Science Standards of Learning

Curriculum Framework 2010

Grade Two

Board of Education
Commonwealth of Virginia

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The 2010 *Science Curriculum Framework* can be found in PDF and Microsoft Word file formats on the Virginia Department of Education's Web site at http://www.doe.virginia.gov.

Virginia *Science Standards of Learning* Curriculum Framework 2010
Introduction

The *Science Standards of Learning* Curriculum Framework amplifies the *Science Standards of Learning for Virginia Public Schools* and defines the content knowledge, skills, and understandings that are measured by the Standards of Learning tests. The Science Curriculum Framework provides additional guidance to school divisions and their teachers as they develop an instructional program appropriate for their students. It assists teachers as they plan their lessons by identifying essential understandings and defining the essential content knowledge, skills, and processes students need to master. This supplemental framework delineates in greater specificity the minimum content that all teachers should teach and all students should learn.

School divisions should use the *Science Curriculum Framework* as a resource for developing sound curricular and instructional programs. This framework should not limit the scope of instructional programs. Additional knowledge and skills that can enrich instruction and enhance students' understanding of the content identified in the Standards of Learning should be included as part of quality learning experiences.

The Curriculum Framework serves as a guide for Standards of Learning assessment development. Assessment items may not and should not be a verbatim reflection of the information presented in the Curriculum Framework. Students are expected to continue to apply knowledge and skills from Standards of Learning presented in previous grades as they build scientific expertise.

The Board of Education recognizes that school divisions will adopt a K–12 instructional sequence that best serves their students. The design of the Standards of Learning assessment program, however, requires that all Virginia school divisions prepare students to demonstrate achievement of the standards for elementary and middle school by the time they complete the grade levels tested. The high school end-of-course Standards of Learning tests, for which students may earn verified units of credit, are administered in a locally determined sequence.

Each topic in the *Science Standards of Learning* Curriculum Framework is developed around the Standards of Learning. The format of the Curriculum Framework facilitates teacher planning by identifying the key concepts, knowledge and skills that should be the focus of instruction for each standard. The Curriculum Framework is divided into two columns: Understanding the Standard (K-5); Essential Understandings (middle and high school); and Essential Knowledge, Skills, and Processes. The purpose of each column is explained below.

Understanding the Standard (K-5)
This section includes background information for the teacher. It contains content that may extend the teachers' knowledge of the standard beyond the current grade level. This section may also contain suggestions and resources that will help teachers plan instruction focusing on the standard.

Essential Understandings (middle and high school)
This section delineates the key concepts, ideas and scientific relationships that all students should grasp to demonstrate an understanding of the Standards of Learning.

Essential Knowledge, Skills and Processes (K-12)
Each standard is expanded in the Essential Knowledge, Skills, and Processes column. What each student should know and be able to do in each standard is outlined. This is not meant to be an exhaustive list nor a list that limits what is taught in the classroom. It is meant to be the key knowledge and skills that define the standard.

Grade Two
Science Strand

Scientific Investigation, Reasoning, and Logic

This strand represents a set of systematic inquiry skills that defines what a student will be able to do when conducting activities and investigations, and represents the student understanding of the nature of science. The various skill categories are described in the "Investigate and Understand" section of the Introduction to the *Science Standards of Learning*, and the skills in science standard 2.1 represent more specifically what a student should achieve during the course of instruction in the second grade. Across the grade levels, the skills in the first standards form a nearly continuous sequence of investigative skills and an understanding of the nature of science. It is very important that the second grade classroom teacher be familiar with the skills in the sequence leading up to standard 2.1. For example in K.1 and in 1.1, nonstandard units are used to measure common objects. In grade two, 2.1 specifies metric and English units of measure. A second-grade curriculum should ensure that skills from preceding grades are continuously reinforced and developed.

2.1	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 are 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 inferences 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; and m) current applications are used to reinforce science concepts.

