

SCIENCE STANDARDS

Kindergarten

Physical Sciences

1.0 Properties of materials can be observed, measured and predicted. As a basis for understanding this concept, students know:

- 1.1 objects can be described in terms of the materials they are made of (clay, cloth, paper, etc.) and their physical properties (color, size, shape, weight, texture, flexibility, attraction to magnets, floating and sinking etc.)
- 1.2 water can be a solid or a liquid and can be made to change back and forth from one form to the other.
- 1.3 water left in an open container evaporates, but water in a closed container does not.

Life Sciences

1.0 God made different types of plants and animals that inhabit the Earth. As a basis for understanding this concept, students know:

- 1.1 how to observe and describe similarities and differences in the behavior of plants and animals (e.g. seed bearing plants, birds fish insects).
- 1.2 stories sometimes give plants and animals attributes they do not really have.
- 1.3 how to identify major structures of common plants and animals (e.g. stems, leaves, roots arms, wings legs).
- 1.4 how to observe and record the changes of a caterpillar, cocoon and butterfly.

Earth Sciences

1.0 The Earth is composed of land, air and water. As a basis for understanding this concept, students know:

- 1.1 characteristics of mountains, rivers, oceans, valleys, deserts and local landforms.
- 1.2. changes in weather occur from day to day and over seasons, affecting the Earth and its inhabitants.
- 1.3 how to identify resources from the Earth that are used in every day life and know that many of them can be conserved.

Investigation and Experimentation

1.0 Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in the other three strands, students should develop their own questions, and perform investigations.

Students will:

- 1.1 observe common objects using the five senses given by God.
- 1.2 describe the properties of common objects.
- 1.3 describe the relative position of objects using one reference (e.g. above or below).
- 1.4 compare and sort common objects based on one physical attribute (including color, shape texture, size and weight).
- 1.5 communicate observations orally and in drawings of everything. They know that all we study comes from God and therefore is holy and should be respected.

SCIENCE STANDARDS

First Grade

Physical Science

1.0 Materials that God created come in different forms (states) including solid liquids and gases, and these forms have different attributes -

- 1.1 solids, liquids, and gases have different properties.
- 1.2 the properties of substances can change when they are mixed, cooled or heated.
- 1.3 solids can either sink or float.

Life Science

1.0 God created all things – living and non-living. Students will understand differences and similarities between nonliving and living things -

- 1.1 know that living things need air, water, and food to survive.
- 1.2 know that living things are made and cared for by a loving God.
- 1.3 know that living things move, grow, and change.
- 1.4 know that nonliving things do not need air, water or food.
- 1.5 know that nonliving things do not move, grow, and change.
- 1.6 be able to tell living and nonliving things apart.

2.0 All living things are made and cared for by God, however, plants and animals meet their needs in different ways -

- 2.1 different plants and animals inhabit different kinds of environments and have features that help them thrive in their environment.
- 2.2 animals eat plants and other animals for food.
- 2.3 animals may use plants or even other animals for shelter or nesting.
- 2.4 how to infer what animals eat from the shapes of their teeth.
- 2.5 green leaves are from making food from the sunlight.

3.0. Be able to put animals in categories by size, shape, movement, color -

- 3.1 know that animals have fur, feather, skin, scales, or shells.
- 3.2 know that animals move in different ways (swim, fly, etc.)
- 3.3 know that animals have different sizes.
- 3.4 know that animals have different shapes.
- 3.5 know that animals help people.
- 3.6 know that animals change (life cycle, metamorphosis).

4.0 Be able to use knowledge of plants -

- 4.1 know the parts of a plant.
- 4.2 know that seeds produce plants.
- 4.3 sort plants into categories by what they have in common.

Earth Science

1.0 God the Creator made the earth, sun, and moon. Students should:

- 1.1 know about the Earth, sun, and the moon.
- 1.2 know the Earth rotates every 24 hours.
- 1.3 know the difference between day and night.
- 1.4 know the Earth revolves around the sun.
- 1.5 know the moon revolves around the Earth.
- 1.6 know the earth is made up of land and water.
- 1.7 know the types of land surfaces (soil, sand, rock, clay).
- 1.8 know how to take care of, and respect the Earth.

2.0 The Sun Supplies Heat and Light energy to the Earth

- 2.1 the sun warms the land, air, and water.
- 2.2 light energy is reflected or absorbed when it strikes surfaces.

3.0. Weather can be observed, measured and described -

- 3.1 how to record changes in the weather from day to day and over the season.
- 3.2 the weather changes from day to day, but trends in temperature or rain and snow tend to be predictable during a season.

