Lakeshore Lutheran Schools

Science Curriculum Guide

Grade 4

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Science Curriculum Guide

Curriculum Guide Contents for Grade 4

Science Overview and Needs Assessment page 2

Beliefs page 3

- Beliefs about Science
- Beliefs about Learning Science
- Beliefs about Instruction in Science

Definitions page 4

Standards with Objectives page 5

- Earth and Space Science
- Life Science
- Physical Science

*Standards & Benchmarks are adopted from Next Generation Science Standards (NGSS). They were adapted from and with a Christian perspective.

Teacher Resources page 11

Assessment and Evaluation page 12

Science Overview & Needs Assessment

Science Instruction

Supplemental Materials

Needs Assessment.

Beliefs

Beliefs about Science

- Science is the study of the orderliness of God's creation and His work of preservation.
- Science is the study of God's universal laws which demonstrate his omnipotence.
- Science is a human pursuit trying to understand God's world.
- Scientific literacy is rooted in an understanding of mathematics, history, society, and inquiry.
- Scientific inquiry and literacy are crucial in our technological society where scientific inquiry and literacy are employed throughout life.

Beliefs about Learning Science

- Students need to be inquisitive about God's creation around them. They need to ask scientific questions, explore for evidence and explanations to their questions, and connect what they observe to deeper scientific concepts.
- Students need to have knowledge of mathematics and the history of science in various cultures to understand previous accomplishments in science.
- Students need to learn that scientific communication skills - such as reading, writing, and modeling - are essential to the development of science and technology in today's world.

Beliefs about Instruction in Science

- Effective instruction in science will be rooted in the inquiry process that provides hands-on instructional and includes asking specific questions, exploring and experimenting to explain the question and rooting the question in a deeper conceptual framework of the standard.
- Effective instruction in science starts from the earliest grades to develop an innate wonder concerning God's creation.
- Effective instruction in science will embed the development of the skills of science, including the scientific method, into a deep conceptual framework of scientific content provided by standards.

Definitions

Standards

There are two major types of standards:

- **Content Standards** describe the knowledge and skills a student should attain.
- **Curriculum Standards** describe overarching goals or ways in which curriculum should be orchestrated to achieve desired results.

Benchmarks

- Benchmarks are subcomponents of a standard.
- Benchmarks are statements of expected or anticipated skill or understanding at various developmental levels.
- Benchmarks could be identified at all grade levels, but the trend is to set them at a few key levels such as grades 4, 8, and 12 or grades 2, 5, 8, and 12.
- Benchmarks seem to have a lower and an upper limit.
- Benchmarks by contrast do not describe the behavior of students who meet an objective nor do they narrow the description of information and skill to a particular set of conditions.
- A benchmark can be described as an “interval” of levels of generality in the description of information and skills.
- The lower bounds of a benchmark have some identifiable characteristics, the characteristics of the upper bounds are much more vague.

Knowledge

Three types of knowledge are considered in developing curriculum:

- **Declarative knowledge** is comprised of information and is important to a content area; begins with “understands that” or “knows that”
- **Procedural knowledge** is composed of skills and processes; begins with “uses” or “solves” or “predicts”
- **Contextual knowledge** is acquired during the execution of some process; begins with verbs or verb phrases but tends to look more like activities in that a particular skill is described in terms of the information about or upon which the skill is applied.

Some subject areas are more heavily declarative or procedural. Contextual knowledge is not as common.

Science Standards and Objectives (*Adopted from NGSS)
Grade 4

Earth and Space Science	**Notes**
Earth's Place in the Universe	
Construct a claim with evidence that changes to a landscape due to erosion and deposition over long periods of time result in rock layers and landforms that can be interpreted today. Use evidence from a given landscape that includes simple landforms and rock layers to support a claim about the role of erosion or deposition in the formation of the landscape.	
Objectives: ● *Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed.* ● *Earth has changed over time. Understanding how landforms develop, are weathered (broken down into smaller pieces), and erode (get transported elsewhere) can help infer the history of the current landscape.*	
Science Practices: ● *Identify the evidence that supports particular points in an explanation.*	
Earth's Systems	
Make observations and collect data to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering and moved around through erosion by water, ice, wind, and vegetation.	
Analyze and interpret maps of Earth's mountain ranges, deep ocean trenches, and the placement of volcanoes and earthquakes to describe patterns of these features and their locations relative to boundaries between continents and oceans.	
Objectives: ● *Rainfall helps to shape the land and affects the types of*	

