SCIENCE – Fourth Grade

Scientific Investigation, Reasoning, and Logic

4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
- a) distinctions are made among observations, conclusions, inferences, and predictions;
- b) objects or events are classified and arranged according to characteristics or properties;
- c) appropriate instruments are selected and used to measure length, mass, volume, and temperature in metric units;
- d) appropriate instruments are selected and used to measure elapsed time;
- e) predictions and inferences are made, and conclusions are drawn based on data from a variety of sources;
- f) independent and dependent variables are identified;
- g) constants in an experimental situation are identified;
- h) hypotheses are developed as cause and effect relationships;
- i) data are collected, recorded, analyzed, and displayed using bar and basic line graphs;
- j) numerical data that are contradictory or unusual in experimental results are recognized;
- k) data are communicated with simple graphs, pictures, written statements, and numbers;
- l) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
- m) current applications are used to reinforce science concepts.

Force, Motion, and Energy

4.2 The student will investigate and understand characteristics and interactions of moving objects. Key concepts include
- a) motion is described by an object's direction and speed;
- b) changes in motion are related to force and mass;
- c) friction is a force that opposes motion; and
- d) moving objects have kinetic energy.

4.3 The student will investigate and understand the characteristics of electricity. Key concepts include
- a) conductors and insulators;
- b) basic circuits;
- c) static electricity;
- d) the ability of electrical energy to be transformed into light and motion, and to produce heat;
- e) simple electromagnets and magnetism; and
- f) historical contributions in understanding electricity.

Life Processes

4.4 The student will investigate and understand basic plant anatomy and life processes. Key concepts include
- a) the structures of typical plants and the function of each structure;
- b) processes and structures involved with plant reproduction;
- c) photosynthesis; and
- d) adaptations allow plants to satisfy life needs and respond to the environment.

Living Systems

4.5 The student will investigate and understand how plants and animals, including humans, in an ecosystem interact with one another and with the nonliving components in the ecosystem. Key concepts include
- a) plant and animal adaptations;
- b) organization of populations, communities, and ecosystems and how they interrelate;
- c) flow of energy through food webs;
- d) habitats and niches;
- e) changes in an organism's niche at various stages in its life cycle; and
- f) influences 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
- a) weather phenomena;
- b) weather measurements and meteorological tools; and
- c) use of weather measurements and weather phenomena to make weather predictions.

Earth Patterns, Cycles, and Change

4.7 The student will investigate and understand the organization of the solar system. Key concepts include
- a) the planets in the solar system;
- b) the order of the planets in the solar system; and
- c) the relative sizes of the planets.

4.8 The student will investigate and understand the relationships among Earth, the moon, and the sun. Key concepts include
- a) the motions of Earth, the moon, and the sun;
- b) the causes for Earth's seasons;
- c) the causes for the phases of the moon;
- d) the relative size, position, age, and makeup of Earth, the moon, and the sun; and
- e) historical contributions in understanding the Earth-moon-sun system.

Earth Resources

4.9 The student will investigate and understand important Virginia natural resources. Key concepts include
- a) watersheds and water resources;
- b) animals and plants;
- c) minerals, rocks, ores, and energy sources; and
- d) forests, soil, and land.