Investigation & Experimentation

1.0 Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in the other three strands, students should develop their own questions, and perform investigations. Students will:

- 1.1 draw pictures that portray some features of the thing being described.
- 1.2 record observations and data with pictures, numbers, and/or written standards.
- 1.3 record observations on a bar graph.
- 1.4 describe the relative position of objects using two references (above and next to, below and left of).
- 1.5 make new observations when discrepancies exist between two descriptions of the same object or phenomena.
- 1.6 think clearly and solve problems about science (classify, decide estimate, solve, compare).
- 1.7 talk and write clearly about science (present, persuade, collaborate, explain, recommend).
- 1.8 make careful plans and use them (brainstorm, envision, research, plan, organize, persist).
- 1.9 use the quality process.

2.0 Be able to apply science knowledge and skills to a variety of purposes -

- 2.1 be able to solve problems using the scientific method (research, hypothesis, test, results, conclusion).
- 2.2 be able to conduct research.
- 2.3 be able to use scientific equipment appropriately.
- 2.4 know how to preserve the earth.
- 2.5 possess technical skills: listen/ read/ dictate/ write/ present: instructions, chart, report, proposal, and summary.
- 2.6 technology: word processing, Internet, AV production.

3.0 Be able to use some scientific instruments -

- 3.1 be able to take care of magnets, magnifying glasses, and thermometers.
- 3.2 know the types of magnets.
- 3.3 know that the magnetic field is stronger at the poles.
- 3.4. know what a magnifying glass is and its uses.
- 3.5 know what a thermometer is and its uses.
- 3.6 be able to read a Celsius and Fahrenheit thermometer.
- 3.7 be able to measure rain.

SCIENCE STANDARDS
Grade Two

Physical Sciences

1.0 The motion of objects can be observed and measured. As a basis for understanding this concept, students know:

- 1.1 the position of an object can be described by locating it relative to another object or the background.
- 1.2 an object's motion can be described by recording the change in its position over time.
- 1.3 the way to change how something is moving is to give it a push or a pull. The size of the change is related to the strength, or the amount of "force" of the push or pull.
- 1.4 tools and machines are used to apply pushes and pulls (forces) to make things move.
- 1.5 objects near the Earth fall to the ground unless something holds them up.
- 1.6 magnets can be used to make some objects move without being touched.
- 1.7 sound is made by vibrating objects and can be described by its pitch and volume.

Life Science

1.0 God made plants and animals to have predictable life cycles. As a basis for understanding this concept, students know:

- 1.1 organisms reproduce offspring of their own kind. The offspring resemble their parents and each other.
- 1.2. the sequential stages of life cycles are different for different animals, for example butterflies, frogs, and mice.
- 1.3 many characteristics of an organism are inherited from the parents. Some characteristics are caused by, or influenced by, the environment.
- 1.4 there is variation among individuals of one kind within a population.
- 1.5 the germination, growth, and development of plants can be affected by light, gravity or touch, or environmental stress.
- 1.6 in plants, flowers and fruits are associated with reproduction.
- 1.7 that each person is a unique individual created by God.
- 1.8 that we have a moral responsibility to nurture and protect the earth God gave us.

Earth Sciences

1.0 Earth is made of materials that have distinct properties and provide resources for human activities. As the basis for understanding this concept, students know:

- 1.1 how to compare the physical properties of different kinds of rocks and that rock is composed of different combinations of minerals.
- 1.2 smaller rocks come from the breakage and weathering of larger rocks.
- 1.3 soil is made partly from weathered rock and partly from organic materials, and that soils differ in their color, texture, capacity to retain water, and ability to support the growth of many kinds of plants.
- 1.4 fossils provide evidence about the plants and animals that lived long ago, and scientists learn about the past history of Earth by studying fossils.
- 1.5 rock, water, plants and soil provide many resources including food, fuel, and building materials that humans use.
- 1.6 that we all have a moral responsibility to care for the natural resources that God has given us.

Investigation And Experimentation

1.0 Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in the other three strands, students should develop their own questions and perform investigations. Students will:

- 1.1 make predictions based on patterns of observation rather than random guessing.
- 1.2 measure length, weight, temperature, and liquid volume with appropriate tools in standard and non-standard units.
- 1.3 compare and sort common objects based on two or more physical attributes (including color, shape, texture, size, and weight).
- 1.4 write or draw descriptions of a sequence of steps, events, and observations.
- 1.5 understand that God gives us the gifts and talents to learn these concepts.

SCIENCE STANDARDS

Third Grade

Physical Science

1.0 God created energy and matter in their multiple forms. They can be changed from one form to another. As a basis for understanding this concept, students know:

- 1.1 energy comes from the sun to the earth in the form of light.
- 1.2 sources of stored energy take many forms: such as food, fuel and batteries.
- 1.3 machines and living things convert stored energy to motion and heat.
- 1.4 energy can be carried from one place to another by waves, such as water waves and sound, by electric current and by moving objects.
- 1.5 matter has three forms: solid, liquid, and gas.
- 1.6 evaporation and melting are changes that occur when the objects are heated.
- 1.7 when two or more substances are combined a new substance may be formed that can have properties that are different from those of the original materials.
- 1.8 all matter is made of small particles called atoms, too small to see with our eyes.
- 1.9 people once thought that earth, wind, fire, and water were the basic elements that made up all matter. Science experiments show that there are over 100 atoms, which are displayed on the Periodic Table of the Elements.

