

ST. JOHN'S EVANGELICAL LUTHERAN SCHOOL
Curriculum in Science

The heavens declare the glory of God; the skies proclaim the work of his hands. Day after day they pour forth speech; night after night they reveal knowledge. They have no speech, they use no words; no sound is heard from them. Yet their voice goes out into all the earth, their words to the ends of the world. In the heavens God has pitched a tent for the sun. It is like a bridegroom coming out of his chamber, like a champion rejoicing to run his course. It rises at one end of the heavens and makes its circuit to the other; nothing is deprived of its warmth.

Psalm 19:1-4

Scriptural Rationale:

Knowledge of science helps students understand what make things happen as they do in the world. The teaching of science gives students the opportunity to see in God's creation the evidence of God's love, wisdom, power and majesty. Connections made between the concepts of science and the Word of God will help students respond with love, gratitude, awe, and reverence toward their Creator.

General Objectives:

Through a study of science students will:

- ✦ Understand and appreciate that science is a study of God's creation.
- ✦ See God's omnipotence and omniscience when studying his creation.
- ✦ Use the scientific method to formulate a hypothesis, identify variables, gather data, state conclusions, and form inferences.
- ✦ Develop understanding in physical science concepts such as sound and light, electricity and magnetism, chemical building blocks, and motion forces and energy.
- ✦ Develop understanding in earth science concepts such as weather and climate, volcanoes and earthquakes, rocks, astronomy, and earth's waters.
- ✦ Develop understanding in life science concepts in the five kingdoms of living things.
- ✦ Develop understanding in the human body by learning the organ systems, cell structure, heredity, and health.

Grade-Specific Measurable Objectives:

Grades K3-K4 students will be able to answer the following questions:

Unit

Unit P-1: Health

Objectives

Why do I want to take care of my body?
How can I take care of my body?
How can I use my senses to learn about the world?
How can I take care of my teeth?

Unit P-2: Seasons: Fall

What do my senses notice about fall?
What makes leaves turn colors?
How do apples change when heated?
What is inside an apple?
Which senses can I use to explore a pumpkin?
What makes up a pumpkin?
How can a face tell me someone's feelings?

Unit P-3: Seasons: Winter

What happens in the winter?
What do we wear in the winter and why?
How is a snowman made?

Unit P-4: Seasons: Spring

What happens in the spring?
How are bees' bodies built?
What is the life cycle of a butterfly?
How do flowers grow?

Unit P-5: The Sky

What is in the sky?
What is a star made of?
What is the moon's surface like?
What activities happen during the day? During the night?
What are clouds made of?

Unit

Unit P-6: Animals

Objectives

Ocean Animals:

What animals are found in the ocean?
Can I identify shallow and deep water?
What is a group of fish called?
How can fish look?
What kind of water is in the ocean?

Desert Animals:

What animals live in the desert?
How did God design them to survive in the desert?

Savannah Animals:

What animals live in the savannah?
What is migration?
Why do animals migrate?

Pond Animals:

What animals live in the pond?
What is a life cycle?
How does God design some animals to live in a pond?

Forest Animals:

What animals live in the forest?
When do different animals sleep?

Arctic Animals:

What animals live in the arctic?
How did God design them to survive in the arctic?

Grade K5 students will be able to answer the following questions:

Unit

Unit K-1: Plants

Objectives

Understand that plants are organisms with parts that help them get what they need to grow and mature.

Recognize that a plant is an organism that needs air, water, light, and soil to survive.

Recognize that plants are organisms that grow and change.

Recognize that plants can be identified by their parts.

Identify and explore plants that we eat and the foods that come from different plants.

Unit K-2: Animals

Understand the basic definition of an animal and explore animals in your neighborhood.

Recognize that animals are organisms that need air, water, food, and shelter to stay alive.

Learn about bugs, their attributes, and where they live.

Understand the basic definition of a reptile, its attributes, and where it lives.

Learn about birds, fish, and other water animals.

Explore how animals have adapted to their environments.

Understand how animals grow and change as they mature.

Explore relationships between people and animals.

Unit K-3: Our Earth, Our Home

Explore the composition and uses of soil

Investigate the characteristics of different rocks.

Learn characteristics of geographic features that are high and low.

Learn characteristics of rivers, streams, lakes and oceans and identify water as a natural resource.

