and decomposers.<br>• infer that most food chains begin with a green plant.<br>• identify sequences of feeding relationships in a food chain.<br>• explain how a change in one part of a food chain might affect the rest of the food chain.<br>• create and interpret a model of a food chain showing producers and consumers. |

**3S-LPS7 The student will investigate and understand that ecosystems support a diversity of plants and animals that share limited resources.**

**Key concepts include**

**a) aquatic ecosystems;**
**b) terrestrial ecosystems;**
**c) populations and communities;**
**d) the human role in conserving limited resources.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • Water-related ecosystems include those with fresh water or salt water. Examples include ponds, marshes, swamps, streams, rivers, and oceans.<br>• Dry-land ecosystems include deserts, grasslands, rain forests, and forests.<br>• There are distinct differences among pond, marshland, swamp, stream, river, ocean, desert, grassland, rainforest, and forest ecosystems.<br>• A population is a group of organisms of the same kind that lives in the same place. Examples of a population are a flock of swans in a pond, a school of fish in a river, and a herd of cattle in the grassland.<br>• A community is all of the populations that live together in the same place. An example of a dry-land community would be a forest made up of trees, squirrels, worms, rabbits, and hawks. An example of a water-related community would be an ocean made up of fish, crabs, and seaweed.<br>• Organisms compete for the limited resources in their specific ecosystem.<br>• Humans need to help conserve limited resources. | **In order to meet this standard, it is expected that students will**<br>• describe major water-related ecosystems and examples of animals and plants that live in each.<br>• describe major dry-land ecosystems and examples of animals and plants that live in each.<br>• compare and contrast water-related and dry-land ecosystems.<br>• explain how animals and plants use resources in their ecosystem.<br>• distinguish between a population and a community.<br>• predict what would occur if a population in a specific ecosystem was to die.<br>• analyze models or diagrams of different water-related ecosystems in order to describe the community of organisms each contains and interpret how the organisms use the resources in that ecosystem.<br>• analyze models or diagrams of different dry-land ecosystems in order to describe the community of organisms each contains and interpret how the organisms use the resources in that ecosystem.<br>• list ways that humans can help conserve limited resources. |

**3S-LPS8 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.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • Every organism depends on other organisms to survive. This is called interdependency.<br>• Human actions, such as polluting, can affect the survival of plants and animals.<br>• Natural events, such as fires, floods, diseases, and erosion, can also affect the survival of plant and animal species.<br>• Conservation is the careful use and preservation of our natural resources.<br>• Resource renewal is a conservation practice in which species are protected. An example would be protecting endangered plants by saving their seeds, growing the seeds indoors, and later putting the new plants back in their natural habitats. | **In order to meet this standard, it is expected that students will**<br>• explain how organisms in an area are dependent on each other.<br>• compare and contrast human influences on the quality of air, water, and habitats.<br>• analyze the effects of fire, flood, disease, and erosion on organisms and habitats.<br>• describe how conservation practices can affect the survival of a species.<br>• describe a conservation practice in the local community. |

**3S-ESS1 The student will investigate and understand basic types, changes, and patterns of weather. Key concepts include**

**a) identification of commons storms and other weather phenomena;**
**b) the uses and importance of measuring, recording, and interpreting weather data;**
**c) the uses and importance of tracking weather data over time.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • Earth's weather changes continuously from day to day.<br>• Changes in the weather are characterized by daily differences in wind, temperature, and precipitation.<br>• Precipitation occurs when water, previously evaporated, condenses out of the air and changes its phase from a gas to a liquid (rain) or to a solid (snow or sleet).<br>• Extremes in the weather, such as too little or too much precipitation, can result in droughts or floods.<br>• Storms have powerful winds, which may be accompanied by rain, snow, or other kinds of precipitation.<br>• Weather data are collected and recorded using instruments. This information is very useful for predicting weather and determining weather patterns.<br>• Weather influences human activity.<br>• Scientists collect weather data over time to study trends and patterns. These trends and patterns help them to make future weather predictions. | **In order to meet this standard, it is expected that students will**<br>• observe and describe seasonal weather patterns and local variations.<br>• observe and record daily weather conditions, such as sunny, cloudy, windy, rainy, or snowy.<br>• record and interpret daily temperature, using a graph with numbered axes.<br>• measure and record weather data, using weather instruments, including a thermometer, rain gauge, and weather vane (standard English and metric measures).<br>• describe weather in terms of temperature, wind, and precipitation.<br>• observe and describe precipitation in terms of evaporation and condensation of water.<br>• observe and describe types of precipitation, including rain, snow, and ice (sleet and hail).<br>• describe how tracking weather data over time helps scientists make future weather predictions.<br>• evaluate the influence of daily weather conditions on personal activities and dress.<br>• identify common types of storms. Examples include hurricanes, tornadoes, blizzards, and thunderstorms.<br>• compare and contrast droughts and floods. |