2.0 Jesus is the light of the world. Light has a source and travels in a direction. As a basis for understanding this concept, students know:

- 2.1 sunlight can be blocked to create shadows.
- 2.2 light is reflected from mirrors and other surfaces.
- 2.3 the color of light striking an object affects how our eyes see it.
- 2.4 we see objects when light traveling from an object enters our eye.

Life Sciences

1.0 God created plants and animals to have adaptations in their physical structure or behavior to improve an organism's chance for survival. As a basis for this understanding this concept, students know:

- 1.1 plants and animals have structures that serve different functions in growth, survival, and reproduction.
- 1.2 plants are either seed or non-seed.
- 1.3 plants make their own food.
- 1.4 examples of diverse life forms in different environments, such as oceans, deserts, tundra, forests, grasslands, and wetlands.
- 1.5 living things cause changes in the environment where they live; some of these changes are detrimental to the organism or other organisms, whereas others are beneficial.
- 1.6 when the environment changes, some plants and animals survive and reproduce, and others die or move to new locations
- 1.7 some kinds of organisms that once lived on Earth have completely disappeared, although they resembled others that are alive today.

Earth Sciences

1.0 God created our universe with objects in the sky that move in regular and predictable patterns. As a basis for understanding this concept, students know:

- 1.1 the patterns of stars stay the same, although they appear to move across the sky nightly, and different stars can be seen at different seasons.
- 1.2 how the moon's appearance changes during the four-week lunar cycle.
- 1.3 telescopes magnify the appearance of some distant objects in the sky, including the moon and the planets. The number of stars that can be seen through telescopes is dramatically greater than can be seen by the unaided eye.
- 1.4 the Earth is one of several planets that orbit the sun, and the moon orbits the Earth.
- 1.5 the position of the sun in the sky changes during the course of the day and from season to season.

Investigation And Experimentation

1.0 Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content the other three strands, students should develop their own questions and perform investigations. Students will:

- 1.1 repeat observations to improve accuracy, and know that the results of similar scientific investigations seldom turn out exactly the same because of differences in the things being investigated, methods being used, or uncertainty in the observation.
- 1.2 differentiate evidence from opinion, and know that scientists do not rely on claims or conclusions unless they are backed by observations that can be confirmed.
- 1.3 use numerical data in describing and comparing objects, events and measurements.
- 1.4 predict the outcome of a simple investigation, and compare the result to the prediction.
- 1.5 collect data in an investigation and analyze them to develop a logical conclusion.

SCIENCE STANDARDS

Fourth Grade

Physical Sciences

1.0 Electricity and magnetism are related effects that have many useful applications in everyday life. As a basis for understanding this concept, students know:

- 1.1 how to design and build simple series and parallel circuit components such as wires, batteries, and bulbs.
- 1.2 how to build a simple compass and use it to detect magnetic effects, including Earth's magnetic field.
- 1.3 that all electric currents produce magnetic fields and how to build a simple electromagnet.
- 1.4 the role of electromagnets in the construction of electric motors, electric generators, and simple devices such as doorbells and earphones.
- 1.5 electrically charged objects attract or repel each other; electricity is a force.
- 1.6 magnets have two poles labeled north and south, and like poles repel each other while unlike poles attract each other; magnetism is a force.
- 1.7 electrical energy can be converted to heat, light, and motion.
- 1.8 know the basic elements of gravity and friction.
- 1.9 understand the characteristics and uses of the six simple machines—plane and wedge, screw, pulley, lever, wheel and axle; identify simple machines with complex machines, and be able to combine simple machines to make complex machines.
- 1.10 understand the characteristics of light and sound and sources of light.
- 1.11 know how reflection, absorption, and transmission of light affects an object's appearance.
- 1.12 know how flat and curved mirrors affect light, and how objects refract light.
- 1.13 know how light waves are different from sound waves, and how light waves and sound waves travel.

Life Sciences

1.0 All organisms that God created need energy and matter to live and grow. As a basis for understanding this concept, students know:

- 1.1 plants are the primary source of matter and energy entering most food chains.
- 1.2 producers and consumers (herbivores, carnivores, omnivores, and decomposers) are related in food chains and food webs, and may compete with each other for resources in an ecosystem.
- 1.3 decomposers, including many fungi, insects, and micro-organisms recycle matter from dead plants and animals.

