

SCIENCE STANDARDS

Grade – First

Standard

Benchmark

Indicators

By the end of the K-2 program, students will...

Earth and Space Sciences

Students demonstrate an understanding about how Earth systems and processes interact in the geosphere resulting in the habitability of Earth. This includes demonstrating an understanding of the composition of the universe, the solar system and Earth. In addition, it includes understanding the properties and the interconnected nature of Earth's systems, processes that shape Earth and Earth's history. Students also demonstrate an understanding of how the concepts and principles of energy, matter, motion and forces explain Earth systems, the solar system and the universe. Finally, they grasp an understanding of the historical perspectives, scientific approaches and emerging scientific issues associated with Earth and space sciences.

- A. Observe constant and changing patterns of objects in the day and night sky.
- B. Explain that living things cause changes on Earth.
- C. Observe, describe and measure changes in the weather, both long term and short term.
- D. Describe what resources are and recognize some are limited but can be extended through recycling or decreased use.

- 1. Identify that resources are things that we get from the living (e.g., forests) and nonliving (e.g., minerals, water) environment and that resources are necessary to meet the needs and wants of a population.
- 2. Explain that the supply of many resources is limited but the supply can be extended through careful use, decreased use, reusing and/or recycling.
- 3. Explain that all organisms cause changes in the environment where they live; the changes can be very noticeable or slightly noticeable, fast or slow (e.g., spread of grass cover slowing soil erosion, tree roots slowly breaking sidewalks).

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Life Sciences

Students demonstrate an understanding of how living systems function and how they interact with the physical environment. This includes an understanding of the cycling of matter and flow of energy in living systems. An understanding of the characteristics, structure and function of cells, organisms and living systems will be developed. Students will also develop a deeper understanding of the principles of heredity, biological evolution, and the diversity and interdependence of life. Students demonstrate an understanding of different historical perspectives, scientific approaches and emerging scientific issues associated with the life sciences.

By the end of the K-2 program, students will...

- A. Discover that there are living things, non-living things and pretend things, and describe the basic needs of living things (organisms).
- B. Explain how organisms function and interact with their physical environment.
- C. Describe similarities and differences that exist among individuals of the same kind of plants and animals.

1. Explore that organisms, including people, have basic needs which include air, water, food, living space and shelter.
2. Explain that food comes from sources other than grocery stores (e.g., farm crops, farm animals, oceans, lakes and forests).
3. Explore that humans and other animals have body parts that help to seek, find and take in food when they are hungry (e.g., sharp teeth, flat teeth, good nose and sharp vision).
4. Investigate that animals eat plants and/or other animals for food and may also use plants or other animals for shelter and nesting.
5. Recognize that seasonal changes can influence the health, survival or activities of organisms.

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Physical Sciences

Students demonstrate an understanding of the composition of physical systems and the concepts and principles that describe and predict physical interactions and events in the natural world. This includes demonstrating an understanding of the structure and properties of matter, the properties of materials and objects, chemical reactions and the conservation of matter. In addition, it includes understanding the nature, transfer and conservation of energy; motion and the forces affecting motion; and the nature of waves and interactions of matter and energy. Students demonstrate an understanding of the historical perspectives, scientific approaches and emerging scientific issues associated with the physical sciences.

By the end of the K-2 program, students will...

- A. Discover that many objects are made of parts that have different characteristics. Describe these characteristics and recognize ways an object may change.
- B. Recognize that light, sound and objects move in different ways.
- C. Recognize sources of energy and their uses.