**3S-ESS2 The student will investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings. Key concepts include**

**b) weathering and erosion of land surfaces.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • Land surfaces are subject to the agents of weathering and erosion. Land surfaces that are not covered with or protected by plants are more likely to be subject to the loss of soil by wind and water.<br>• Weathering is the breaking down of rocks, which usually happens over long periods of time.<br>• Erosion is the process by which the products of weathering are moved from one place to another. Erosion may happen quickly (e.g., during a flood or a hurricane) or over a long period of time. | **In order to meet this standard, it is expected that students will**<br>• model the effects of weathering and erosion on the land surface. |

**3S-ESS3 The student will investigate and understand the major components of soil, its origin, and its importance to plants and animals including humans. Key concepts include**

- **a) soil provides the support and nutrients necessary for plant growth;**
- **b) topsoil is a natural product of subsoil and bedrock;**
- **c) rock, clay, silt, sand, and humus are components of soils;**
- **d) soil is a natural resource and should be conserved.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • Soil is important because many plants grow in soil, and it provides support and nutrients for the plants.<br>• Over many years, weather, water, and living organisms help break down rocks and create soil (weathering).<br>• Nutrients are materials that plants and animals need to live and grow.<br>• Rock, clay, silt, sand, and humus are components of soil.<br>• Topsoil is the upper soil surface and a natural product of subsoil and bedrock. Topsoil is best for plant growth.<br>• Subsoil and bedrock are layers of soil under the topsoil that are formed over a long period of time by the action of water.<br>• Subsoil and bedrock are not as good for growing plants as is topsoil.<br>• Humus is decayed matter in soil. It adds nutrients to the soil. It is located in the topsoil.<br>• Clay contains tiny particles of soil that hold water well and provides nutrients.<br>• Sand is made up of small grains of worn-down rock, has few nutrients, and does not hold water well.<br>• Silt is made up of very small broken pieces of rock. Its particles are larger than clay and smaller than sand.<br>• Since soil takes a long time to form, it should be conserved, not wasted. | **In order to meet this standard, it is expected that students will**<br>• observe and recognize that soil, as a natural resource, provides the support and nutrients necessary for plant growth.<br>• understand the key terminology related to soil, including humus, nutrients, topsoil, and bedrock.<br>• interpret and illustrate a basic diagram showing major soil layers, including bedrock, subsoil, and topsoil.<br>• analyze and describe the different components of soil, including rock fragments, clay, silt, sand, and humus.<br>• explain how soil forms over time.<br>• design an investigation to compare how different types of soil affect plant growth. This includes organizing data in tables and constructing simple graphs.<br>• collect, chart, and analyze data on soil conservation on the school grounds.<br>• evaluate the importance of soil to people.<br>• describe how soil can be conserved. |

## STANDARD 3S-ESS4 REPORTING CATEGORY: EARTH/SPACE SYSTEMS CONTENT: SCIENCE

**3S-ESS4 The student will investigate and understand basic patterns and cycles occurring in nature. Key concepts include**

**a) patterns of natural events such as day and night, seasonal changes, simple phases of the moon, and tides;**

**b) animal life cycles;**

**c) plant life cycles.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • A cycle is a repeated pattern. A sequence is a series of events that occur in a natural order.<br>• The pattern of day and night is caused by the rotation of Earth. One complete rotation occurs every 24 hours. The part of Earth toward the sun has daylight while the part of Earth away from the sun has night.<br>• The pattern of seasonal changes takes place because Earth's axis is tilted toward or away from the sun during its revolution around the sun. Because the tilt of Earth on its axis is 23.5°, the sun's energy is not equally intense at different latitudes. Rays striking Earth near the equator do so at close to a 90° angle. Rays striking Earth near the poles do so at a much smaller angle and thus the same amount of sunlight is spread over a larger area. For this reason, the same amount of energy from the sun will be less intense nearer the poles and these areas will have a colder climate. Earth takes 365¼ days, or one year, to make one revolution.<br>• The cycle of moon phases occurs as the moon makes one revolution around Earth. The visible portion of the moon that we see each night follows a pattern.<br>• The tides follow a pattern of two high and two low tides every 24 hours. This pattern is caused for the most part by the gravitational attraction between Earth and the moon.<br>• Plants and animals undergo life cycles (e.g., Frogs begin as eggs in water. The eggs grow into tadpoles, the tadpoles eventually become frogs, and the adult frogs lay eggs to start a new life cycle over again. In the plant life cycle, a seed grows into a new plant that forms seeds. Then the new seeds repeat the life cycle.). | **In order to meet this standard, it is expected that students will**<br>• explain how some events in nature occur in a pattern or cycle, such as the seasons, day and night, phases of the moon (first quarter, full, last [third] quarter, new), tides, and life cycles.<br>• recognize that the relationships that exist between and among Earth, the sun, and the moon result in day and night, seasonal changes, phases of the moon, and the tides.<br>• model and describe how Earth's rotation causes day and night.<br>• model and describe how the sun's rays strike Earth to cause seasons.<br>• observe, chart, and illustrate phases of the moon (first quarter, full, last [third] quarter, new), and describe the changing pattern of the moon as it revolves around Earth.<br>• collect and analyze data from simple tide tables to determine a pattern of high and low tides.<br>• explain the pattern of growth and change that organisms, such as the frog and butterfly undergo during their life cycle. |