Learn about Earth's natural resources that are used in everyday life and that resources can be conserved.

Learn different reasons for and ways of recycling.

Unit

Unit K-4: Weather and Sky

Objectives

Recognize the characteristics of different kinds of weather, such as wind, sun, rain, and snow.

Describe clouds and how they change.

Identify what occurs in nature and what people do in different seasons.

Recognize changes that occur in the sky from day to night and night to day.

Recognize that the sun creates shadows and appears to move through the sky.

Unit K-5: Exploring Matter

Identify and explore the ways we can use and change paper and cloth.

Identify and explore the ways we can use and change natural resources such as wood and metal.

Identify clay as a natural resource that can be manipulated to make things.

Identify and explore the properties and changing states of water and investigate objects that sink and float in water.

Unit K-6: Moving Right Along

Recognize that wheels affect speed and motion and make moving easier.

Explore ways objects move and forces that cause movement.

Understand that certain objects, like the sun and moon, stay in the sky, while others, like an airplane, are in the sky but return to Earth.

Describe sounds and understand how they are made.

Recognize that magnets can be used to make some objects move without being touched.

Grade 1 students will be able to...

Unit

Unit 1-1: My Body

Objectives

Recognize that the human body has structures and behaviors that help it grow and survive.

Name the following internal body parts: skeleton, muscles, heart, lungs, stomach and intestines.

Recall that the brain controls body functions and is the center of thinking.

Know and demonstrate that humans use their five senses of hearing, sight, smell, taste and touch to find out about their surroundings.

Recognize that humans grow and change during their life cycle.

Explain that we must take care of our bodies through nutrition, rest, cleanliness, exercise and safety.

Unit 1-2: Weather

Identify the many kinds of weather.

Recognize that weather changes from day to day.

Recognize that weather changes from season to season.

Demonstrate that weather can be described by measurable quantities including temperature and wind speed.

Identify the three states of matter.

State that water can change from one form to another.

Recall that rain is a part of the water cycle.

Unit 1-3: Animals

Recognize that animals are living things and living things are alike in many ways.

Give examples to demonstrate knowledge of are many kinds of animals.

Discover that animals live in different habitats.

Discuss that an animal's body and behavior's help it survive in its environment.

Recognize that animals are many sizes and colors.

Give examples that show animals' bodies have different kinds of coverings.

Identify the different appendages of animals.

Read that animals find and eat food in different ways.

Discuss that animals have different methods of self-defense.

Unit

Unit 1-3: Animals (cont.)

Objectives

State that animals need air, food, and water and that all animals depend on plants for food.

Recognize that animals grow and change.

Identify baby animals and their parents.

Unit 1-4: Plants

Recognize that plants are living things.

Discover there are many kinds of plants in many kinds of environments.

Discover the parts of a plant help it survive in its environment.

Label the following parts of a plant: roots, stem, leaves, flowers, and seeds.

State the functions of the following parts of a plant: roots, stem, leaves, flowers and seeds.

Recognize that plants change and grow.

State that a plant needs air, water, food and light.

Discover that animals and people need plants.

Unit 1-5: Exploring Space

State that earth is a part of our solar system in the Milky Way Galaxy.

Discover that stars are huge balls of hot, glowing gases.

Recognize that our sun is a star.

Read that groups of stars together are called constellations.

Discover that each planet in our solar system has unique characteristics.

State that Earth has one satellite called the moon.

Discuss that Earth's movements through space cause day and night and the seasons.

Discover that scientists study space in many ways.

Grade 2 students will be able to...

Unit

Unit 2-1: Plants

Objectives

Identify living and nonliving things.
Explain why plants are living things and describe their parts.
Describe seeds and their origins.
Identify the stages in a plant's life cycle.
Recognize that plants look and act like their parent plants.
Describe ways plants change to meet their needs.

Unit 2-2: Animals

Describe, classify, and compare animals.
Explain how animal parts help animals meet their needs.
Explain that every animal has a life cycle.
Describe and compare the life cycles of animals.
Identify how camouflage helps animals stay safe.
Explain how animals protect themselves.

Unit 2-3: Looking at Habitats

Describe different habitats.
Explain how plants and animals use their habitats.
Describe a food chain.
Describe a food web.
Explain why habitats change.
Describe what happens when habitats change.

