



Shakopee Area Catholic School
Science Standards and Benchmarks
Grade Level: 5
(FOSS™) Minnesota Science Standards

HISTORY AND NATURE OF SCIENCE

Standard: The student will understand that communication is essential to science.

1. Know that current scientific knowledge and understanding guide scientific investigation.
2. Recognize that clear communication of methods, findings and critical review is an essential part of doing science.

Standard: The student will understand the process of scientific investigations.

1. Perform a controlled experiment and present conclusions supported by the evidence.
2. Observe that when a science investigation or experiment is repeated, a similar result is expected.
3. Know that it is important to keep accurate records and descriptions to provide information and clues on causes of discrepancies in repeated experiments.
4. Understand that although the same scientific investigation may give slightly different results when it is carried out by different persons or at different times or places, the general evidence collected from the investigation should be replicable by others.
5. Know that a successful method to explore the natural world is to observe and record, and then analyze and communicate the results.
6. Understand that scientists use different kinds of investigations.
7. Understand the importance of accuracy in conducting measurements, and uses estimation when exact measurements are not possible.
8. Know that to work collaboratively, all team members should be free to reach, explain, and justify their own individual conclusions.
9. Understand the importance of communication among scientists.
10. Know that to compare and contrast observations and results is an essential skill in science.
11. Use strategies to review, compare and contrast, and critique scientific investigations.
12. Know that an experiment must be repeated many times and yield consistent results before the results are accepted.
13. Know that a model of something is different from the real thing, but can be used to learn something about the real thing.
14. Use sketches and diagrams to propose scientific solutions to problems.
15. Construct models to compare objects in science.

Standard: The student understands that most natural events occur in comprehensible, consistent patterns

1. Know that natural events are often predictable and logical.
2. Make predictions for a new investigation using the data from a previous investigation.
3. Understand that change is constantly occurring and uses strategies to analyze different patterns of change.

Standard: The student understands that science, technology, and society are interwoven and interdependent.

1. Know that data is collected and interpreted in order to explain an event or concept.
2. Select appropriate graphical representations.
3. Know that through the use of science processes and knowledge, people can solve problems, make decisions, and form new ideas.

4. Extend and refine knowledge of ways that, through the use of science processes and knowledge, people can solve problems, make decisions and form new ideas.

PHYSICAL SCIENCE

Standard: The student will understand that changes in speed or direction of motion are caused by forces.

1. Investigate the use of a lever, inclined plane, wheel and axle to move objects.
2. Demonstrate that the greater the force applied, the greater the change in motion.

EARTH SCIENCE AND PHYSICAL SCIENCE

Standard: Develop students' understanding of transfer of energy. The Sun is a major source of energy for changes on Earth's surface.

1. Global patterns of atmospheric movement influence local weather.

SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

Standard: Develop an understanding of science and technology in society.

Technology influences society through its products and processes.

1. Science and technology have advanced through the contributions of many different people, in different cultures, at different times in history.

PROCESSES THAT SHAPE THE EARTH

Standard: The student recognizes that processes in the lithosphere, atmosphere, hydrosphere, and biosphere interact to shape the Earth.

1. Know that 75 percent of the surface of the Earth is covered by water.
2. Know that the water cycle is influenced by temperature, pressure, and the topography of the land.
3. Understand how atmospheric pressure affects the water cycle.

Standard: The student understands the need for protection of the natural systems on Earth.

1. Know that reusing, recycling, and reducing the use of natural resources improves and protects the quality of life.
2. Extend and refine knowledge of ways people can reuse, recycle, reduce the use of resources to improve and protect the quality of life.

EARTH AND SPACE

Standard: The student understands the interaction and organization in the Solar System and the universe and how this affects life on Earth.

1. Know that the tilt of the Earth on its own axis as it rotates and revolves around the Sun causes changes in season, length of day, and energy available.
2. Know the orbit of the Earth is slightly elliptical and the Earth is closer to the Sun in the Northern Hemisphere in winter.
3. Know that the angle that the rays of the Sun strike the surface of the Earth determines the amount of energy received and thus the season of the year.
4. Know the effect of the tilt of the Earth on polar climates.
5. Know that the combination of the Earth's movement and the Moon's own orbit around the Earth results in the appearance of cyclical phases of the Moon.
6. Know the relative positions of the Moon, Earth, and Sun during each of phases of the Moon.
7. Know that the planets differ in size, characteristics, and composition and that they orbit the Sun in our Solar System.

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9. Understand the arrangement of planets in our Solar System
10. Know the arrangement of the planets and the asteroid belt in our Solar System.

Standard: The solar system consists of planets and other bodies that orbit the sun in predictable paths.

1. Describe the Earth as part of a system called the *solar system*.
2. Recognize that the Earth is the third planet from the sun on our solar system.
3. Demonstrate how the Earth orbits the sun in a year's time and Earth rotates on its axis about once every 24 hours.
4. Describe that, like all planets and stars, the Earth is approximately spherical in shape.
5. Explain the rotation of the Earth on its axis.
6. Observe how telescopes are used both to magnify images of distant objects in the sky.
7. Observe and describe that stars vary in size, but they are so far away that they look like points of light.
8. Observe stars and identify ones that are unusually bright, and others that have unusual colors.

Standard: Water on Earth moves from the ocean to the land through the process of evaporation and condensation.