Overview

Standard 2.1 is intended to develop investigative and inquiry skills and the understanding of the nature of science for all of the other second-grade standards. Standard 2.1 requires students to continue developing a range of inquiry skills and achieve proficiency with those skills, and develop and reinforce their understanding of the nature of science in the context of the concepts developed in second grade. **Standard 2.1 does not require a discrete unit be taught on scientific investigation and the nature of science because the skills that make up the standard should be incorporated in all the other second-grade standards.** It is also intended that by developing these skills, students will achieve greater understanding of scientific inquiry and the nature of science as well as more fully grasp the content-related concepts.

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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 inferences 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; and
m) current applications are used to reinforce science concepts.

Understanding the Standard
(Background Information for Instructor Use Only)

- 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:
  a) the natural world is understandable;
  b) science is based on evidence, both observational and experimental;
  c) science is a blend of logic and innovation;
  d) scientific ideas are durable yet subject to change as new data are collected;
  e) science is a complex social endeavor; and
  f) scientists try to remain objective and engage in peer review to help avoid bias.

  In grade two, an emphasis should be placed on concepts a, b, and e.
- 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.

Essential Knowledge, Skills, and Processes

In order to meet this standard, it is expected that students will

- conduct simple experiments, make predictions, gather data from those experiments, repeat observations to improve accuracy, and draw conclusions.
- differentiate among simple observations and personal interpretations.
- classify items, using two or more attributes such as size, shape, color, texture, and weight.
- use centimeters, meters, liters, degrees Celsius, grams, and kilograms in measurement.
- use inches, feet, yards, quarts, gallons, degrees Fahrenheit, ounces, and pounds in measurement.
- measure time using both digital and analog clocks.
- identify conditions that influence a change in an experiment.
- construct and interpret simple models (e.g., weathering and erosion of land surfaces — 2.7).

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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; and
m) current applications are used to reinforce science concepts.

Understanding the Standard (Background Information for Instructor Use Only)	**Essential Knowledge, Skills, and Processes**
• 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. • 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. • 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. • An observation is what you actually see, feel, taste, hear, or smell.	• analyze sets of objects, numerical data, or pictures, and create basic categories to organize the data (descriptive or numerical). • judge which, if any, collected data in a small set appear to be unexpected or unusual. • construct and interpret picture and bar graphs with numbered axes depicting the distribution of data. • communicate observations and data.

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Understanding the Standard (Background Information for Instructor Use Only)	**Essential Knowledge, Skills, and Processes**
• The more times an observation is repeated, the greater the chance of ensuring the accuracy of the observation. • It is easier to see how things are related if objects are classified according to their common characteristics. • By constructing and studying simple models, it is sometimes easier to understand how real things work. • 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. • 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. • Students should communicate observations and data publicly.	

Grade Two
Science Strand

Force, Motion, and Energy

This strand focuses on student understanding of what force, motion, and energy are and how the concepts are connected. The major topics developed in this strand include magnetism, types of motion, simple and compound machines, and energy forms and transformations, especially electricity, sound, and light. This strand includes science standards K.3, 1.2, 2.2, 3.2, 4.2, 4.3, 5.2, 5.3, 6.2, and 6.3.

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 b) important applications of magnetism.

Overview

This standard continues the focus on magnets. In K.3 students investigate and learn that magnets can be used to make some things move without touching them by either attracting them or repelling them. In 2.2, the study of magnets is expanded as students investigate and understand that magnets can be artificial or natural and have certain characteristics. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

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
b) important applications of magnetism.

Understanding the Standard (Background Information for Instructor Use Only)	**Essential Knowledge, Skills, and Processes**
• Magnets have a north and a south pole. • 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. • A magnet creates an invisible area of magnetism all around it called a magnetic field. • 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. • 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. • A magnet is strongest at its poles. • The farther away the magnetic poles are from each other, the weaker the magnetic force. • If you cut a bar magnet in half, you get two new, smaller magnets, each with its own north and south pole. • Magnets can attract objects made of iron, nickel, or cobalt. • Magnets can be artificially made from special metals or can occur naturally. Naturally occurring magnets are composed of a mineral called magnetite or lodestone. • Magnets have important applications and uses in everyday life.	In order to meet this standard, it is expected that students will • identify the north and south magnetic poles of magnets. • use magnetic compasses to determine the directions of north and south poles. • 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. • conduct an investigation to determine how the different poles of magnets react to the poles of other magnets. • identify important applications of magnets in everyday life: - refrigerator magnets and chalkboard letters - toys - door latches - paper clip holders - computers - motors - credit card magnetic strips. • compare natural magnets (lodestone or magnetite) and artificial magnets. • create a new application for using a magnet.