2.0 Living things depend on one another and their environment for survival. As a basis for understanding this concept, students know:

- 2.1 ecosystems can be characterized in terms of their living and nonliving components.
- 2.2 for any particular environment (ocean and land food chains), some kind of plants and animals survive well, some survive less well, and some cannot survive at all.
- 2.3 many plants depend on animals for pollination and seed dispersal, while animals depend on plants for food and shelter.
- 2.4 most micro-organisms do not cause disease and many are beneficial.
- 2.5 be appreciative of the complexities and differences of all God's living creations.

Earth Sciences

1.0 The properties of rocks and minerals reflect the processes that formed them. As a basis for understanding this concept, students know:

- 1.1 how to differentiate among igneous, sedimentary, and metamorphic rocks by their properties and methods of formation (the rock cycle).
- 1.2 how to identify common rock-forming minerals (including quartz, calcite, feldspar, mica, and hornblende) and ore minerals using a table of diagnostic properties.
- 1.3 understand the Earth's surface and changes which affect it.
- 1.4 know the layers which form the Earth's crust, and the characteristics of each layer.
- 1.5 be able to identify examples of various layers of the Earth's crust, and how the various layers were formed.
- 1.6 know how wind, water, time, and geological shifts affect the Earth's surface.
- 1.7 know how humans change the Earth's surface, and their appreciation for the resources God has provided for us all.

2.0 Waves, wind, water, and ice shape and reshape the Earth's land surface. As a basis for understanding this concept, students know:

- 2.1 some changes in the Earth are due to slow processes, such as erosion (weathering, transport, and deposition), and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earth-quakes.
- 2.2 natural processes including freezing/thawing and growth of roots, cause rocks to break down into smaller pieces.
- 2.3 moving water erodes landforms, reshaping the land by taking it away in places and depositing it as pebbles, sand, silt, and mud in other places.

Investigation And Experimentation

1.0 Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content of the other three strands, students should develop their own questions and perform investigations. Students will:

- 1.1 differentiate observation from interpretation, and know that scientists' explanations come partly from what they observe and partly from how they interpret their observations.
- 1.2 measure and estimate weight, length, or volume of objects.
- 1.3 formulate predictions and justify predictions based on cause and effect relationships.
- 1.4 conduct multiple trials to test a prediction and draw conclusions about the relationships between results and predictions.
- 1.5 construct and interpret graphs from measurements.
- 1.6 follow a set of written instructions for a scientific investigation.

SCIENCE STANDARDS

Grade Five

Physical Sciences

1.0 God created the world and all its matter with an infinite sense of order. Elements and their combinations account for all the varied types of matter in the world. As a basis for understanding this concept, students know:

- 1.1. during chemical reactions, the atoms in the reactants rearrange to form products with different properties.
- 1.2. all matter is made of atoms which may combine to form molecules.
- 1.3. metals are a group of substances that have shared properties such as electrical and thermal conductivity. Some metals, such as aluminum (Al), iron (Fe), nickel (Ni), copper (Cu), silver (Ag), gold (Au), are pure elements while others, such as steel and brass, are composed of a combination of elemental metals.
- 1.4. each element is made of one kind of atom. These elements are organized in the Periodic Table by their chemical properties.
- 1.5. scientists have developed instruments that can create images of atoms and molecules showing that they are discrete and often occur in well ordered arrays.
- 1.6. differences in chemical and physical properties of substances are used to separate mixtures and identify compounds.
- 1.7. properties of solid, liquid, and gaseous substances such as sugar ($C_6H_{12}O_6$), water (H_2O), helium (He), oxygen (O_2), nitrogen (N_2), and carbon dioxide (CO_2).
- 1.8. living organisms and most materials are composed of just a few elements.
- 1.9. common properties of salts, such as sodium chloride (NaCl).

Life Sciences

1.0 God made all life on Earth, creating plants and animals that have structures for respiration, digestion, waste disposal, and transport of materials. As a basis for understanding this concept, students know:

- 1.1. many multi-cellular organisms have specialized structures to support the transport of materials.
- 1.2. how blood circulates through the heart chambers, lungs, and body, and how carbon dioxide (CO_2) and oxygen (O_2) are exchanged in the lungs and tissues.
- 1.3. the sequential steps of digestion, and how the teeth and mouth, esophagus, stomach, small intestine, large intestine, and colon are important in the function of the digestive system.
- 1.4. the role of the kidney in removing cellular wastes out of blood, which become urine stored in the bladder.
- 1.5. how sugar, water, and minerals are transported in a vascular plant.
- 1.6. plants use carbon dioxide (CO_2) and energy from sunlight to build molecules of sugar and release oxygen.
- 1.7. plant and animal cells break down sugar to obtain energy, forming carbon dioxide (CO_2) and water (respiration).

