



Fox Valley Lutheran Schools

Christian Child Care & Education for Pre-K - 12th Grade

K-8 Science Curriculum 2019

FVL Schools Partners

Appleton:

*Mount Olive Lutheran School
Riverview Lutheran School
St. Paul Lutheran School
St. Peter Lutheran School*

Brillion:

Trinity Lutheran School

Fremont (East Bloomfield):

St. John Lutheran School

Green Bay:

*St. Mark Lutheran School
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Greenville:

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Greenleaf:

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*Martin Luther School
Trinity Lutheran School*

New London:

Emanuel Lutheran School

Oshkosh:

Martin Luther School

Weyauwega:

St. Peter Lutheran School

Philosophy of Science Curriculum

Students in FVL Schools know and believe that God created a working, perfect universe including the earth system in six twenty-four hour days and understand that God still preserves it today. This one absolute truth is the unifying connection between all science standards. Students in FVL Schools will understand that science is ongoing and inventive, and that scientific understandings have changed over time as new evidence is found. Students will also understand that while scientific understandings may change over time, God's Word is changeless. When studying a science-related problem, FVL Schools students will apply God's truths. They will predict future events or changes in the natural world, realizing that we are the caretakers of God's universe. They will state what they have learned from investigations, relating their inferences to Christian faith and scientific knowledge, and to the data they have collected. FVL Schools students will realize that the more they learn about science, the better they will understand God's universal organization. Students will understand science better when they connect and integrate the understandings and skills, found in the FVL Schools K-8 Science Curriculum Guide into what they know about themselves, their faith, and the world around them.

The 2019 FVL Schools K-8 Science Curriculum Guide are based on the Next Generation Science Standards (2013), a set of science standards adopted by many states of the U.S.A., and also the Wisconsin Standards for Science (2017), a set of standards that are based on the Next Generation Science Standards adopted by the state of Wisconsin. When portions of NGSS violated truths of Scripture, they were revised or explained so that they are consistent with our approach to scientific skills and truths as described above.

Exit Goals for Graduation

By the end of eighth grade all FVL Schools students will be able to:

PHYSICAL SCIENCE

1. Develop a model to describe the **atomic composition** (relating to the periodic table of elements) of simple molecules and extended structures to predict results of chemical and physical changes and to explain how the total number of atoms does not change and thus mass is conserved.
2. Plan and carry out investigations to provide evidence that changes in an object's **motion** depend on the sum of the **forces** (gravitational, normal, tension, electric, magnetic) on the object, the mass of the object, and transfers of momentum from collisions and/or transfers of energy.
3. Develop a model that predicts and describes the relationships among the **energy transferred** to or from an object and the average kinetic energy of the object and its particles by the changes in motion and/or the state of matter.

4. Analyze and interpret data to describe how the characteristics (speed, frequency, wavelength, amplitude) of **waves** (light, sound, mechanical) are reflected, absorbed or transmitted through various materials to transmit energy and information.

EARTH SCIENCE

1. Use a mental model (deeply ingrained assumptions, generalizations or even pictures or images that influence how we understand the world and how we take action) of the **motion of the sun, Earth and moon** to explain seasons and eclipses.
2. Analyze and interpret data to explain how **water** influences weather, circulates in the ocean and shapes the Earth's surface.
3. Obtain, evaluate and communicate information regarding the ways in which **human activities impact Earth's systems and resources** (land, energy, minerals and water).

LIFE SCIENCE

1. Develop and use models to understand the structure and function of **cells, organs, tissues, organ systems, and whole organisms**.
2. Construct explanations for the **change in genetic materials** between generations of organisms.
3. Analyze and interpret data to provide evidence for the **effects of resource availability on the interactions of organisms with each other and the environment**.