1. Classify objects according to the materials they are made of and their physical properties.
2. Investigate that water can change from liquid to solid or solid to liquid.
3. Explore and observe that things can be done to materials to change their properties (e.g., heating, freezing, mixing, cutting, wetting, dissolving, bending and exposing to light).
4. Explore changes that greatly change the properties of an object (e.g., burning paper) and changes that leave the properties largely unchanged (e.g., tearing paper).
5. Explore the effects some objects have on others even when the two objects might not touch (e.g., magnets).
6. Investigate a variety of ways to make things move and what causes them to change speed, direction and/or stop.
7. Explore how energy makes things work (e.g., batteries in a toy and electricity turning fan blades).
8. Recognize that the sun is an energy source that warms the land, air and water.
9. Describe that energy can be obtained from many sources in many ways (e.g., food, gasoline, electricity or batteries).

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Science and Technology

Students recognize that science and technology are interconnected and that using technology involves assessment of the benefits, risks and costs. Students should build scientific and technological knowledge, as well as the skill required to design and construct devices. In addition, they should develop the processes to solve problems and understand that problems may be solved in several ways.

By the end of the K-2 program, students will...

- A. Explain why people, when building or making something, need to determine what it will be made of, how it will affect other people and the environment.
- B. Explain that to construct something requires planning, communication, problem solving and tools.

1. Explore that some kinds of materials are better suited than others for making something new (e.g., the building materials used in the *Three Little Pigs*).
2. Explain that when trying to build something or get something to work better, it helps to follow directions and ask someone who has done it before.
3. Identify some materials that can be saved for community recycling projects (e.g., newspapers, glass and aluminum).
4. Explore ways people use energy to cook their food and warm their homes (e.g., wood, coal, natural gas and electricity).
5. Identify how people can save energy by turning things off when they are not using them (e.g., lights and motors).
6. Investigate that tools are used to help make things and some things cannot be made without tools.
7. Explore that several steps are usually needed to make things (e.g., building with blocks).
8. Investigate that when parts are put together they can do things that they could not do by themselves (e.g., blocks, gears and wheels).

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Scientific Inquiry

Students develop scientific habits of mind as they use the processes of scientific inquiry to ask valid questions and to gather and analyze information. They understand how to develop hypotheses and make predictions. They are able to reflect on scientific practices as they develop plans of action to create and evaluate a variety of conclusions. Students are also able to demonstrate the ability to communicate their findings to others.

By the end of the K-2 program, students will...

- A. Ask a testable question.
- B. Design and conduct a simple investigation to explore a question.
- C. Gather and communicate information from careful observations and simple investigation through a variety of methods.

- 1. Ask "what happens when" questions.
- 2. Explore and pursue student-generated "what happens when" questions.
- 3. Use appropriate safety procedures when completing scientific investigations.
- 4. Work in a small group to complete an investigation and then share findings with others.
- 5. Create individual conclusions about group findings.
- 6. Use appropriate tools and simple equipment/instruments to safely gather scientific data (e.g., magnifiers, timers and simple balances and other appropriate tools).
- 7. Make estimates to compare familiar lengths, weights and time intervals.
- 8. Use oral, written and pictorial representation to communicate work.
- 9. Describe things as accurately as possible and compare with the observations of others.

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Scientific Ways of Knowing

Students realize that the current body of scientific knowledge must be based on evidence, be predictive, logical, subject to modification and limited to the natural world. This includes demonstrating an understanding that scientific knowledge grows and advances as new evidence is discovered to support or modify existing theories, as well as to encourage the development of new theories. Students are able to reflect on ethical scientific practices and demonstrate an understanding of how the current body of scientific knowledge reflects the historical and cultural contributions of women and men who provide us with a more reliable and comprehensive understanding of the natural world.

By the end of the K-2 program, students will...

- A. Recognize that there are different ways to carry out scientific investigations. Realize that investigations can be repeated under the same conditions with similar results and may have different explanations.
- B. Recognize the importance of respect for all living things.
- C. Recognize that diverse groups of people contribute to our understanding of the natural world.

- 1. Discover that when a science investigation is done the same way multiple times, one can expect to get very similar results each time it is performed.
- 2. Demonstrate good explanations based on evidence from investigations and observations.
- 3. Explain that everybody can do science, invent things and have scientific ideas no matter where they live.