Unit 2-4: Types of Habitats

Compare and contrast woodland forest and rainforests.
Explain how different animals live in forest habitats.
Describe desert habitats.
Explain how plants and animals survive in a dry habitat.
Describe oceans and ponds.
Explain how plants and animals live in oceans and ponds.

Unit

Unit 2-5: Observing Weather

Objectives

Describe temperature, wind, and precipitation.
Identify and use tools to measure weather.
Identify the different stages of the water cycle.
Describe and illustrate the water cycle.
Predict weather by observing clouds.
Identify different types of clouds and storms.

Unit 2-6: Earth and Space

Identify how Earth rotates to make day and night.
Explain how shadows change as Earth moves.
Describe seasonal and annual patterns on Earth.
Relate seasonal patterns to Earth's orbit around the Sun.
Observe the Moon and its phases as it orbits the Earth.
Recognize that the Sun is the closest star to Earth.
Explain the relationship between the planets and the Sun.
Describe the planets in the solar system.

Unit 2-7: Looking at Matter

Identify matter as anything that has mass and takes up space.
Compare and contrast different properties of matter.
Compare and contrast the properties of solids.
Use different ways to measure solids.
Describe the properties of liquids and gases.
Compare and contrast liquids and gases.

Unit 2-8: Changes in Matter

Identify chemical and physical changes.
Observe how heat can change matter.
Observe how solids, liquids and gases mix.

Unit 2-9: How Things Move

Describe an object's position in relation to another object.
Measure and record changes in an object's position.
Identify a force as a push or a pull.
Describe the forces of gravity and friction.

Unit

Unit 2-9: How Things Move (cont.)

Objectives

Identify simple machines.
Discover that simple machines change force to make work easier.
Observe magnets attract and repel objects.
Identify magnet poles and how they function.

Unit 2-10: Using Energy

Recognize that the Sun supplies heat and energy to Earth.
Discover how different sounds are produced.
Describe the volume and pitch of sounds.
Identify the composition and properties of light.
Identify forms of electricity and their uses.

Grade 3 students will be able to...

Unit

Unit 3-1: Living Things

Objectives

Compare nonliving things and living things.
Describe what living things need to survive.
Relate plant structures to their functions.
Describe how plants are classified.
Describe what an animal needs to survive.
Relate how an animal meets its needs.
Identify two major groups of animals.
Classify animals into groups based on their structures.
Understand how plants grow and reproduce.
Recognize the life cycles of different types of plants.
Identify the different stages that animals go through in a life cycle.
Compare the life cycles of different kinds of animals.
Explain how some traits are inherited from parents.
Distinguish between inherited traits and learned traits.

Unit

Unit 3-2: Ecosystems

Objectives

Define an ecosystem.

Understand how energy moves through a food chain.

Identify the roles of different organisms in a food web.

Identify different ecosystems.

Describe the characteristics of different ecosystems.

Recognize adaptations that allow organisms to survive in certain environments.

Explain how adaptations help organisms survive.

Identify ways that living things change their environments.

Explain how different organisms compete with each other for food, water, and shelter.

Show how environmental changes affect living things.

Explain what it means for an animal to be endangered.

Explain how scientists learn about ancient plants and animals by studying fossils.

Show how present-day organisms are similar to those that lived long ago.

Unit 3-3: Earth and Its Resources

Identify Earth's landforms and the features of the ocean floor.

Describe the layers of Earth.

Describe earthquakes and volcanoes and identify their effects.

Describe the effects of landslides and floods.

Describe and identify the forces that cause weathering and erosion.

Analyze how people change the land.

Compare and contrast properties of minerals.

Describe how three main kinds of rocks form.

Explore soil and identify its components.

Compare and contrast different soils.

Model and describe how fossils form.

List examples of fossil fuels and other sources of energy.

Describe how air and water are used as resources.

Explain reasons and methods for conserving and protecting air and water.

Unit

Unit 3-4: Weather and Space

Objectives

Define weather.

Describe different characteristics of weather.

Infer how condensation occurs and rain forms in the atmosphere.

Describe the water cycle and relate it to weather.

Explain why climate varies from place to place.

Summarize how seasons differ from place to place.

Explain what causes day and night and the seasons.