Grade Two
Science Strand

Matter

This strand focuses on the description, physical properties, and basic structure of matter. The major topics developed in this strand include concepts related to the basic description of objects, phases of matter (solids, liquids, and gases – especially water), phase changes, mass and volume, and the structure of classification of matter. This strand includes science standards K.4, K.5, 1.3, 2.3, 3.3, 5.4, 6.4, 6.5, and 6.6.

2.3	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; and c) changes in phases of matter with the addition or removal of energy.

Overview

This standard continues to focus on matter. In 2.3 students build upon the knowledge introduced in K.4 and 1.3. In K.4 physical properties of matter are investigated and the properties of water are observed and tested. In 1.3 students investigate how common materials interact with water. In 2.3 students investigate, by conducting simple experiments, the properties of solids, liquids, and gases. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

2.3 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; and
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. • Matter is anything that has mass and takes up space. • Solids have a defined shape and volume. • Liquids have a definite volume and take the shape of the container. • 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.) • Mass is a measure of the amount of matter. • Weight is the measure of the gravitational pull on an object. • Volume is the measure of the amount of space occupied by matter. • Matter most commonly occurs in three phases: solids, liquids, and gases. • Matter can change from one phase to another. • When matter changes from one phase to another, these changes are referred to as physical changes. • Changes from solid to liquid to gas require the addition of energy.	In order to meet this standard, it is expected that students will • classify materials as to whether they are liquids, solids, or gases. • describe and identify examples of condensation, evaporation, melting, and freezing of water. • measure the mass of solids and the volume of liquids in metric and standard English units. • examine and describe the transformation of matter from one phase to another, i.e., solid water (ice) to liquid (water) to gas (water vapor). • conduct an investigation to observe the condensation of water. • design and conduct an investigation to determine basic factors that affect the evaporation of water. • identify the phases of water and the uses of water in its various phases in the home and at school.

Grade Two
Science Strand

Life Processes

This strand focuses on the life processes of plants and animals and the specific needs of each. The major topics developed in the strand include basic needs and life processes of organisms, their physical characteristics, orderly changes in life cycles, behavioral and physical adaptations, and survival and perpetuation of species. This strand includes science standards K.6, K.7, 1.4, 1.5, 2.4, 3.4, and 4.4.

2.4	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; and b) plant life cycles.

Overview

In 2.4 students investigate and understand that plants and animals undergo change throughout their lives. This concept builds upon K.6 in which students learn about classifying things as living and nonliving. In K.7 students learn about the basic needs and life processes of animals. In 1.4 they learn that plants have life needs, functional parts, and can be classified according to certain characteristics. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

2.4 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; and
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. • Changes in organisms over time occur in cycles and differ among the various plants and animals. • 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. • 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. • 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. • A white-tailed deer's lifespan averages eight years. • 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. • The basic stages in the life cycle of flowering plants include: seeds,	In order to meet this standard, it is expected that students will • describe changes in the life cycles of a butterfly and a white-tailed deer. • compare and contrast life cycles of a butterfly and a white-tailed deer. • identify the stages in the life cycle of a flowering plant. • construct and interpret models/diagrams of animal and plant life cycles.

2.4	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; and b) plant life cycles.

Understanding the Standard (Background Information for Instructor Use Only)	**Essential Knowledge, Skills, and Processes**
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.	

Grade Two
Science Strand

Living Systems

This strand begins in second grade and builds from basic to more complex understandings of a system, both at the ecosystem level and at the level of the cell. The concept of kingdoms of living organisms and a general classifying of organisms are also presented. The other major topics developed in the strand include the types of relationships among organisms in a food chain, different types of environments and the organisms they support, and the relationship between organisms and their nonliving environment. This strand includes science standards 2.5, 3.5, 3.6, 4.5, 5.5, and 6.7.