INQUIRY ATTAINMENT TARGETS (Student Can Statements)

1. I can describe how experimental evidence and creative thinking have been combined to provide a scientific explanation.
2. I can choose an appropriate way to answer a scientific question.
3. I can select from a range of sources of information.
4. I can identify key factors in a fair test investigation.
5. I can make predictions using scientific knowledge and understanding
6. I can choose apparatus for a range of tasks and plan to use it effectively.
7. I can make a series of observations, comparisons or measurements with accuracy.
8. I can repeat observations and measurements, then offer simple explanations for any differences.
9. I can record observations and measurements systematically and, where appropriate, present data as line graphs.
10. I can draw conclusions linked to the evidence and am beginning to relate these to my scientific knowledge and understanding.
11. I can make practical suggestions about how my working methods could be improved.
12. I can use scientific language and conventions to share collected data.

Grade Level Measurable Objectives

The measurable objectives have been divided into both the domains of science and grade level categories in order to provide continuity regardless of student enrollment and grade level combinations. Each domain of science is introduced with spiritual goals in order to clearly reflect the rich and well-rounded curriculum that is strongly rooted in God's Word. When applicable, the objectives also refer to the coinciding state and/or national standards.

Physical Science

Spiritual Goals:

Students in FVL Schools will demonstrate an understanding of the order in God's physical creation. They will understand physical and chemical properties of matter, the storage modes of energy, and the ways in which matter and energy interact. God is a God of order, which he displays in all parts of his creation. Knowledge of this order and the systems which govern this order is basic to the study of all sciences.

Academic Goals:

Primary Grades (Kindergarten - 2nd Grade)

Kindergarten

- Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object. (K-PS2-1 Motion and Stability: Forces and Interactions)
- Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull. (K-PS2-2 Motion and Stability: Forces and Interactions)
- Make observations to determine the effect of sunlight on Earth's surface. (K-PS3-1 Energy)
- Use tools and materials provided to design and build a structure that will reduce the warming effect of sunlight on Earth's surface. (K-PS3-2 Energy)

1st Grade

- Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. (1-PS4-1 Waves and Their Applications in Technologies for Information Transfer)

- Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. (1-PS4-2 Waves and Their Applications in Technologies for Information Transfer)
- Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light. (1-PS4-3 Waves and Their Applications in Technologies for Information Transfer)
- Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. (1-PS4-4 Waves and Their Applications in Technologies for Information Transfer)

2nd Grade

- Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. (2-PS1-1 Matter and Its Interactions)
- Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. (2-PS1-2 Matter and Its Interactions)
- Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. (2-PS1-3 Matter and Its Interactions)
- Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. (2-PS1-4 Matter and Its Interactions)

Elementary Grades (3rd - 5th Grade)

3rd Grade

- Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. (3-PS2-1 Motion and Stability: Forces and Interactions)
- Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. (3-PS2-2 Motion and Stability: Forces and Interactions)
- Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. (3-PS2-3 Motion and Stability: Forces and Interactions)
- Define a simple design problem that can be solved by applying scientific ideas about magnets. (3-PS2-4 Motion and Stability: Forces and Interactions)

4th Grade

- Use evidence to construct an explanation relating the speed of an object to the energy of that object. (4-PS3-1 Energy)

- Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. (4-PS3-2 Energy)
- Ask questions and predict outcomes about the changes in energy that occur when objects collide. (4-PS3-3 Energy)
- Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. (4-PS3-4 Energy)
- Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. (4-PS4-1 Waves and Their Applications in Technologies for Information Transfer)
- Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. (4-PS4-2 Waves and Their Applications in Technologies for Information Transfer)
- Generate and compare multiple solutions that use patterns to transfer information. (4-PS4-3 Waves and Their Applications in Technologies for Information Transfer)

5th Grade

- Develop a model to describe that matter is made of particles too small to be seen. (5-PS1-1 Matter and Its Interactions)
- Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. (5-PS1-2 Matter and Its Interactions)
- Make observations and measurements to identify materials based on their properties. (5-PS1-3 Matter and Its Interactions)
- Conduct an investigation to determine whether the mixing of two or more substances results in new substances. (5-PS1-4 Matter and Its Interactions)
- Support an argument that the gravitational force exerted by Earth on objects is directed down. (5-PS2-1 Motion and Stability: Forces and Interactions)
- Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. (5-PS3-1 Energy)

