

GRADE FOUR

Goal

The focus for the fourth grade student is on analyzing systems and learning how they work. Thinking about and analyzing systems helps students understand the relationships of mass, energy, objects, and organization. They learn that systems consist of combinations of organisms, machines, objects, ideas, and numbers. Systems have boundaries, components, resources flow and feedback. The following explanations characterize the strands at the fourth grade level.

Nature of Science

The Nature of Science Strand helps students understand the human dimensions of science, the nature of scientific thought, and the role of science in society. Science teaches that nature and natural laws are the same everywhere, and that nature is understandable and predictable. Students develop an understanding of the organization of systems, which in turn leads to understanding of basic laws of nature, scientific theories, and models that help explain the world. Students read, investigate, and learn that science is a human endeavor. Students begin to realize that doing science involves more than being a "scientist," and that science is used in many occupations including medicine, engineering, agriculture, business, and many others.

Science as Inquiry

Fourth grade students can master some skills of a good inquirer. Students make measurements using tools, rulers, thermometers, containers, and balances. They learn that the most useful skills are the ability to make careful measurements, to record observations and measurements, to make predictions based on observations, and to communicate results using charts and simple graphs as well as by writing and speaking. They discover that the best explanations of processes and events are based on evidence from systematic investigations. By grade four, students learn that similarities and differences between the properties of objects and materials can be understood and

described in specific context, such as a set of rocks or a group of living materials. Through experiments with electricity and magnetism, students begin to understand that phenomena can be observed, measured and manipulated by changing specific variables. Students develop their abilities to communicate, infer, analyze, and critique their own work and that of other students. The results of their work may be spoken, drawn, written, or presented in multimedia.

Science and Technology

Students become interested in technology as they design projects, use tools well, measure things carefully, make reasonable predictions, calculate accurately, and communicate clearly. Students become confident in designing and analyzing projects, and the more experience they have with design, the less direct guidance they need. They begin to enjoy opportunities to clarify a problem, generate criteria for an acceptable solution, suggest possible solutions, try one out, and then make adjustments or start over with another proposed solution. It is important for students to find out that there is more than one way to design a product or solve a problem. To accomplish this goal, several groups of students can be asked to design and solve the same problem and then discuss the advantages and disadvantages of each solution. Students discover that solving some problems may lead to others, and they become able to use simple constraint in problem solving. Students learn to analyze and evaluate their own results and solutions, as well as those of other students, by considering how well a product or design met a specific challenge need or problem.

Personal and Social Perspectives

Students investigate the progression of uses of tools over time. They understand that people continue to invent new ways of solving problems and getting things done. As they research inventions and technological advances, students begin to understand how new ideas and inventions affect human life. They analyze advantages and disadvantages of new ideas and inventions and learn to consider the costs and benefits of various solutions.

Science – Grade 4

The focus for fourth grade students is on analyzing systems and learning how systems work. Thinking about and analyzing systems help students understand the relationships of mass, energy, objects, and organisms. Students learn that systems may be made up of subsystems and that systems have structure and function, feedback, equilibrium, and that there are both open and closed systems. Guide student learning to continue to emphasize the unifying concepts previously introduced (including evidence, explanation, measurement, order, organization and change, and systems) as well as the introduction at grade four of form and function. The strands provide a context for teaching the content throughout all goals.

Strands: Nature of Science, Science as Inquiry, Science and Technology, Science in Personal and Social Perspectives

COMPETENCY GOAL 1: The learner will make observations and conduct investigations to build an understanding of animal behavior and adaptation.

Objectives

- 1.01 Observe and describe how all living and nonliving things affect the life of a particular animal including:
 - Other animals.
 - Plants.
 - Weather.
 - Climate.
- 1.02 Observe and record how animals of the same kind differ in some of their characteristics and discuss possible advantages and disadvantages of this variation.
- 1.03 Observe and discuss how behaviors and body structures help animals survive in a particular habitat.
- 1.04 Explain and discuss how humans and other animals can adapt their behavior to live in changing habitats.
- 1.05 Recognize that humans can understand themselves better by learning about other animals.

COMPETENCY GOAL 2: The learner will conduct investigations and use appropriate technology to build an understanding of the composition and uses of rocks and minerals.

Objectives

- 2.01 Describe and evaluate the properties of several minerals.
- 2.02 Recognize that minerals have a definite chemical composition and structure, resulting in specific physical properties including:

- Hardness.
 - Streak color.
 - Luster.
 - Magnetism.
- 2.03 Explain how rocks are composed of minerals.
 - 2.04 Show that different rocks have different properties.
 - 2.05 Discuss and communicate the uses of rocks and minerals.
 - 2.06 Classify rocks and rock-forming minerals using student-made rules.
 - 2.07 Identify and discuss different rocks and minerals in North Carolina including their role in geologic formations and distinguishing geologic regions.

COMPETENCY GOAL 3: The learner will make observations and conduct investigations to build an understanding of magnetism and electricity.

Objectives

- 3.01 Observe and investigate the pull of magnets on all materials made of iron and the pushes or pulls on other magnets.
- 3.02 Describe and demonstrate how magnetism can be used to generate electricity.
- 3.03 Design and test an electric circuit as a closed pathway including an energy source, energy conductor, and an energy receiver.
- 3.04 Explain how magnetism is related to electricity.
- 3.05 Describe and explain the parts of a light bulb.
- 3.06 Describe and identify materials that are conductors and non-conductors of electricity.
- 3.07 Observe and investigate that parallel and series circuits have different characteristics.
- 3.08 Observe and investigate the ability of electric circuits to produce light, heat, sound, and magnetic effects.
- 3.09 Recognize lightning as an electrical discharge and show proper safety behavior when lightning occurs.

COMPETENCY GOAL 4: The learner will conduct investigations and use appropriate technology to build an understanding of how food provides energy and materials for growth and repair of the body.

Objective

- 4.01 Explain why organisms require energy to live and grow.
- 4.02 Show how calories can be used to compare the chemical energy of different foods.
- 4.03. Discuss how foods provide both energy and nutrients for living organisms.
- 4.04 Identify starches and sugars as carbohydrates.
- 4.05 Determine that foods are made up of a variety of components: