

SVSU LOCAL SCIENCE CURRICULUM GUIDE

FOURTH GRADE

Created using the [Next Generation Science Standard](#)

SVSU Science Grade 4

Fourth [Grade Topics](#)

Earth and Space Sciences-*Space Systems: Patterns and Cycles (SVSU 4th Grade Unit- Earth Systems)*

- 4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.
- 4-ESS2-1. 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-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth's features.
- 4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

Physical Science- *Energy and Waves (SVSU 4th Grade Unit- Waves and Energy)*

- 4-PS3-1. Use evidence to construct an explanation relating the speed of an object to the energy of that object.
- 4-PS3-3. Ask questions and predict outcomes about the changes in energy that occur when objects collide
- 4-PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
- 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
- 4-PS4-1. Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. 4-PS4-3. Generate and compare multiple solutions that use patterns to transfer information.

Life Sciences- *Structure, Function, and Information Processing (SVSU 4th Grade Unit- Structure/ Function)*

- 4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
- 4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
- 4-LS1-2. 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.

Engineering Design (Addressed through SVSU 4th Grade Units)

- 3-5-ETS1-1. 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-ETS1-2. 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-ETS1-3. 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.

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Instructional Focus Areas for Each Topic

<u>Science and Engineering Practices</u>	<u>Disciplinary Core Ideas</u>	<u>Cross Cutting Concepts</u>
Energy Asking Questions and Defining Problems - Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. (4-PS3-3) Planning and Carrying Out Investigations - Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2) Constructing Explanations and Designing Solutions - Use evidence (e.g., measurements, observations, patterns) to construct an explanation. (4-PS3-1) - Apply scientific ideas to solve design problems. (4-PS3-4) Obtaining, Evaluating, and Communicating Information - Obtain and combine information from books and other reliable media to explain phenomena. (4-ESS3-1)	Energy PS3.A: Definitions of Energy - The faster a given object is moving, the more energy it possesses. (4-PS3-1) - Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3) PS3.B: Conservation of Energy and Energy Transfer - 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. (4-PS3-2), (4-PS3-3) - Light also transfers energy from place to place. (4-PS3-2) - 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. (4-PS3-2),(4-PS3-4) PS3.C: Relationship Between Energy and Forces - When objects collide, the contact forces transfer energy so as to change the objects' motions. (4-PS3-3) PS3.D: Energy in Chemical Processes and Everyday Life - The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4) ESS3.A: Natural Resources - Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1)	Energy Energy and Matter - Energy can be transferred in various ways and between objects. (4-PS3-1),(4-PS3-2),(4-PS3-3),(4-PS3-4) Cause and Effect - Cause and effect relationships are routinely identified and used to explain change. (4-ESS3-1) <i>Connections to Engineering, Technology, and Applications of Science</i> Interdependence of Science, Engineering, and Technology - Knowledge of relevant scientific concepts and research findings is important in engineering. (4-ESS3-1) Influence of Engineering, Technology, and Science on Society and the Natural World - Over time, people's needs and wants change, as do their demands for new and improved technologies. (4-ESS3-1) - Engineers improve existing technologies or develop new ones. (4-PS3-4) <i>Connections to Nature of Science</i> Science is a Human Endeavor - Most scientists and engineers work in teams. (4-PS3-4) - Science affects everyday life. (4-PS3-4)

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Earth's Process Planning and Carrying Out Investigations - Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (4-ESS2-1) Analyzing and Interpreting Data - Analyze and interpret data to make sense of phenomena using logical reasoning. (4-ESS2-2) Constructing Explanations and Designing Solutions - Identify the evidence that supports particular points in an explanation. (4-ESS1-1) - Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-ESS3-2)	LS1.D: Information Processing - Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2) Earth's Process ESS1.C: The History of Planet Earth - 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. (4-ESS1-1) ESS2.A: Earth Materials and Systems - Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1) ESS2.B: Plate Tectonics and Large-Scale System Interactions - 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. (4-ESS2-2) ESS2.E: Biogeology - Living things affect the physical characteristics of their regions. (4-ESS2-1) ESS3.B: Natural Hazards - 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. (4-ESS3-2) (Note: This Disciplinary Core Idea can also be found in 3.WC.) ETS1.B: Designing Solutions to Engineering Problems - Testing a solution involves investigating how well it performs under a range of likely conditions. (secondary to 4-ESS3-2)	- A system can be described in terms of its components and their interactions. (4-LS1-1),(4-LS1-2) Earth's Process Patterns - Patterns can be used as evidence to support an explanation. (4-ESS1-1),(4-ESS2-2) Cause and Effect - Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS2-1),(4-ESS3-2) <i>Connections to Engineering, Technology, and Applications of Science</i> Influence of Engineering, Technology, and Science on Society and the Natural World - Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands. (4-ESS3-2) <i>Connections to Nature of Science</i> Scientific Knowledge Assumes an Order and Consistency in Natural Systems - Science assumes consistent patterns in natural systems. (4-ESS1-1)
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Engineering Design Asking Questions and Defining Problems - Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1) Planning and Carrying Out Investigations - Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3) Constructing Explanations and Designing Solutions - Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)	Engineering Design ETS1.A: Defining and Delimiting Engineering Problems - Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1) ETS1.B: Developing Possible Solutions - Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2) - At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2) - Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3) ETS1.C: Optimizing the Design Solution - Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)	Engineering Design Influence of Science, Engineering, and Technology on Society and the Natural World - People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1) - Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)
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