

# Grade Four Science

The fourth-grade standards stress the importance of using information, analyzing data, and validating experimental results. Defining variables in experimentation is emphasized, and making simple predictions from picture, bar, and line graphs is underscored. Questioning and hypothesizing become more detailed at this level. Students are introduced to basic principles of electricity and to the concept of energy as it relates to work and machines. Relationships are investigated in the interactions among the Earth, moon, and sun and among plants and animals and their environments. In examining weather phenomena and conditions, students identify various factors, make predictions based on data, and evaluate the results. The importance of natural resources in Virginia is emphasized.

## Scientific Investigation, Reasoning, and Logic

- 4.1 The student will plan and conduct investigations in which
- distinctions are made among observations, conclusions (inferences), and predictions;
  - data are classified to create frequency distributions;
  - appropriate metric measures are used to collect, record, and report data;
  - appropriate instruments are selected to measure linear distance, volume, mass, and temperature;
  - predictions are made based on data from picture graphs, bar graphs, and basic line graphs;
  - hypotheses are formulated based on cause and effect relationships;
  - variables that must be held constant in an experimental situation are defined; and
  - numerical data that are contradictory or unusual in experimental results are recognized.

## Force, Motion, and Energy

- 4.2 The student will investigate and understand that energy is needed to do work and that machines make work easier. Key concepts include
- energy forms (electrical, mechanical, and chemical energy);
  - potential and kinetic energy;
  - simple and complex machines; and
  - efficiency, friction, and inertia.
- 4.3 The student will investigate and understand the characteristics of electricity. Key concepts include
- the nature of electricity (voltage, ampere, resistance, conductors, and insulators);
  - circuits (open/closed, parallel/series);
  - magnetism and magnetic fields;
  - static electricity ; and
  - historical contributions in understanding electricity.

## Life Processes

- 4.4 The student will investigate and understand basic plant anatomy and life processes. Key concepts include
- the structures of typical plants (leaves, stems, roots, and flowers);
  - processes and structures involved with reproduction (pollination, stamen, pistil, sepal, embryo, spore, and seed);
  - photosynthesis (chlorophyll, carbon dioxide); and
  - dormancy.

## Living Systems

- 4.5 The student will investigate and understand how plants and animals in an ecosystem interact with one another and the nonliving environment. Key concepts include
- behavioral and structural adaptations;
  - organization of communities;
  - flow of energy through food webs;
  - habitats and niches;
  - life cycles; and
  - influence of human activity on ecosystems.

## Interrelationships in Earth/Space Systems

- 4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. Key concepts include
- weather factors (temperature, air pressure, fronts, formation and type of clouds, and storms); and
  - meteorological tools (barometer, hygrometer, anemometer, rain gauge, and thermometer).

## **Earth Patterns, Cycles, and Change**

- 4.7 The student will investigate and understand the relationships among the Earth, moon, and sun. Key concepts include
- the motions of the Earth, moon, and sun (revolution and rotation);
  - the causes for the Earth's seasons and phases of the moon;
  - the relative size, position, and makeup of the Earth, moon, and sun;
  - unique properties of the Earth as a planet and as part of the solar system; and
  - historical contributions in understanding the Earth-moon-sun system.

## **Resources**

- 4.8 The student will investigate and understand important Virginia natural resources. Key concepts include
- watershed and water resources;
  - animals and plants, both domesticated and wild;
  - minerals, rocks, ores, and energy sources; and
  - forests, soil, and land.