Middle School (6th - 8th Grade)

6th Grade

- 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. (MS-PS1-4 Matter and its Interactions)
- 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. (MS-PS2-2 Motion and Stability: Forces and Interactions)
- Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. (MS-PS2-3 Motion and Stability: Forces and Interactions)

- 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. (MS-PS2-5 Motion and Stability: Forces and Interactions)
- 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. (MS-PS3-2 Energy)
- Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. (MS-PS3-3 Energy)
- 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. (MS-PS3-4 Energy)
- Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. (MS-PS3-5 Energy)

7th Grade

- Develop models to describe the atomic composition of simple molecules and extended structures. (MS-PS1-1 Matter and its Interactions)
- Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. (MS-PS1-2 Matter and its Interactions)
- Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. (MS-PS1-3 Matter and its Interactions)
- 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. (MS-PS1-4 Matter and its Interactions)
- 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. (MS-PS1-5 Matter and its Interactions)
- Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes. (MS-PS1-5 Matter and its Interactions)
- Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. (MS-PS3-3 Energy)
- 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. (MS-PS3-4 Energy)
- Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. (MS-PS3-5 Energy)

8th Grade

- Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. (MS-PS2-1 Motion and Stability: Forces and Interactions)

- 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. (MS-PS2-2 Motion and Stability: Forces and Interactions)
- Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. (MS-PS2-4 Motion and Stability: Forces and Interactions)
- 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. (MS-PS3-1 Energy)
- 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. (MS-PS3-2 Energy)
- Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. (MS-PS3-5 Energy)
- 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. (MS-PS4-1 Waves and their Applications in Technologies for Information Transfer)
- Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. (MS-PS4-2 Waves and their Applications in Technologies for Information Transfer)
- 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. (MS-PS4-2 Waves and their Applications in Technologies for Information Transfer)

Life Science

Spiritual Goals:

Students in FVL Schools will understand the unity of structure and function in all of God's created beings. They will demonstrate an understanding of the characteristics and structures of living things, the processes of life, and how living things interact with one another and their environment. They will enhance their natural curiosity about living things and their environment through the study of the structure and function of living things, ecosystems, life cycles, energy movement, energy change, and changes in populations through natural selection. Students will appreciate the design of organisms by an all-powerful Creator. Understanding similar structures and processes in different organisms will demonstrate the unity of this design. The study of interactions between and among organisms and their environment will yield a special appreciation for and stimulate informed choices regarding the role of all of God's created things. Finally, FVLHS students will recognize the vast responsibility that God has placed upon them as the crown of his creation to properly manage his creation and exercise stewardship regarding it.

Academic Goals:

Primary Grades (Kindergarten - 2nd Grade)

Kindergarten

- Use observations to describe patterns of what plants and animals (including humans) need to survive. (K-LS1-1 From Molecules to Organisms: Structures and Processes)

1st Grade

- Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. (1-LS1-1 From Molecules to Organisms: Structures and Processes)
- Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. (1-LS1-2 From Molecules to Organisms: Structures and Processes)
- Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. (1-LS3-1 Heredity: Inheritance and Variation of Traits)

2nd Grade

- Plan and conduct an investigation to determine if plants need sunlight and water to grow. (2-LS2-1 Ecosystems: Interactions, Energy, and Dynamics)

- Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants. (2-LS2-2 Ecosystems: Interactions, Energy, and Dynamics)
- Make observations of plants and animals to compare the diversity of life in different habitats. (2-LS4-1 Biological Evolution: Unity and Diversity)

Elementary Grades (3rd - 5th Grade)