Describe the sun.

Identify the phases of the moon and explain why the moon seems to change shape.

Describe features of the moon.

Describe our solar system.

Describe the inner and outer planets.

Describe stars and constellations.

Describe why different constellations can be seen during different seasons.

Unit 3-5: Matter

Define matter as anything that has mass and takes up space.

Describe properties of matter and understand that properties can be used to identify matter.

Measure matter using tools that record standard units.

Compare and contrast weight and mass.

Define the three common states of matter: solid, liquid, and gas.

Explain the properties of solids, liquids, and gases.

Measure and record the temperature of water in different states.

Identify the effects of heating and cooling matter.

Define physical changes as those that do not change the identity of a material.

Describe how to make and separate mixtures.

Describe chemical changes.

Understand that chemical changes are part of our everyday life.

Unit

Unit 3-6: Forces and Energy

Objectives

Describe and relate position and motion.

Define speed using distance and time.

Identify a force as a push or a pull.

Define common forces, such as friction, gravity, and magnetism.

Define energy and work.

Discuss the forms of energy and how energy changes from one form to another.

Identify and describe simple machines, and apply their use to real-world tasks.

Define what a compound machine is and give several examples.

Describe how heat moves.

Compare insulators and conductors.

Describe how vibrations produce sounds.

Compare the pitch and volume of a sound.

Explore how light travels.

Describe how colors are seen.

Describe electrical charge.

Identify the parts of a circuit.

Unit 3-7: Human Body Systems

Discuss the functions of the skeletal system.

Discuss the functions of the muscular system.

Discuss the function of the circulatory system.

Discuss the function of the respiratory system.

Discuss the function of the digestive system.

Discuss the function of the excretory system.

Discuss the function of the nervous system.

Discuss the function of the immune system.

Unit 3-8: Healthy Living

Discuss the importance of nutrients in staying healthy.

Explain the value of My Pyramid.

Grade 4 students will be able to...

Unit

Unit 4-1: The Scientific Method

Objectives

When conducting science investigations, ask and answer questions that will help decide the general areas of science being addressed.

When faced with a science-related problem, decide what evidence, models, or explanations previously studied can be used to better understand what is happening now.

When investigating a science-related problem, decide what data can be collected to determine the most useful explanations.

When studying science-related problems, decide which of the science themes are important.

When studying a science-related problem, decide what changes over time are occurring or have occurred.

Use the vocabulary of the unifying themes to ask questions about objects, organisms, and events being studied.

Use the science content being learned to ask questions, plan investigations, make observations, make predictions, and offer explanations.

Select multiple sources of information to help answer questions selected for classroom investigations.

Use simple science equipment safely and effectively, including rulers, balances, graduated cylinders, hand lenses, thermometers, and computers, to collect data relevant to questions and investigations.

Use data they have collected to develop explanations and answer questions generated by investigations.

Communicate the results of their investigations in ways their audiences will understand by using charts, graphs, drawings, written descriptions, and various other means, to display their answers.

Support their conclusions with logical arguments.

Ask additional questions that might help focus or further an investigation.

Unit

Unit 4-2: Properties of Earth Materials

Objectives

Understand that objects are made of more than one substance, by observing, describing and measuring the properties of earth materials, including properties of size, weight, shape, color, temperature, and the ability to react with other substances. Group and/or classify objects and substances based on the properties of earth materials.

Understand that substances can exist in different states-solid, liquid, gas.

Observe and describe changes in form, temperature, color, speed, and direction of objects and construct explanations for the changes.

Construct simple models of what is happening to materials and substances undergoing change, using simple instruments or tools to aid observations and collect data.

Unit 4-3: Position and Motion of Objects

Observe and describe physical events in objects at rest or in motion.

Observe and describe physical events involving objects and develop record-keeping systems to follow these events by measuring and describing changes in their properties, including position relative to another object, motion over time, and position due to forces.

Unit 4-4: Light, Heat, Electricity, and Magnetism

Ask questions and make observations to discover the differences between substances that can be touched (matter) and substances that cannot be touched (forms of energy, light, heat, electricity, sound, and magnetism).

Unit 4-5: The Characteristics of Organisms

Discover how each organism meets its basic needs for water, nutrients, protection, and energy in order to survive.