Earth Sciences

1.0 According to God’s design, water on Earth moves between the oceans and land through the processes of evaporation and condensation. As a basis for understanding this concept, students know:

- 1.1 almost all of the Earth’s water is present as salt water in the oceans which cover most of the Earth’s surface.
- 1.2 when liquid water evaporates, it turns into water vapor (invisible) in the air and can reappear as a liquid when cooled, or as a solid if cooled below the freezing point of water.
- 1.3 water moves in the air from one place to another in the form of clouds or fog, which are tiny droplets of water or ice, and falls to the Earth as rain, hail, sleet, or snow.
- 1.4 the amount of fresh water, located in rivers, lakes, underground sources, and glaciers, is limited, and its availability can be extended through recycling and decreased use.
- 1.5 the origin of water used by their local communities.

2.0 Our Creator designed our world so that energy from the sun heats the Earth unevenly, causing air movements resulting in changing weather patterns. As a basis for understanding this concept, students know:

- 2.1 uneven heating of the Earth causes air movements (convection currents).
- 2.2 how the angle of the sun affects weather, how latitude affects weather, the influence of the ocean on weather, and the role of the water cycle in weather.
- 2.3 causes and effects of different types of severe weather.
- 2.4 how to use weather maps and weather forecasts to predict local weather, and that prediction depends on many changing variables.
- 2.5 the Earth’s atmosphere exerts a pressure that decreases with distance above the Earth’s surface, and is the same in all directions.

3.0 The Creator’s ordered design extends from the smallest atom on Earth, through our solar system, and to the furthest reaches of the universe. The solar system consists of planets and other bodies that orbit the sun in predictable paths. As a basis for understanding this concept, students know:

- 3.1 the sun, an average star, is the central and largest body in the solar system and is composed primarily of hydrogen and helium.
- 3.2 the solar system includes the Earth, moon, sun, eight other planets and their satellites, and smaller objects such as asteroids and comets.
- 3.3 that the path of a planet around the sun is due to the gravitational attraction between the sun and the planet.

Investigation and Experimentation

1.0 Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content of the other three strands, students should develop their own questions and perform investigations. Students will:

- 1.1 classify objects (e.g., rocks, plants, leaves) based on appropriate criteria.
- 1.2 develop a testable question.
- 1.3 plan and conduct a simple investigation based on a student-developed question, and write instructions others can follow to carry out the procedure.
- 1.4 identify the dependent and controlled variables in an investigation.
- 1.5 identify a single independent variable in a scientific investigation and explain what will be learned by collecting data on this variable.
- 1.6 select appropriate tools (e.g., thermometers, meter sticks, balances, and graduated cylinders) and make quantitative observations.
- 1.7 record data using appropriate graphic representation (including charts, graphs, and labeled diagrams), and make inferences based on that data.
- 1.8 draw conclusions based on scientific evidence and indicate whether further information is needed to support a specific conclusion.
- 1.9 write a report of an investigation that includes tests conducted, data collected or evidence examined, and conclusions drawn.

SCIENCE STANDARDS

Grade Six

FOCUS ON EARTH SCIENCE

Plate Tectonics and Earth's Structure

1.0 Plate tectonics explains important features of the Earth's surface and major geologic events God has created. As the basis for understanding this concept, students know:

- 1.1 evidence for plate tectonics based on the fit of the continents, location of earthquakes, volcanoes, and mid-ocean ridges, and the distribution of fossils, rock types and ancient climatic zones.
- 1.2 the solid Earth is layered with cold, brittle lithosphere; hot, convecting mantle, and dense, metallic core.
- 1.3 lithospheric plates, on the scales of continents and oceans, move at rates of centimeters per year in response to movements in the mantle.
- 1.4 earthquakes are sudden motions along breaks in the crust called faults, and volcanoes/fissures are locations where magma reaches the surface.
- 1.5 major geologic events, such as earthquakes, volcanic eruptions and mountain building result from plate motions.
- 1.6 how to explain major features of California geology in terms of plate tectonics (including mountains, faults and volcanoes).
- 1.7 how to determine the epicenter of an earthquake and that the effects of an earthquake vary with its size, distance from the epicenter, local geology and the type of construction involved.

Shaping The Earth's Surface

2.0 Topography is reshaped by weathering of rock and soil and by the transportation and deposition of sediment. As the basis for understanding this concept, students know:

- 2.1 water running downhill is the dominant process in shaping the landscape, including California's landscape.
- 2.2 rivers and streams are dynamic systems that erode and transport sediment, change their course and flood their banks in natural and recurring patterns.
- 2.3 beaches are dynamic systems in which sand is supplied by rivers and moved along the coast by wave action.
- 2.4 earthquakes, volcanic eruptions, landslides and floods change human and wildlife habitats.