3rd Grade

- Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. (3-LS1-1 From molecules to Organisms: Structures and Processes)
- Construct an argument that some animals form groups that help members survive. (3-LS2-1 Ecosystems: Interactions, Energy, and Dynamics)
- Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. (3-LS3-1 Heredity: Inheritance and Variation of Traits)
- Use evidence to support the explanation that traits can be influenced by the environment. (3-LS3-2 Heredity: Inheritance and Variation of Traits)
- Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. (3-LS4-1 Biological Evolution: Unity and Diversity)
- Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. (3-LS4-2 Biological Evolution: Unity and Diversity)
- Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. (3-LS4-3 Biological Evolution: Unity and Diversity)
- Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. (3-LS4-4 Biological Evolution: Unity and Diversity)

4th Grade

- Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. (4-LS1-1 From Molecules to Organisms: Structures and Processes)
- Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. (4-LS1-2 From Molecules to Organisms: Structures and Processes)

5th Grade

- Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. (5-PS3-1 Energy)
- Support an argument that plants get the materials they need for growth chiefly from air and water. (5-LS1-1 From Molecules to Organisms: Structures and Processes)
- Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. (5-LS2-1 Ecosystems: Interactions, Energy, and Dynamics)

Middle School (6th - 8th Grade)

6th Grade

- Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. (MS-LS1-1 From Molecules to Organisms: Structures and Processes)
- Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. (MS-LS1-2 From Molecules to Organisms: Structures and Processes)
- Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. (MS-LS1-3 From Molecules to Organisms: Structures and Processes)
- 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. (MS-LS1-4 From Molecules to Organisms: Structures and Processes)
- Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. (MS-LS1-5 From Molecules to Organisms: Structures and Processes)
- 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. (MS-LS3-2 Heredity: Inheritance and Variation of Traits)

7th Grade

- 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. (MS-LS1-6 From Molecules to Organisms: Structures and Processes)
- 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. (MS-LS1-7 From Molecules to Organisms: Structures and Processes)

- Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. (MS-LS2-1 Ecosystems: Interactions, Energy, and Dynamics)
- Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. (MS-LS2-2 Ecosystems: Interactions, Energy, and Dynamics)
- Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. (MS-LS2-3 Ecosystems: Interactions, Energy, and Dynamics)
- Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. (MS-LS2-4 Ecosystems: Interactions, Energy, and Dynamics)
- Evaluate competing design solutions for maintaining biodiversity and ecosystem services. (MS-LS2-5 Ecosystems: Interactions, Energy, and Dynamics)
- 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. (MS-LS4-1 Biological Evolution: Unity and Diversity)

8th Grade

- Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. (MS-LS1-3 From Molecules to Organisms: Structures and Processes)
- 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. (MS-LS1-7 From Molecules to Organisms: Structures and Processes)
- Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. (MS-LS1-8 From Molecules to Organisms: Structures and Processes)
- 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. (MS-LS3-1 Heredity: Inheritance and Variation of Traits)
- 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. (MS-LS3-2 Heredity: Inheritance and Variation of Traits)
- 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. (MS-LS4-1 Biological Evolution: Unity and Diversity)

- 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. (MS-LS4-2 Biological Evolution: Unity and Diversity)
- 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. (MS-LS4-3 Biological Evolution: Unity and Diversity)
- 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. (MS-LS4-4 Biological Evolution: Unity and Diversity)
- Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. (MS-LS4-5 Biological Evolution: Unity and Diversity)
- Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. (MS-LS4-6 Biological Evolution: Unity and Diversity)

Earth & Space Science

Spiritual Goals:

Students in FVL Schools will demonstrate an understanding of the structure and systems of the Earth and other bodies in the universe and their interactions.

By studying the Earth, its composition, history from creation, and the processes that continue to shape it, students gain a better understanding of the planet on which they live. In addition, all bodies in space: including the Earth, are influenced by forces acting throughout the solar system and the universe. Studying the universe and understanding geologic, oceanographic, meteorological, and astronomical processes give the students a greater knowledge and appreciation of the universe around them. FVLHS students will describe God's power over nature as described in the Bible, comprehend that God created a working universe including the earth system in six twenty-four hour days and understand that God still preserves it today. They will contrast the theories of the evolution of the universe and evaluate them in the light of Scripture.