living things found in a region. Water, ice, wind, and living organisms break rocks, soils, and sediments into smaller particles and move them around. ● *The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth.*	
Science Practices: ● *Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.* ● *Analyze and interpret data to make sense of phenomena using logical reasoning.*	
Earth and Human Activity	
Obtain information to describe that energy and fuels humans use are derived from natural resources and that some energy and fuel sources are renewable and some are not.	
Evaluate the design of a solution on its potential to reduce the impacts of an earthquake, flood, tsunami or volcanic eruption on humans.	
Objectives: ● *Energy and fuels that humans use are derived from natural sources. Some resources are renewable over time, and others are not.* ● *A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts.*	
Science Practices: ● *Obtain and combine information from books and other reliable media to explain phenomena.* ● *Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.*	
Life Science	**Notes**

From Molecules to Organisms: Structures and Processes	
Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction.	
Objectives: ● *Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.*	
Science Practices: ● *Construct an argument with evidence, data, and/or a model.*	
Physical Science	**Notes**
Energy	
Use evidence to construct an explanation relating the speed of an object to the energy of that object.	
Make observations to show that energy can be transferred from place to place by sound, light, heat, and electric currents.	
Ask questions and predict outcomes about the changes in energy that occur when objects collide.	
Apply scientific principles of energy and motion to test and refine a device that converts motion energy to electrical energy or uses stored energy to cause motion or produce light or sound.	
Objectives: ● *The faster a given object is moving, the more energy it possesses.* ● *Energy can be moved from place to place by moving objects or through sound, light, or electric currents.* ● *Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced.* ● *Light also transfers energy from place to place.* ● *Energy can also be transferred from place to place by*	

electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. ● *When objects collide, the contact forces transfer energy so as to change the objects' motions.* ● *The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use.*	
Science Practices: ● *Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.* ● *Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.* ● *Use evidence (e.g., measurements, observations, patterns) to construct an explanation.* ● *Apply scientific ideas to solve design problems.*	
Waves and their Applications in Technologies for Information Transfer	
Develop a model of a simple wave to communicate that waves: ***a.*** *are regular patterns of motion along which energy travels, and* ***b.*** *can differ in amplitude and wavelength.*	
Develop a model to describe that light must bounce off an object and enter the eye for the object to be seen.	
Develop and compare multiple ways to transfer information through encoding, sending, receiving, and decoding a pattern.	
Objectives: ● *Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; it does not move in the direction of the wave except when the water meets the beach.* ● *An object can be seen when light reflected from its surface enters the eyes.* ● *High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa.*	

Science Practices: ● *Develop a model using an analogy, example, or abstract representation to describe a scientific principle.* ● *Develop a model to describe phenomena.* ● *Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.*	
Engineering Design	
Plan and carry out tests of one or more elements of a model or prototype in which variables are controlled and failure points are considered to identify which elements need to be improved. Apply the results of tests to redesign a model or prototype.	
Evaluate relevant design features that must be considered in building a model or prototype of a solution to a given design problem.	
Objectives: ● *The success of a designed solution is determined by considering the desired features of a solution (criteria).* ● *Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.*	
Science Practices: ● *Use data to evaluate and refine design solutions.* ● *Plan and conduct fair tests in which variables are controlled and the number of trials considered.*	
Technological Systems	
Recognize that technology is any modification of the natural or designed world done to fulfill human needs or wants. These modifications can be improvements to existing technologies or the development of new technologies.	
Describe that technological products or devices are made up of parts. Use sketches or drawings to show how each part of a product or device relates to other parts in the product or device.	
Objectives: ● *Over time, people's needs and wants change, as do their demands for new and improved technologies. Engineers improve existing technologies or develop new ones to*	

increase their benefits (e.g., better artificial limbs), to decrease known risks (e.g., seatbelts in cars), and to meet societal demands (e.g., cell phones). When new technologies become available, they can bring about changes in the way people live and interact with one another.	
Science Practices: ● *Develop and/or use models to describe and/or predict phenomena.*	

TEACHER RESOURCE PAGE
GRADE 4 SCIENCE

Science Textbook:
Copyright:

Supplemental Resources:

Assessment: Tools and Strategies

Introduction:

There are two types of assessment used in education: formative and summative. Formative assessment is used to assist in making instructional decisions and guiding the instructional process. This is an informal assessment that teachers use on a daily basis, providing students with effective and timely feedback, specific to the content learned. Summative assessment is designed to make judgements regarding student achievement at the end of an instruction period or unit.

Formative assessment is assessment *for* learning. Summative assessment is assessment *of* learning.

Formative Assessment: Common Tools and Strategies

Summative Assessment: Common Tools and Strategies