Investigate how organisms, especially plants, respond to both internal cues (the need for water) and external cues (changes in the environment).

Unit 4-6: Life Cycles of Organisms

Illustrate the different ways that organisms grow through life stages and survive to produce new members of their type.

Unit

Unit 4-7: Organisms and Their Environment

Objectives

Using the science themes, develop explanations for the connections among living and non-living things in various environments.
Identify the technology used by someone employed in a job or position in Wisconsin and explain how the technology helps.
Discover what changes in technology have occurred in a career chosen by a parent, grandparent, or an adult friend over a long period of time.
Determine what science discoveries have led to changes in technologies that are being used in the workplace by someone employed locally.
Identify the combinations of simple machines in a device used in the home, the workplace, or elsewhere in the community, to make or repair things, or to move goods or people.
Ask questions to find answers about how devices and machines were invented and produced.

Grade 5 students will be able to...

Unit

Unit 5-1: Cells and Kingdoms

Objectives

Describe and explain how they are organized in living things.
Compare and contrast the structures of animal cells and plant cells.
Describe kingdom and species.
Describe organisms in the six kingdoms.
Discuss the process by which leaves carry out photosynthesis.
Describe the structure and function of roots, stems, and leaves.
Define invertebrates; describe invertebrate groups.
Define vertebrates; describe the major vertebrate groups.
Summarize the functions of animal systems.
Describe how the body systems work together to perform life functions.

Unit

Unit 5-2: Parents and Offspring

Objectives

Explain sexual and asexual reproduction.
Compare and contrast sexual and asexual reproduction.
Describe the life cycles of mosses and ferns.
Learn about the angiosperm life cycle.
Understand the conifer life cycle.
Define complete and incomplete metamorphosis.
Discuss fertilization and explain how the processes of external and internal fertilization work.
Describe how traits are passed from one generation to the next.
Explain dominant and recessive traits.

Unit 5-3: Interactions in Ecosystems

Explain ecosystems, communities, and populations.
Describe how food chains, food webs, and energy pyramids work.
Explain how populations compete and are limited by the resources they need.
Define habitat, niche, symbiosis, commensalism, mutualism, and parasitism.
Explain structural and behavioral adaptations.
Describe plant and animal adaptations including camouflage and mimicry.

Unit 5-4: Ecosystems and Biomes

List the steps in the water carbon, and nitrogen cycles and explain their importance.
Explain how recycling and composting benefit the ecosystem.
Analyze how changes in ecosystems can cause extinction.
Describe the natural and human-cause changes in ecosystems.
Describe harsh climate biomes: desert, tundra, and taiga.
Describe the biomes of forests and grasslands.
Understand how oceans get salty.
Describe freshwater, ocean, and estuary ecosystems.

Unit 5-5: The Dynamic Earth

Classify Earth's physical features including landforms and features of the ocean floor.
Define Earth's layers.
Discuss how the theory of plate tectonics explains continental drift.
Identify the processes that produce different kinds of mountains.

Unit

Unit 5-5: The Dynamic Earth (cont.)

Objectives

Explain why a volcano erupts.
Describe how volcanoes build land.
Discuss the causes of earthquakes.
Describe how earthquakes are detected.
Describe weathering.
Discuss the relationship between erosion and deposition.

Unit 5-6: Protecting Earth's Resources

Compare and contrast igneous, sedimentary, and metamorphic rocks.
Trace the pathways of the rock cycle.
Describe how soil is formed and kinds of soils.
Understand how soil used and polluted.
Identify and compare types of fossils.
Discuss and identify renewable and nonrenewable energy resources, including fossil fuels.
Explain why air and water are resources.
Describe important ideas about the pollution and conservation of air and water.

Unit 5-7: Weather Patterns

Explain how Earth's shape and tilt affect temperatures and winds.
Describe how global and local winds form.
Explain how clouds and precipitation form.
Summarize how air masses and fronts affect the weather.
Summarize the different kinds of severe storms.
Explain how severe storms form.
Explain what determines an area's climate.
Summarize the factors that affect climate.

Unit 5-8: Earth and Sun

Describe the movements of Earth and the Sun.
Explain how Earth's movements cause the seasons and day and night.
Describe the features of the Moon, and identify and relative positions of the Moon, Earth, and the Sun that produce each of the Moon's major phases.
Explain how eclipses and tides occur.