Academic Goals:

Primary Grades (Kindergarten - 2nd Grade)

Kindergarten

- Use and share observations of local weather conditions to describe patterns over time. (K-ESS2-1 Earth's Systems)
- Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. (K-ESS2-2 Earth's Systems)
- Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live. (K-ESS3-1 Earth and Human Activity)
- Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather. (K-ESS3-2 Earth and Human Activity)
- Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment. (K-ESS3-3 Earth and Human Activity)

1st Grade

- Use observations of the sun, moon, and stars to describe patterns that can be predicted. (1-ESS1-1 Earth's Place in the Universe)
- Make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2 Earth's Place in the Universe)

2nd Grade

- Use information from several sources to provide evidence that Earth events can occur quickly or slowly. (2-ESS1-1 Earth's Place in the Universe)
- Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. (2-ESS2-1 Earth's Systems)
- Develop a model to represent the shapes and kinds of land and bodies of water in an area. (2-ESS2-2 Earth's Systems)
- Obtain information to identify where water is found on Earth and that it can be solid or liquid. (2-ESS2-3 Earth's Systems)

Elementary Grades (3rd - 5th Grade)

3rd Grade

- Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. (3-ESS2-1 Earth's Systems)
- Obtain and combine information to describe climates in different regions of the world. (3-ESS2-2 Earth's Systems)
- Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard. (3-ESS3-1 Earth and Human Activity)

4th Grade

- Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. (4-ESS1-1 Earth's Place in the Universe)
- Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. (4-ESS2-1 Earth's Systems)
- Analyze and interpret data from maps to describe patterns of Earth's features. (4-ESS2-2 Earth's Systems)
- Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. (4-ESS3-1 Earth and Human Activity)
- Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. (4-ESS3-2 Earth and Human Activity)

5th Grade

- Support an argument that the apparent brightness of the sun and stars is due to their relative distances from the Earth. (5-ESS1-1 Earth's Place in the Universe)

- Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. (5-ESS1-2 Earth's Place in the Universe)
- Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. (5-ESS2-1 Earth's Systems)
- Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. (5-ESS2-2 Earth's Systems)
- Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. (5-ESS3-1 Earth and Human Activity)

Middle School (6th - 8th Grade)

6th Grade

- 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. (MS-ESS1-1 Earth's Place in the Universe)
- Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. (MS-ESS2-4 Earth's Systems)
- Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. (MS-ESS2-5 Earth's Systems)
- 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. (MS-ESS2-6 Earth's Systems)
- Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. (MS-ESS3-2 Earth and Human Activity)
- Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. (MS-ESS3-3 Earth and Human Activity)
- Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. (MS-ESS3-4 Earth and Human Activity)
- Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. (MS-ESS3-5 Earth and Human Activity)

7th Grade

- 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. (MS-ESS1-4 Earth's Place in the Universe)

- Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. (MS-ESS2-1 Earth's Systems)
- Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. (MS-ESS2-2 Earth's Systems)
- Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. (MS-ESS2-3 Earth's Systems)
- 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. (MS-ESS3-1 Earth and Human Activity)
- Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. (MS-ESS3-2 Earth and Human Activity)
- Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. (MS-ESS3-3 Earth and Human Activity)
- Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. (MS-ESS3-4 Earth and Human Activity)
- Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. (MS-ESS3-5 Earth and Human Activity)

8th Grade

- 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. (MS-ESS1-1 Earth's Place in the Universe)
- Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. (MS-ESS1-2 Earth's Place in the Universe)
- Analyze and interpret data to determine scale properties of objects in the solar system. (MS-ESS1-3 Earth's Place in the Universe)
- Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. (MS-ESS2-2 Earth's Systems)
- Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. (MS-ESS3-3 Earth and Human Activity)
- Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. (MS-ESS3-4 Earth and Human Activity)

Science Application & Engineering

Spiritual Goals:

Students in FVL Schools will demonstrate an understanding of the relationship between science and technology and the ways in which that relationship influences human activities. Science and technology complement each other. Science helps drive technology and technology provides science with tools for investigations, inquiry, and analysis. Together, science and technology applications provide solutions to human problems, needs, and aspirations. Students should understand that God has blessed our lives with advances in science and technology. FVLHS students will evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of a problem FVLHS students will also describe how major scientific and technological changes have impacted work, leisure, and the home and are blessings from God.