Heat (Thermal Energy) (Physical Science)

3.0 Heat moves in a predictable flow from warmer objects to cooler objects until all objects are at the same temperature. All forms of energy are controlled by God. As a basis for understanding this concept, students know:

- 3.1 energy can be carried from one place to another by heat flow or by waves, including water waves, light and sound, or by moving objects.
- 3.2 when fuel is consumed, most of the energy released becomes heat energy.
- 3.3 heat flows in solids by conduction (which involves no flow of matter) and in fluids by conduction and also by convection (which involves flow of matter).
- 3.4 heat energy is also transferred between objects by radiation; radiation can travel through space.

Energy In The Earth System

4.0 Many phenomena on the Earth's surface are affected by the transfer of energy through radiation and convection currents, as planned by God. As a basis for understanding this concept, students know:

- 4.1 the sun is the major source of energy for phenomena on the Earth's surface, powering winds, ocean currents and the water cycle.
- 4.2 solar energy reaches Earth through radiation, mostly in the form of visible light.
- 4.3 heat from Earth's interior reaches the surface primarily through convection.
- 4.4 convection currents distribute heat in the atmosphere and oceans.
- 4.5 differences in pressure, heat, air movement and humidity result in changes of weather.

Ecology (Life Science)

5.0 Organisms in ecosystems exchange energy and nutrients among themselves and with the physical environment in God's amazing circle of life. As a basis for understanding this concept, students know:

- 5.1 energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism to organism in food webs.
- 5.2 over time, matter is transferred from one organism to others in the food web and between organisms and the physical environment.
- 5.3 populations of organisms can be categorized by the functions they serve in an ecosystem.
- 5.4 different kinds of organisms may play similar ecological roles in similar biomes.
- 5.5 the number and types of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures and soil composition.

Resources

6.0 Sources of energy and materials differ in amounts, distribution, usefulness and the time required for their formation. God has provided a huge array of resources, which we must use wisely. As a basis for understanding this concept, students know:

- 6.1 the utility of energy sources is determined by factors that are involved in converting these sources to useful forms and the consequences of the conversion process.
- 6.2 different natural energy and material resources including air, soil, rocks, minerals, petroleum, fresh water wildlife and forests, and classify them as renewable or nonrenewable.
- 6.3 natural origin of the materials used to make common objects.

Investigation And Experimentation

7.0 Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in the other three strands, students should develop their own questions and perform investigations. Students will:

- 7.1 develop a hypothesis.
- 7.2 select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes and binoculars) to perform tests, collect data and display data.
- 7.3 construct appropriate graphs from data and develop qualitative statements about the relationships between variables.
- 7.4 communicate the steps and results from an investigation in written reports and verbal presentations.
- 7.5 recognize whether evidence is consistent with a proposed explanation.
- 7.6 read a topographic map and a geologic map for evidence provided on the maps, and construct and interpret a simple scale map.
- 7.7 interpret events by sequence and time from natural phenomena (e.g., relative ages of rocks and intrusions).
- 7.8 identify changes in natural phenomena over time without manipulating the phenomena (e.g., a tree limb, a grove of trees, a stream, a hill slope).

SCIENCE STANDARDS

Grade Seven

Focus on Life Science

Cell Biology

1.0 God made all living things to be composed of cells, from just one to many trillions, whose details usually are visible only through a microscope. As a basis for understanding this concept, students know:

- 1.1 the way in which cells function is similar in all living organisms.
- 1.2 the characteristics that distinguish plant cells from animal cells, including chloroplasts and cell walls.
- 1.3 the nucleus is the repository for genetic information in plant and animal cells.
- 1.4 mitochondria liberate energy for the work that cells do, and chloroplasts capture sunlight energy for photosynthesis .
- 1.5 cells divide to increase their numbers through a process of mitosis, which results in two daughter cells with identical sets of chromosomes.
- 1.6 As multi-cellular organisms develop, their cells differentiate.
- 1.7 observe plant and animal cells through microscopes.
- 1.8 how immune system cells fight disease.
- 1.9 how HIV destroys T-cells.
- 1.10 cell organelles and their function.
- 1.11 the cell in its environment.
- 1.12 chemical compounds in cells.
- 1.13 diffusion; osmosis; passive and active transport across cell membrane.
- 1.14 cell mutation causing cancer.

Genetics

2.0 A typical cell of any organism contains genetic instructions that specify its traits. Those traits may be modified by environmental influences. As a basis for understanding this concept, students know:

- 2.1 the differences between the life cycles and reproduction of sexual organisms .
- 2.2 sexual reproduction produces offspring that inherit half of their genes from each parent.
- 2.3 an inherited trait can be determined by one or by many genes.
- 2.4 plant and animal cells contain many thousands of different genes, and typically have two copies of every gene. The two copies (or alleles) of the gene may or may not be identical, and one may be dominant in determining the phenotype while the other is recessive.
- 2.5 DNA is the genetic material of living organisms and is located in the chromosomes of each cell.
- 2.6 human genetic disorders and disease

Evolution

3.0 God initiated the biological evolution process which accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept, students know:

- 3.1 both genetic variation and environmental forces act to cause evolution and diversity of organisms.
- 3.2 the reasoning used by Darwin in his conclusions that natural selection is the mechanism of evolution.
- 3.3 how independent lines of evidence from geology, fossils, and comparative anatomy provide a basis for the theory of evolution.
- 3.4 how to construct a simple branching diagram to classify several living groups of organisms by shared derived characteristics, and that a branching diagram can be expanded to include fossil organisms.
- 3.5 extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival.