Unit

Unit 5-8: Earth and Sun (cont.)

Objectives

Describe the planets and some of their major features, as well as asteroids, meteors, and comets.

Describe how humans have explored the solar system.

Learn about the cycles, colors, and sizes of stars.

Identify star systems and learn about the big bang theory.

Unit 5-9: Comparing Kinds of Matter

Describe matter and the three states of matter; solid, liquid, and gas.

Measure and calculate density as mass divided by volume.

Explain the structure of matter, elements, and atoms.

Describe common elements and their properties.

Name the parts of an atom.

Describe the properties of metals, nonmetals, and metalloids.

Determine whether an element is a metal, nonmetal, or metalloid.

Unit 5-10: Physical and Chemical Changes

Learn that changes of state occur at distinct temperatures or points.

Predict whether an object will expand or contract based on a change in temperature.

Identify different kinds of mixtures and their parts.

Understand methods of separating mixtures.

Find that compounds are made of two or more elements and have different properties than their component elements.

Learn common signs of chemical change.

Describe the properties of acids and bases, and find out how indicators work with them.

Learn how salts are formed.

Unit 5-11: Using Forces

Understand the relationship between position, motion, velocity, and acceleration.

Calculate velocity and acceleration.

Learn about balanced and unbalanced forces.

Understand how gravity and friction affect motion.

Learn how to apply Newton's three laws of motion.

Define work and energy.

Unit

Unit 5-11: Using Forces (cont.)

Objectives

Understand how work and energy are related.

Identify the six types of simple machines.

Calculate the output force and output distance for a given effort force and effort distance.

Unit 5-12: Using Energy

Learn the difference between heat and temperature.

Find out how heat is transferred by conduction, convection, and radiation.

Find out how a sound wave travels and how echolocation works.

Learn the parts of a wave: frequency, pitch, and volume.

Learn that light is a wave and a particle.

Recognize that light can be reflected and bent, and that it has wavelengths and colors.

Understand static electricity and the attraction between charged objects.

Describe the different types of electric circuits.

Explain how magnetism works and how electromagnets work and are used.

Describe how generators produce electricity.

Grade 6 students will be able to...

Unit

Unit 6-1

Objectives

Classify different living organisms

Explain the scientific system used for classifying organisms.

Describe the processes of plant reproduction.

Trace the life cycles of different plants.

Summarize the characteristics of invertebrates.

Identify the structure and function of organ systems in animals.

Compare the organ systems of vertebrates and invertebrates.

Identify and describe plant adaptations.

Describe how animals are adapted for their surroundings.

Unit

Unit 6-2

Objectives

Understand that cells are the basic units that make up all living organisms.
Explain how cells, tissues, organs, and organ systems work to perform basic life functions.
Distinguish between plant and animal cells.
Discuss photosynthesis and respiration in cells.
Summarize the cell cycle.
Compare the ways that organisms reproduce.
Compare different types of microorganisms.
Explain how microorganisms live and reproduce.

Unit 6-3

Compare dominant and recessive traits.
Summarize the importance of Mendel's work.
Explain how the sex of an offspring is determined.
Summarize how a pedigree shows patterns of inheritance.
Explain the structure of a DNA molecule.
Summarize the process of genetic engineering.
Explain how variations help animals survive over time.
Summarize the process of natural selection.

Unit 6-4

Describe how abiotic factors cycle in an ecosystem.
Explain symbiosis, and give examples of parasitism, mutualism, and commensalism.
Compare the roles of producers, consumers, and decomposers.
Describe how energy is transferred in food chains and food webs.
Explain how climate affects organisms that live in a biome.
Compare climate conditions that determine biomes.
Summarize changes in ecosystems caused by humans and nature.
Describe evidence that shows how environments have changed over time.

Unit 6-5

Describe the layers that make up Earth.
Explain how to use latitude and longitude.
Discuss evidence for continental drift and plate tectonics.

Unit

Unit 6-5

Objectives

Explain seafloor spreading.
Identify types of landforms and the processes that form them.
Describe what happens when an earthquake occurs.
Describe the two main types of weathering.
Summarize how soil is formed and why it is important.
Distinguish between relative age and absolute age.
Discuss the future of Earth's life and geologic structures.