Academic Goals:

Primary Grades (Kindergarten - 2nd Grade)

- Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1 Engineering Design)
- Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2 Engineering Design)
- Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. (K-2-ETS1-3 Engineering Design)

Elementary Grades (3rd - 5th Grade)

- Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1 Engineering Design)
- Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (3-5-ETS1-2 Engineering Design)
- Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. (3-5-ETS1-3 Engineering Design)

Middle School (6th - 8th Grade)

- 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. (MS-ETS1-1 Engineering Design)
- Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (MS-ETS1-2 Engineering Design)
- 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. (MS-ETS1-3 Engineering Design)
- 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. (MS-ETS1-4 Engineering Design)

Lesson and Instructional Continuity

Please see the [FVL Schools K-8 Science Pacing Guide by Grade Level](#) for more detail about each instructional unit.

FVL Schools Primary (Kindergarten - 2nd Grade) Science Curricular Units by Topic

Kindergarten	Grade 1	Grade 2
<ul style="list-style-type: none"> • Forces & Interactions: Pushes & Pulls • Interdependent Relationships in Ecosystems: Animals, Plants, & Their Environments • Weather & Climate 	<ul style="list-style-type: none"> • Waves: Light & Sound • Structure, Function, & Information Processing • Space Systems: Patterns & Cycles 	<ul style="list-style-type: none"> • Structure & Properties of Matter • Interdependent Relationships in Ecosystems • Earth's Systems: Processes that Shape the Earth

FVL Schools Elementary (3rd - 5th Grade) Science Curricular Units by Topic

Grade 3	Grade 4	Grade 5
<ul style="list-style-type: none"> • Forces & Interactions • Interdependent Relationships in Ecosystems: Environmental Impacts on Organisms • Inheritance & Variation of Traits: Life Cycles & Traits • Weather & Climate 	<ul style="list-style-type: none"> • Energy • Waves • Structure, Function, & Information Processing • Earth's Systems: Processes that Shape the Earth 	<ul style="list-style-type: none"> • Structures & Properties of Matter • Matter & Energy in Organisms & Ecosystems • Earth's Systems • Space Systems: Stars & the Solar System

FVL Schools Middle School (6th - 8th Grade)
Science Curricular Units by Topic

Grade 6	Grade 7	Grade 8
<ul style="list-style-type: none"> ● Christian Perspective: Earth's Weather & Water ● Forces & Interactions: Electromagnetic Force ● Christian Perspective: Earth's Diversity of Life 	<ul style="list-style-type: none"> ● Interactions of Chemicals ● Christian Perspective: Earth History ● Interdependence of Populations & Ecosystems 	<ul style="list-style-type: none"> ● Gravity & Kinetic Energy ● Waves ● Christian Perspective: Planetary Science ● Human Systems & Interactions ● Christian Perspective: Heredity & Adaptation

Assessments of Academic Growth & Achievement

Primary (Kindergarten - 2nd Grade)

- Teacher questions with student response
- Observations from teacher-guided small group or partner discussion
- Modeling through foldables and science notebooks
- Simple writing activities
- Observations during whole-group lab investigations

Elementary (3rd - 5th Grade)

- Teacher and student questions and dialogue
- Observations from student-led small group or partner discussion
- Modeling through foldables and science notebooks
- Written explanations, applications, and extensions
- Observations during whole group and small group lab investigations

Middle School (6th - 8th Grade)

- Student-led questioning and dialogue

- Observations from student-led small group or partner discussion
- Modeling through science notebooks
- Defining claims and supporting with argumentation
- Written explanations, applications, and extensions
- Observations during small group lab investigations

Evidence of Fundamental Principles of Student Growth

Current Resources Used for Instruction