**3S-ESS5 The student will investigate and understand the water cycle and its relationship to life on Earth. Key concepts include**

- **a) there are many sources of water on Earth;**
- **b) the energy from the sun drives the water cycle;**
- **c) the water cycle involves several processes;**
- **d) water is essential for living things;**
- **e) water on Earth is limited and needs to be conserved.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • The water cycle is the movement of water from the ground to the air and back to the ground by evaporation, condensation, and precipitation. The energy that drives this cycle comes from the sun.<br>• During the water cycle, liquid water is heated and changed to a gas (water vapor). This process is called evaporation. The gas (water vapor) is cooled and changed back to a liquid. This process is called condensation. Water as a liquid or a solid falls to the ground as precipitation.<br>• Our water supply on Earth is limited. Pollution reduces the amount of usable water; therefore, the supply should be conserved carefully.<br>• Water is a simple compound essential for life on Earth. Living cells are mostly water. In each cell, the chemicals necessary for life are dissolved in water. | **In order to meet this standard, it is expected that students will**<br>• identify the sun as the origin of energy that drives the water cycle.<br>• describe the processes of evaporation, condensation, and precipitation as they relate to the water cycle.<br>• construct and interpret a model of the water cycle.<br>• identify the different ways that organisms get water from the environment.<br>• identify major water sources for a community, including rivers, reservoirs, and wells. Describe the major water sources for the local community.<br>• explain methods of water conservation in the home and school.<br>• identify and communicate the importance of water to people and to other living organisms.<br>• analyze possible sources of water pollution in their neighborhoods, at school, and in the local community. This includes runoff from over-fertilized lawns and fields, oil from parking lots, eroding soil, and animal waste. |

## STANDARD 3S-ESS6 REPORTING CATEGORY: EARTH/SPACE SYSTEMS CONTENT: SCIENCE

**3S-ESS6 The student will investigate and understand that natural events and human influences can affect the survival of species. Key concepts include**

**a) the effects of human activity on the quality of air, water, and habitat;**
**b) the effects of fire, flood, disease, and erosion on organisms;**
**c) conservation and resource renewal.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • Every organism depends on other organisms to survive. This is called interdependency.<br>• Human actions, such as polluting, can affect the survival of plants and animals.<br>• Natural events, such as fires, floods, diseases, and erosion, can also affect the survival of plant and animal species.<br>• Conservation is the careful use and preservation of our natural resources.<br>• Resource renewal is a conservation practice in which species are protected. An example would be protecting endangered plants by saving their seeds, growing the seeds indoors, and later putting the new plants back in their natural habitats. | **In order to meet this standard, it is expected that students will**<br>• explain how organisms in an area are dependent on each other.<br>• compare and contrast human influences on the quality of air, water, and habitats.<br>• analyze the effects of fire, flood, disease, and erosion on organisms and habitats.<br>• describe how conservation practices can affect the survival of a species.<br>• describe a conservation practice in the local community. |

## STANDARD 3S-ESS7 REPORTING CATEGORY: EARTH/SPACE SYSTEMS CONTENT: SCIENCE

**3S-ESS7 The student will investigate and understand different sources of energy. Key concepts include**

**a) energy from the sun;**
**b) sources of renewable energy;**
**c) sources of nonrenewable energy.**

| UNDERSTANDING THE STANDARD<br>(Background Information for Instructor Use Only) | ESSENTIAL KNOWLEDGE, SKILLS AND PROCESSES |
|---|---|
| • The sun is the source of almost all energy on Earth. The sun is the direct source of light and thermal energy.<br>• Sunlight, water, and wind are sources of energy. The force of flowing water and moving air (wind) can also be used to generate electricity.<br>• Wood comes from trees. It has many important uses, including its use as a fuel.<br>• Some energy sources are renewable. That means that they can be replaced. Some energy sources are nonrenewable. That means that once they are used up, they are gone and cannot be replaced. Coal, oil, and natural gas are nonrenewable resources.<br>• Fossil fuels, such as coal, oil, and natural gas, are formed from decayed plants and animals. The formation of fossil fuels takes millions of years. | **In order to meet this standard, it is expected that students will**<br>• explain that the sun is the major source of energy for Earth.<br>• identify sources of energy and their uses.<br>• describe how solar energy, wind, and moving water can be used to produce electricity.<br>• describe how fossil fuels are used as an energy source.<br>• compare and contrast renewable and nonrenewable energy sources.<br>• analyze the advantages and disadvantages of using different naturally occurring energy sources.<br>• design a basic investigation to determine the effects of sunlight on warming various objects and materials, including water. |