Unit 6-6

Identify minerals by their properties.
Discuss the formation of igneous, sedimentary, and metamorphic rocks.
Summarize the importance of air.
Describe the water cycle.
Compare renewable and nonrenewable resources.
Describe how human activities affect the environment.
Describe practices used to conserve Earth's land, water, and air.
Discuss alternative energy sources and methods of reducing pollution from fossil fuels.

Unit 6-7

Describe what weather is, what affects it, and where it occurs.
Explain the connection between air pressure and wind.
Explore how the water cycle drives weather.
Discuss the conditions that favor thunderstorms and tornadoes.
Describe high- and low-pressure systems and the weather associated with each.
Explain how technology is used to study weather.
Define climate in terms of temperature and precipitation.
Describe the factors that affect climate.

Unit 6-8

Model some of the ways in which scientists observe the planets.
Relate evidence that Earth rotates, and define revolution.
Investigate how the interaction of Earth, the Moon, and the Sun causes lunar phases.
Describe conditions that produce lunar and solar eclipses.

Unit

Unit 6-8 (cont.)

Objectives

Demonstrate how to identify a planet by observing its movement against the background stars.

Explain that the solar system consists of many bodies held together by gravity.

Define some of the properties of stars.

Compare the evolutionary paths of star types.

Classify galaxies according to their properties.

Explain the big bang and the way in which Earth and its atmosphere were formed.

Unit 6-9

Measure the density of a given substance.

Classify the different states of matter.

Compare protons, neutrons, and electrons.

Compare atoms, molecules, elements, and compounds.

Explain boiling point and melting point.

Understand the relation of temperature, pressure, and volume.

Classify different types of mixtures.

Explain solutions and solubility.

Unit 6-10

Describe three types of chemical reactions.

Compare exothermic and endothermic reactions.

Describe the periodic table.

Explain how to test for acids or bases.

Discuss the uses of organic compounds.

Describe organic compounds in foods.

Compare nuclear fission and nuclear fusion.

Explain how radioactivity can be used.

Unit 6-11

Explain that motion can be described by position, direction, and speed.

Summarize how forces affect motion.

Describe how force and mass affect an object's acceleration.

Explain that a gravitational force pulls objects toward Earth's center.

Calculate work and explain its formula.

Unit

Unit 6-11 (cont.)

Objectives

Compare and illustrate the ways in which energy can be transformed.
Describe types of simple machines.
Identify types of levers.

Unit 6-12

Explain how wave motion is quantified and measured.
Describe how sound energy is transferred.
Explain the way in which light travels.
Describe how light acts with mirrors and lenses.
Explain that an object's color depends on the colors of light it absorbs and reflects.
Describe the electromagnetic spectrum.
Explain the difference between heat and the temperature.
Compare how thermal (heat) energy can be transferred by conduction, convection, and radiation.
Describe electricity and identify the roles that static electricity and current electricity play.
Describe electromagnets and electromagnetism in the context of their utility in society.

Grade 7-8 students will be able to...

Content Area

Structure and Properties of Matter

Objectives

Develop models to describe the atomic composition of simple molecules and extended structures.
Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

Chemical Reactions

Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

Content Area

Chemical Reactions (cont.)

Objectives

Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

Forces and Interactions

Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.

Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.

Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

Energy

Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.

Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

Waves and Electromagnetic Radiation

Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

Content Area

Waves and Electromagnetic Radiation
(cont.)

Objectives

Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.

Structure, Function, and Information
Processing

Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.
Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

Growth, Development, and
Reproduction of Organisms

Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.
Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

Matter and Energy in Organisms and
Ecosystems

Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

Content Area

Matter and Energy in Organisms and Ecosystems (cont.)

Interdependent Relationships in Ecosystems

Natural Selection and Adaptations

Note that this content is to be taught for the purpose of high school preparedness, but is to be presented from the Christian perspective and contrasted to the truth of the Creation account in the book of Genesis.

Objectives

Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.

Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.

Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

Content Area

Space Systems

Objectives

Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.

Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

Analyze and interpret data to determine scale properties of objects in the solar system.

History of Earth

See note on the Natural Selection and Adaptations content area, above.

Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.

Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales

Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.

Earth's Systems

Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity

Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

Weather and Climate

Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.

Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Content Area

Human Impacts

Objectives

Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Engineering Design

Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.