1. Investigate and describe that when liquid water evaporates, it turns into a gas (vapor) mixed into the air, and can condense and reappear as a liquid when cooled or as a solid (ice) if cooled below the freezing point.
2. Explain how water moves in air masses from one place to another in the form of clouds, fog, or as invisible water vapor, and falls to the Earth as rain, hail, sleet, or snow.
3. Describe that clouds are made of tiny droplets of water or ice crystals.
4. Using maps and globes, recognize that the earth's oceans are all connected as one body of water that covers about three-quarters of the Earth's surface.

Standard: Weather (in the short run) and climate (in the long run) involve the transfer of energy in and out of the atmosphere.

1. Explain how different regions receive different amounts of solar heating because of their latitude, clouds, surface water, ice, and other variables. Understand that this results in large scale convective air flow and weather patterns.
2. Recognize and describe that the currents in the air and ocean distribute heat energy.

PROCESSES OF LIFE

Standard: The student describes patterns of structure and function in living things.

1. Know that the human body is made of systems with structures and functions that are related.
2. Understand how body systems interact.

Standard: The student understands the process and importance of genetic diversity.

1. Know that many characteristics of an organism are inherited from the parents of the organism, but that other characteristics are learned from an individual's interactions with the environment.
2. Know that many characteristics of an organism are inherited from the genetic ancestors of the organism (for example, eye color, and flower color).
3. Know that some characteristics result from the organism's interactions with the environment.

SCIENTIFIC INQUIRY

Standard: Scientific progress is made by asking questions and conducting careful investigations. As a basis for understanding this concept and to address the content in this grade.,

1. Recognize and describe how results of similar scientific investigations may turn out differently.
2. Evaluate the validity of claims based on the amount and quality of the evidence cited.
3. Keep a notebook to record observations and be able to distinguish inferences from actual observations.
4. Write instructions that others can follow to carry out an investigation.

5. Read and follow step-by-step instructions when learning new investigations.
6. Identify the controlled variable and at least one independent variable in a scientific investigation.
7. Explain that predictions can be based on what is known about the past.
8. Realize and explain why predictions may be more accurate if they are based on large collections of similar events for statistical accuracy.
9. Understand how plotting data on a number line helps in seeing where the data lie.
10. Explain the distortion inherent in using only a portion of the data collected to describe the whole. Understand that it is sometimes acceptable to discard data.

LIFE SCIENCE

Standard: All living things are composed of cells, from just one to many quadrillions, whose details usually are visible only through a microscope.

1. Observe and describe that some organisms consist of a single cell that need an environment that can supply food, water, sometimes oxygen, and a way to dispose of waste
2. Observe and explain that some organisms are made of a collection of similar cells that benefit from cooperating.
3. Explain that in complex organisms such as humans, cells can have a very wide variety of forms and perform very different roles (e.g., nerve cells, muscle cells, and fat cells).
4. One of the systems of the human organism is the digestive system. This system interacts with the other systems in the human body.
5. Disease is a breakdown in structures or functions of an organism and can be caused by improper nutrition.

SOLAR SYSTEM

Standard: Astronomy and planetary exploration reveal the structure and scale of the solar system.

1. Recognize that the solar system consists of the Earth, moon, sun, eight generally recognized other planets that orbit the sun and their satellites, and smaller objects, such as asteroids and comets.
2. Describe how the planets move around the sun in elliptical orbits.
3. Explain that the moon is Earth's only natural satellite, but several of the other planets have natural satellites as well.
4. Explain that large numbers of asteroids and comets orbit the sun.
5. Describe how planets change their position relative to the background of stars.
6. Construct models or drawings to explain that the seasons are caused by the tilt of the earth's axis relative to the plane of its orbit and its revolution around the sun. Explain how this results in uneven heating of the various parts of Earth's surface that varies over the course of the year.
7. Recognize and describe the sun as a midsize star located near the edge of a disk-shaped galaxy of stars called the *Milky Way*.
8. Recognize that the universe contains many billions of galaxies, and each galaxy contains billions of stars.
9. Recognize that the sun-to-Earth distance is such that it takes about eight minutes for light from the sun to reach Earth. Know that the next nearest star is many thousands of times farther from earth, and its light takes about four years to reach Earth.
10. Explain that gravity is a force of attraction that every mass in the universe exerts on every other mass.
11. Describe that the sun's gravitational attraction holds Earth and the other planets in their orbits, just as the planets' gravitational attraction keeps their moons in orbit around them.

HEAT

Standard: The transfer of energy through radiation and convection currents affects many phenomena on the Earth's surface.

1. Explain the meaning of radiation, convection, and conduction.
2. Describe that the heat from the sun falls on Earth unevenly because of its spherical shape. Describe that regions close to the equator receive more concentrated solar energy than those closer to the poles.

3. Observe and explain how uneven heating sets up convective cells in the atmosphere and oceans that distribute heat away from the equator.
4. Explain that much of the heat from the sun is absorbed by the land and oceans and then is released into the atmosphere.
5. Recognize that a given mass of water requires a greater input or output of heat energy to change its temperature by a given amount.
6. Describe why ocean temperatures tend to vary seasonally less than land areas and why coastal areas tend to have cooler summers and warmer winters than inland areas at a similar distance from the poles.