

GRADE FIVE

Goal

Fifth grade students focus on using evidence, models, and reasoning to form scientific explanations. Evidence consists of observations and data on which scientific explanations are based. Using evidence to understand interactions allows students to predict changes in natural and human-designed systems. Models are tentative schemes or structures constructed to represent real objects or processes. Models help students understand how things work. Explanations incorporate prior knowledge and new evidence from observations, experiments, or models into consistent, logical statements. As students come to understand science concepts and processes, their explanations should become more accurate and logical. Activities and other experiences for fifth grade students continue to emphasize the unifying concepts previously learned as well as the introduction of models at grade five. The following explanations characterize the strands at this 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 investigations provide the background for developing and appreciating the nature of science. Science is a human endeavor and therefore relies on human qualities, including reasoning, insight, energy, skill and creativity. Students learn that science is involved in many different kinds of work and engages men and women of all ages and backgrounds.

Science as Inquiry

Students must actively participate in science investigations, and use the cognitive and manipulative skills necessary for formation of scientific explanations. They examine the validity of an explanation based on evidence rather than speculation. Through experiments and investigations students conduct, shape, and modify their knowledge of science concepts and processes. Students explore ecosystems in local environments, focusing on the interactions between living and nonliving things. They look

at food webs within ecosystems and describe the relationships among producers, consumers, and decomposers while examining the energy flow from one organism to another in a food web. Students at this level should be able to formulate questions, design and carry out investigations, interpret and use data to generate explanations, and critique explanations and procedures. Students will construct understanding of the Earth's landforms and how those landforms change with time because of interactions among soil, rocks, water, and wind. Such investigations should lead students to conduct their own further investigations.

Science and Technology

Students should become interested in technology as they design projects, use tools well, measure things carefully, make reasonable predictions, calculate accurately, and communicate clearly. Students explore weather systems by observing, measuring, and recording local conditions. They use tools such as thermometers, rain gauges, and barometers to collect data and to identify weather patterns. Students gain confidence in designing and analyzing their products and solutions. The more experience students have with design, the less direct guidance they need. Students learn basic physical concepts about energy and forces affecting the motion of objects and the effects of design on the movements of a machine. They learn from opportunities to identify and 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. They become competent designing, analyzing, and explaining their products and solutions. Does it work? How can I make it work better? Would it have worked better if I had used different materials? 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, several groups of students may be asked to design and solve the same problem and then discuss the advantages and disadvantages of each solution. Students see that solving some problems may lead to other problems, and gain the ability to overcome simple obstacles in problem solving. Students learn to

analyze and evaluate their own results or solutions to problems, as well as those of other students, by considering how a product or design met the challenge to solve a problem.

Personal and Social Perspectives

Students investigate the progression of tool use and development of tools and machines over time. They understand that humans continue inventing new ways of solving problems and getting things done. As they study inventions and technological advances, they begin to understand how new ideas and inventions affect people. They analyze the advantages and disadvantages of new ideas and inventions. As students study ecosystems they will become acquainted with what happens when changes occur when the environment becomes overpopulated and the use of resources increases. Through investigation of landforms students observe earth's external processes that cause natural changes and present challenges, including landslides, floods, and storms.

Science – Grade 5

Fifth grade students focus on evidence, models, and scientific explanations. Evidence consists of observations and data on which to base scientific explanations. Using evidence to understand interactions allows students to predict changes in natural and designed systems. Models are tentative schemes or structures that represent real objects. Models help students understand how things work. Explanations incorporate prior scientific knowledge and new evidence from observations, experiments, or models into consistent, logical statements. As students understand more science concepts and processes, their explanations should become more accurate and logical. Guide student learning to continue to emphasize the unifying concepts previously introduced as well as the introduction at grade five of models. 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 conduct investigations to build an understanding of the interdependence of plants and animals.

Objectives

- 1.01 Describe and compare several common ecosystems (communities of organisms and their interaction with the environment).
- 1.02 Identify and analyze the functions of organisms within the population of the ecosystem:
 - Producers.
 - Consumers.
 - Decomposers.
- 1.03 Explain why an ecosystem can support a variety of organisms.
- 1.04 Discuss and determine the role of light, temperature, and soil composition in an ecosystem's capacity to support life.
- 1.05 Determine the interaction of organisms within an ecosystem.
- 1.06 Explain and evaluate some ways that humans affect ecosystems.
 - Habitat reduction due to development.
 - Pollutants.
 - Increased nutrients.
- 1.07 Determine how materials are recycled in nature.

COMPETENCY GOAL 2: The learner will make observations and conduct investigations to build an understanding of landforms.

Objectives

- 2.01 Identify and analyze forces that cause change in landforms over time including.
 - Water and Ice.
 - Wind.
 - Gravity.
- 2.02 Investigate and discuss the role of the water cycle and how movement of water over and through the landscape helps shape land forms.
- 2.03 Discuss and consider the wearing away and movement of rock and soil in erosion and its importance in forming:
 - Canyons.
 - Valleys.
 - Meanders.
 - Tributaries.
- 2.04 Describe the deposition of eroded material and its importance in establishing landforms including:
 - Deltas.
 - Flood Plains.
- 2.05 Discuss how the flow of water and the slope of the land affect erosion.
- 2.06 Identify and use models, maps, and aerial photographs as ways of representing landforms.
- 2.07 Discuss and analyze how humans influence erosion and deposition in local communities, including school grounds, as a result of:
 - Clearing land.
 - Planting vegetation.
 - Building dams.

COMPETENCY GOAL 3: The learner will conduct investigations and use appropriate technology to build an understanding of weather and climate.

Objectives

- 3.01 Investigate the water cycle including the processes of:
 - Evaporation.
 - Condensation.
 - Precipitation.
 - Run-off.
- 3.02 Discuss and determine how the following are affected by predictable patterns of weather:
 - Temperature.
 - Wind direction and speed.
 - Precipitation.

- Cloud cover.
 - Air pressure.
- 3.03 Describe and analyze the formation of various types of clouds and discuss their relation to weather systems.
- 3.04 Explain how global atmospheric movement patterns affect local weather.
- 3.05 Compile and use weather data to establish a climate record and reveal any trends.
- 3.06 Discuss and determine the influence of geography on weather and climate:
- Mountains
 - Sea breezes
 - Water bodies.

COMPETENCY GOAL 4: The learner will conduct investigations and use appropriate technologies to build an understanding of forces and motion in technological designs.

Objectives

- 4.01 Determine the motion of an object by following and measuring its position over time.
- 4.02 Evaluate how pushing or pulling forces can change the position and motion of an object.
- 4.03 Explain how energy is needed to make machines move.
- Moving air.
 - Gravity.
- 4.04 Determine that an unbalanced force is needed to move an object or change its direction.
- 4.05 Determine factors that affect motion including:
- Force
 - Friction.
 - Inertia.
 - Momentum
- 4.06 Build and use a model to solve a mechanical design problem.
- Devise a test for the model.
 - Evaluate the results of test.
- 4.07 Determine how people use simple machines to solve problems.