Earth And Life History (Earth Science)

4.0 Evidence from rocks allows us to understand the evolution of life on Earth. As the basis for understanding, students know:

- 4.1 Earth processes today are similar to those that occurred in the past and slow geologic processes have large cumulative effects over long periods of time.
- 4.2 the history of life on Earth has been disrupted by major catastrophic events, such as major volcanic eruptions or the impact of an asteroid.
- 4.3 the rock cycle includes the formation of new sediment and rocks. Rocks are often found in layers with the oldest generally on the bottom.
- 4.4 evidence from geologic layers and radioactive dating indicate the Earth is approximately 4.6 billion years old, and that life has existed for more than 3 billion years.
- 4.5 fossils provide important evidence of how life and environmental conditions have changed.
- 4.6 how movements of the Earth's continental and oceanic plates through time, with associated changes in climate and geographical connections, have affected the past and present distribution of organisms.
- 4.7 how to explain significant developments and extinctions of plant and animal life on the geologic time scale.
- 4.8 viruses and bacteria; how infectious diseases spread.
- 4.9 research report on virus/bacterial disease using paraphrasing of resource materials.
- 4.10 types of protists and algae.

Structure And Function In Living Systems

5.0 The anatomy and physiology of plants and animals of God's world illustrate the complimentary nature of structure and function. As a basis for understanding this concept, students know:

- 5.1 plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.
- 5.2 organ systems function because of the contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system.

- 5.3 how bones and muscles work together to provide a structural framework for movement.
- 5.4 how the reproductive organs of the human female and male generate eggs and sperm, and how sexual activity may lead to fertilization and pregnancy.
- 5.5 the function of the umbilicus and placenta during pregnancy.
- 5.6 the structures and processes by which flowering plants generate pollen and ovules, seeds, and fruit.
- 5.7 relate the structures of the eye and ear to their functions.

Physical Principles In Living Systems (Physical Science)

6.0 Physical principles underlie biological structures and functions of God's universe. As a basis for understanding this concept, students know:

- 6.1 visible light is a small band within a very broad electromagnetic spectrum.
- 6.2 for an object to be seen, light emitted by or scattered from it must enter the eye.
- 6.3 that light travels in straight lines except when the medium it travels through changes.
- 6.4 how simple lenses are used in a magnifying glass, the eye, camera, telescope, and microscope.
- 6.5 white light is a mixture of many wavelengths (colors), and that retinal cells react differently with different wavelengths.
- 6.6 the angle of reflection of a light beam is equal to the angle of incidence.
- 6.7 how to compare joints in the body (wrist, shoulder, thigh) with structures used in machines and simple devices (hinge, ball-and-socket, and sliding joints)
- 6.8 how levers confer mechanical advantage and how the application of this principle applies to the muscular-skeletal system.
- 6.9 that contractions of the heart generate blood pressure, and that heart valves prevent back flow of blood in the circulatory system.
- 6.10 light interacts with matter by transmission (including refraction), absorption, or scattering (including reflection).
- 6.11 the steps of the scientific method and application for problem solving; understanding and demonstrating.

Investigation And Experimentation

7.0 Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in the other three strands, students should develop their own questions and perform investigations. Students will:

- 7.1 develop a hypothesis.
- 7.2 select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes and binoculars) to perform tests, collect data and display data.
- 7.3 construct appropriate graphs from data and develop qualitative statements about the relationships between variables.
- 7.4 communicate the steps and results from an investigation in written reports and verbal presentations.
- 7.5 recognize whether evidence is consistent with a proposed explanation.
- 7.6 read a topographic map and a geologic map for evidence provided on the maps, and construct and interpret a simple scale map.
- 7.7 interpret events by sequence and time from natural phenomena.
- 7.8 identify changes in natural phenomena over time without manipulating the phenomena.

SCIENCE STANDARDS

Grade Eight

FOCUS ON PHYSICAL SCIENCE

Motion

1.0 The velocity of an object is the rate of change of its position. As a basis for understanding this concept, students know:

- 1.1 position is defined relative to some choice of standard reference point and a set of reference directions.
- 1.2 average speed is the total distance traveled divided by the total time elapsed. The speed of an object along the path traveled can vary.
- 1.3 how to solve problems involving distance, time, and average speed.
- 1.4 that to describe the velocity of an object, one must specify both direction and speed.
- 1.5 changes in velocity can be changes in speed, direction, or both.
- 1.6 how to interpret graphs of position versus time, and speed versus time for motion in a single direction.