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

Overview

In K.6 students are introduced to the concept of living and nonliving. Students are introduced to living systems in 2.5 and investigate and understand that living organisms interact with other living organisms and their surroundings. The formal word system is introduced in this standard. The expectation is that students understand the concept in terms of the interactions between living and nonliving things. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

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;
b) an animal's habitat includes adequate food, water, shelter or cover, and space;
c) habitats change over time due to many influences; and
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. • All of the interactions between and among living organisms and their nonliving surroundings are referred to as a system. • Shelter may be living (coral, tree) or nonliving (caves, houses). • 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. • 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. • 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.) • 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 • classify objects as to whether they are living or nonliving. • describe the basic components of an animal habitat (food, water, shelter or cover, and space). • classify the parts of an animal's habitat as living or nonliving. • construct and interpret simple models of different kinds of habitats, including a forest and a stream. • 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. • describe how animals are dependent on their surroundings, for example, how squirrels and other animals are affected by the loss of forest habitat. • describe how scientists use the study of fossils to show past weather/climate conditions and environmental characteristics.

Grade Two
Science Strand

Interrelationships in Earth/Space Systems

This strand focuses on student understanding of how Earth systems are connected and how Earth interacts with other members of the solar system. The topics developed include shadows; relationships between the sun and Earth; weather types, patterns, and instruments; properties of soil; characteristics of the ocean environment; and organization of the solar system. This strand includes science standards K.8, 1.6, 2.6, 3.7, 4.6, 5.6, and 6.8.

2.6	The student will investigate and understand basic types, changes, and patterns of weather. Key concepts include a) identification of common storms and other weather phenomena; b) the uses and importance of measuring, recording, and interpreting weather data; and c) the uses and importance of tracking weather data over time.

Overview

In K.9 students conduct weather observations. In 1.6 and 1.7 students are introduced to the concept that the sun is the source of energy for Earth, and that the sun's energy and precipitation affect people and other living things. In 2.6 students investigate and understand types of weather and weather patterns and measure and record current weather data. Students also explore the uses of tracking weather data over time. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

2.6 The student will investigate and understand basic types, changes, and patterns of weather. Key concepts include
a) identification of common storms and other weather phenomena;
b) the uses and importance of measuring, recording, and interpreting weather data; and
c) the uses and importance of tracking weather data over time.

Understanding the Standard (Background Information for Instructor Use Only)	**Essential Knowledge, Skills, and Processes**
• Earth's weather changes continuously from day to day. • Changes in the weather are characterized by daily differences in wind, temperature, and precipitation. • 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). • Extremes in the weather, such as too little or too much precipitation, can result in droughts or floods. • Storms have powerful winds, which may be accompanied by rain, snow, or other kinds of precipitation. • Weather data are collected and recorded using instruments. This information is very useful for predicting weather and determining weather patterns. • Weather influences human activity. • 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 • observe and describe seasonal weather patterns and local variations. • observe and record daily weather conditions, such as sunny, cloudy, windy, rainy, or snowy. • record and interpret daily temperature, using a graph with numbered axes. • measure and record weather data, using weather instruments, including a thermometer, rain gauge, and weather vane (standard English and metric measures). • describe weather in terms of temperature, wind, and precipitation. • observe and describe precipitation in terms of evaporation and condensation of water. • observe and describe types of precipitation, including rain, snow, and ice (sleet and hail). • describe how tracking weather data over time helps scientists make future weather predictions. • evaluate the influence of daily weather conditions on personal activities and dress. • identify common types of storms. Examples include hurricanes, tornadoes, blizzards, and thunderstorms. • compare and contrast droughts and floods.

