

Grade Six Science

The sixth-grade standards continue to emphasize data analysis and experimentation. Methods are studied for testing the validity of predictions and conclusions. Scientific methodology, focusing on precision in stating hypotheses and defining dependent and independent variables, is strongly reinforced. The concept of change is explored through the study of transformations of energy and matter, both in living things and in the physical sciences. A more detailed understanding of the solar system becomes a focus of instruction. Natural resource management and its relation to public policy and cost/benefit tradeoffs are introduced.

Scientific Investigation, Reasoning, and Logic

6.1 The student will plan and conduct investigations in which

- observations are made involving fine discrimination between similar objects and organisms;
- a classification system is developed based on multiple attributes;
- differences in descriptions and working definitions are made;
- precise and approximate measures are recorded;
- scale models are used to estimate distance, volume, and quantity;
- hypotheses are stated in ways that identify the independent (manipulated) and dependent (responding) variables;
- a method is devised to test the validity of predictions and inferences;
- one variable is manipulated over time with many repeated trials;
- data are collected, recorded, analyzed, and reported using appropriate metric measurement;
- data are organized and communicated through graphical representation (graphs, charts, and diagrams); and
- models are designed to explain a sequence.

6.2 The student will demonstrate scientific reasoning and logic. Key concepts include

- ideas are investigated by asking for and actively seeking information;
- multiple tests of ideas are performed before accepting or rejecting them;
- alternative scientific explanations are analyzed; and
- conclusions are based on scientific evidence obtained from a variety of sources.

Force, Motion, and Energy

6.3 The student will investigate and understand sources of energy and their transformations. Key concepts include

- potential and kinetic energy;

- energy sources (fossil fuels, wood, wind, water, solar, and nuclear power); and
- energy transformations (mechanical to electrical, electrical to heat/light, chemical to light, and chemical to electrical/light).

6.4 The student will investigate and understand basic characteristics of electricity. Key concepts include

- electrical energy can be produced from a variety of energy sources and can be transformed into almost any other form of energy;
- electricity is related to magnetism;
- currents are either alternating or direct;
- circuits can be parallel or series;
- electrical energy can be described in volts and amps; and
- electrical energy consumption is measured using common units (kilowatts/kilowatt hours).

Matter

6.5 The student will investigate and understand that all matter is made up of atoms. Key concepts include

- atoms are made up of electrons, protons, and neutrons;
- atoms of any element are alike but are different from atoms of other elements; and
- historical development and significance of discoveries related to the atom.

6.6 The student will investigate and understand how to classify materials as elements, compounds, or mixtures. Key concepts include

- mixtures can be separated by physical processes;
- compounds can only be separated by chemical processes; and
- elements cannot be separated by physical or chemical means.

6.7 The student will investigate and understand that matter has physical and chemical properties and can undergo change. Key concepts include

- physical changes; and
- changes in chemical composition, including oxidation reactions (rusting and burning), photosynthesis, and acid-base neutralization reactions.

Life Processes

- 6.8 The student will investigate and understand that organisms perform life processes that are essential for the survival and perpetuation of the species. Key concepts include
- energy transformation (from food or photosynthesis); and
 - respiration, movement, waste removal, growth, irritability (response), and reproduction.

Living Systems

- 6.9 The student will investigate and understand that organisms depend on other organisms and the nonliving components of the environment. Key concepts include
- producers, consumers, and decomposers;
 - food webs and food pyramids; and
 - cycles (water, carbon dioxide/oxygen, nitrogen).

Interrelationships in Earth/Space Systems

- 6.10 The student will investigate and understand the organization of the solar system and the relationships among the various bodies that comprise it. Key concepts include
- the sun, moon, Earth, other planets and their moons, meteors, asteroids, and comets;
 - relative size of and distance between planets;
 - the role of gravity;
 - revolution and rotation;
 - the mechanics of day and night and phases of the moon;
 - the relationship of the Earth's tilt and seasons;
 - the cause of tides; and
 - the history and technology of space exploration.

Resources

- 6.11 The student will investigate and understand public policy decisions relating to the environment. Key concepts include
- management of renewable resources (water, air, plant life, animal life);
 - management of nonrenewable resources (coal, oil, natural gas, nuclear power); and
 - cost/benefit tradeoffs in conservation policies.