Forces

2.0 Unbalanced forces cause changes in velocity. As a basis for understanding this concept, students know:

- 2.1 a force has both direction and magnitude.
- 2.2 when an object is subject to two or more forces at once, the effect is the cumulative effect of all the forces.
- 2.3 when the forces on an object are balanced, the motion of the object does not change.
- 2.4 how to identify separately two or more forces acting on a single static object, including gravity, elastic forces due to tension or compression in matter, and friction.
- 2.5 when the forces on an object are unbalanced, the object will change its motion (that is, it will speed up, slow down, or change direction).
- 2.6 the greater the mass of an object, the more force is needed to achieve the same change in motion.
- 2.7 the role of gravity in forming and maintaining planets, stars, and the solar system.

Structure Of Matter

3.0 Elements have distinct properties and atomic structure in the scientific realm created by God. All matter is comprised of one or more of over 100 elements. As a basis for understanding this concept, students know:

- 3.1 the structure of the atom and how it is composed of protons, neutrons, and electrons.
- 3.2 compounds are formed by combining two or more different elements.
- 3.3 atoms and molecules form solids by building up repeating patterns such as the crystal structure of NaCl or long chain polymers.
- 3.4 the states (solid, liquid, gas) of matter depend on molecular motion.
- 3.5 in solids, the atoms are closely locked in position and can only vibrate; in liquids, the atoms and molecules are more loosely connected and can collide with and move past one another; in gases, the atoms or molecules are free to move independently, colliding frequently.
- 3.6 how to use the periodic table to identify elements in simple compounds.

Earth In The Solar System (Earth Science)

4.0 The structure and composition of the universe can be learned from the study of stars and galaxies and their evolution. As a basis for understanding this concept, students know:

- 4.1 galaxies are clusters of billions of stars, and may have different shapes.
- 4.2 the sun is one of many stars in our own Milky Way galaxy. Stars may differ in size, temperature, and color.
- 4.3 how to use astronomical units and light years as measures of distance between the sun, stars, and Earth.
- 4.4 stars are the source of light for all bright objects in outer space. The moon and planets do not shine by their own light, but by reflected sunlight.
- 4.5 the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids.

Reactions

5.0 Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept, students know:

- 5.1 reactant atoms and molecules interact to form products with different chemical properties.
- 5.2 the idea of atoms explains the conservation of matter: in chemical reactions, the number of atoms stays the same no matter how they are arranged, so their total mass stays the same.
- 5.3 chemical reactions usually liberate heat or absorb heat.
- 5.4 physical processes include freezing and boiling, in which a material changes form with no chemical reaction.
- 5.5 how to determine whether a solution is acidic, basic or neutral.

Chemistry of Living Systems (Life Sciences)

6.0 Principles of chemistry underlie the functioning of biological systems as created by God. As a basis for understanding this concept, students know:

- 6.1 carbon, because of its ability to combine in many ways with itself and other elements, has a central role in the chemistry of living things.
- 6.2 living things are made of molecules largely consisting of carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur.
- 6.3 living things have many different kinds of molecules, including small ones, such as water and salt, and very large ones, such as carbohydrates, fats, proteins and DNA.

Periodic Table

7.0 The organization of the periodic table is based on the properties of the elements and reflects the structure of atoms. As a basis for understanding this concept, students know:

- 7.1 how to identify regions corresponding to metals, nonmetals, and inert gases.
- 7.2 elements are defined by the number of protons in the nucleus, which is called the atomic number. Different isotopes of an element have a different number of neutrons in the nucleus.
- 7.3 substances can be classified by their properties, including melting temperature, density, hardness, heat, and electrical conductivity.

Density And Buoyancy

8.0 All objects experience a buoyant force when immersed in a fluid. As a basis for understanding this concept, students know:

- 8.1 that density is mass per unit volume and how to calculate the density of substances (regular and irregular solids and liquids) from measurements of mass and volume.
- 8.2 that the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid it has displaced, and know how to apply this principle to predict whether an object will float or sink.
- 8.3 writing a research report; paraphrasing, cover page, bibliography, footnotes, and organization of resource materials.
- 8.4 application and use of scientific method for problem solving.

Investigation And Experimentation

9.0 Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in the other three strands, students should develop their own questions and perform investigations. Students will:

- 9.1 develop a hypothesis.
- 9.2 select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes and binoculars) to perform tests, collect data and display data.
- 9.3 construct appropriate graphs from data and develop qualitative statements about the relationships between variables.
- 9.4 communicate the steps and results from an investigation in written reports and verbal presentations.
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