Grade Two
Science Strand

Earth Patterns, Cycles, and Change

This strand focuses on student understanding of patterns in nature, natural cycles, and changes that occur both quickly and slowly over time. An important idea represented in this strand is the relationship among Earth patterns, cycles, and change and their effects on living things. The topics developed include noting and measuring changes, weather and seasonal changes, the water cycle, cycles in the Earth-moon-sun system, our solar system, and change in Earth's surface over time. This strand includes science standards K.9, K.10, 1.7, 2.7, 3.8, 3.9, 4.7, 4.8, and 5.7.

2.7	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; and b) weathering and erosion of land surfaces.

Overview

Students are introduced to the concepts of patterns, cycles, and change in standards K.9 and K.10. These concepts include, in K.9, weather observations, shapes and forms of common natural objects (seeds, cones, and leaves), and animal and plant growth. Standard K.10 introduces concepts that include natural and human-made objects that change over time, either fast or slow, and that change can be measured. In 1.7 students investigate and understand the relationship between seasonal change and weather. Important concepts include how plants, animals, and people respond to changes in light, temperature, and precipitation. In 2.7 the students investigate and understand that weather and seasons affect plants, animals, and their surroundings. The effects of weather and seasonal changes on weathering and erosion of the land surface are included in 2.7. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

2.7 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; and
b) weathering and erosion of land surfaces.

Understanding the Standard (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. • 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. • 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. • Many trees produce new leaves in the spring and lose them in the fall due to seasonal changes in temperature and light. • 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. • 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. • 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. • 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 • 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. • identify animals that migrate, hibernate, or show other changes throughout the seasons or in the presence of adverse environmental conditions. • evaluate the usefulness of camouflage in an animal's habitat (for example, coloration patterns of frogs). • compare and contrast the responses of plants and animals to weather and seasonal changes. • model the effects of weathering and erosion on the land surface.

2.7	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; and b) weathering and erosion of land surfaces.

Understanding the Standard (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. • Weathering is the breaking down of rocks, which usually happens over long periods of time. • 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.	

Grade Two
Science Strand

Earth Resources

This strand focuses on student understanding of the role of resources in the natural world and how people can utilize those resources in a sustainable way. An important idea represented in this strand is the concept of management of resource use. This begins with basic ideas of conservation and proceeds to more abstract consideration of costs and benefits. The topics developed include conservation of materials, soil and plants as resources, energy use, water, Virginia's resources, and how public policy impacts the environment. This strand includes science standards K.11, 1.8, 2.8, 3.10, 3.11, 4.9, and 6.9.

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 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; and d) plants can help reduce erosion.

Overview

In K.11 students investigate and understand that materials can be used, recycled, and conserved, while in 1.8 students investigate and understand that natural resources, which are identified as plants, animals, water, air, land, minerals, forests, and soil, are limited. In 2.8 students investigate and understand that plants produce oxygen and food, are a source of useful products, and provide benefits in nature. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

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

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; and
d) plants can help reduce erosion.

Understanding the Standard
(Background Information for Instructor Use Only)

- Plants provide many useful products and materials, which benefit human beings as well as other living organisms.
- Plant products include such essentials as oxygen and food, as well as materials useful for clothing and shelter.
- 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.
- Some examples of plants that grow in Virginia's geographic regions include:
  - Coastal Plains (Tidewater): peanuts, cotton, soybeans;
  - Piedmont: apples, tobacco, cabbage;
  - Blue Ridge Mountains: evergreens, apples, corn;
  - Valleys and Ridges: evergreens, apples, corn; and
  - Appalachian Plateau: tobacco.
- Plants provide homes and food sources for many animals.
- Plants are important in the prevention of soil erosion.
- 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).

Essential Knowledge, Skills, and Processes

In order to meet this standard, it is expected that students will

- understand that plants produce oxygen and food.
- classify and identify the sources and uses of plant products, such as fiber, cotton, oil, spices, lumber, rubber, medicines, and paper.
- describe how the availability of certain plant products in a geographic area would affect the development of that area.
- 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).
- compare and contrast different ways animals use plants as homes and shelters.
- construct and interpret a chart illustrating the plant foods consumed by different animals.
- construct and interpret a model that demonstrates how plants reduce soil erosion.