Grade Level Expectations for the Sunshine State Standards

Science
Sixth Grade

FLORIDA
Department of Education
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Sunshine State Standards

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Science
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The sixth grade student:

The Nature of Matter

- knows ways in which substances differ (for example, mass, volume, shape, density, texture, reaction to heat and light).
- understands that mass is the amount of material in an object.
- understands that increasing the average motion of the particles in a substance increases the temperature of the substance.
- understands that decreasing the average motion of the particles decreases the temperature.
- determines the effect of a change in temperature on common materials (for example, butter, food coloring in water, isopropol alcohol).
- understands that matter may exist as solids, liquids, and gases.
- knows that molecular motion increases from solids to liquids to gases.
- knows the physical properties of various substances.
- knows the chemical properties of various substances.
- knows the difference between a physical and chemical change.
- knows that equal volumes of different substances may have different masses.
- uses the water displacement method to find the volume of common items (for example, rocks, nails, marbles).
- understands that particles and objects may be either neutral or have a positive or negative charge.
- knows the properties of waves (frequency, amplitude, wavelength).
- knows how to compare and contrast the properties of particles and waves.
- understands the behavior of charged particles as evidenced by simple static electricity experiments.
- determines the charge of an ion by comparing the number of protons and electrons associated with it.
- knows forms of radiant energy and their applications to everyday life (for example, visible, microwave, radio).

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Energy

- knows different types of energy and the units used to quantify the energy (for example, solar, nuclear, electrical, chemical).
- understands that energy can be converted from one form to another (for example, solar energy to heat energy).
- understands that energy can be changed in form.
- uses examples to demonstrate common energy transformations.
- knows types of radiant energy that come to Earth from the Sun (for example, visible, infrared, ultraviolet).
- knows the effect of sunlight on photosynthetic pigments.
- understands that energy moves through systems.

Force and Motion

- knows that a change in motion and position can be measured.
- knows ways to measure time intervals.
- knows ways to estimate speed.
- uses common items (a pebble dropped in water, a marble dropped in sand) to demonstrate that vibrations in materials set up visible disturbances that spread away from a force in all directions.
- recognizes the result of several forces acting on an object.
- knows that the net force is dependent on the direction and magnitude of forces acting on a body.
- knows uses of simple machines.
- knows advantages and disadvantages of simple machines.
- knows that an object at rest will stay at rest unless acted upon by an outside force.
- knows objects in motion will remain in motion unless acted upon by an outside force.
- knows that gravity is a force that causes an object to fall to the ground.
- knows that gravity causes an object to have weight.

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Processes that Shape the Earth

- understands that the surface of the Earth is constantly changing due to mechanical and chemical action.
- knows that sedimentary rock may contain fossils of plants, animals, and microbes.
- knows ways the systems of Earth change over time and predicts the causes of the change.
- knows that different events on the Earth change features on Earth (for example, hurricanes, earthquakes, volcanoes).
- records seasonal changes of the landscape in a specific area over time.
- knows ways that plants and animals reconstitute the soil and alter the landscape.
- understands the processes that prevent or cause erosion.
- understands the range of time over which natural events occur (for example, lightning in seconds, mountains form over many years).
- knows that a change in the environment affects the quality of life in different ways for different organisms.
- knows positive and negative consequences of human action on the Earth's systems (for example, farming, transportation, mining, manufacturing).

Earth and Space

- knows the relationship between tides on Earth and the positions of the Moon, the Sun, and Earth.
- knows the relative sizes of the planets, Sun, Solar System, galaxy, and universe.
- understands the positions of the Earth, Moon, and Sun during a solar eclipse and a lunar eclipse.
- understands that our Sun is one of many stars in our galaxy.

Processes of Life

- knows ways systems in an organism function and interact (for example, the muscular system provides the ability to move and is supported by the skeletal system when one is present).
- understands the differences between growth and maintenance.
- knows that the cell is the basic unit of structure and function in all living things.
- knows that there is great diversity among unicellular organisms.

- knows the basic processes that occur in cells.
- knows that in multicellular organisms cells grow and divide to form and repair various organs and tissues.
- understands cells reproduce to ensure the growth and repair of tissue.
- knows that the levels of structural organization in living things include cells, tissues, organs, systems, and organisms.
- understands that there are structures with particular functions that are unique to certain types of cells (for example, plant cells have cell walls, animal cells do not).
- understands the process of osmosis and diffusion.
- knows the essential functions in cells.
- uses or constructs models of plant and animal cells to identify the basic structures of each.
- knows the functions of structures in plant and animal cells.
- knows that behavior is a response to the environment.
- knows adaptations that aid in species survival (for example, protective coloration, hibernation, delayed implantation).

How Living Things Interact with Their Environment

- understands that living things are sorted for convenience and identification.
- understands that the structural characteristics among animals and plants are more alike as organisms are closer to the same kind or species within a classification level.
- knows the nonliving (abiotic) and living (biotic) aspects of an ecosystem.
- understands how the components of an ecosystem interact.
- understands that food chains show specific trophic relationships and food webs are used to illustrate interrelationships of trophic levels.
- knows renewable and nonrenewable energy sources.
- distinguishes between biotic and abiotic factors in the environment.
- understands that changes in the environment may influence the size, number, or diversity of organisms in an area.
- understands that humans are a part of an ecosystem and their activities may deliberately or inadvertently alter the equilibrium in the ecosystem.

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The Nature of Science

- knows ways scientific theories may change with new discoveries.
- understands that new technology may lead to new discoveries.
- uses systematic, scientific processes to develop and test hypotheses.
- knows that the scientific method is a process that involves a logical and empirical but flexible approach to problem solving.
- knows that the disciplines of science provide in depth study and information that becomes available for all to share and use.
- knows that accurate record keeping, openness, and replication are essential to maintaining an investigator's credibility with other scientists and society.
- uses accurate records, openness, and replication of experiments to ensure credibility.
- understands the importance of the control in an experiment.
- knows how to identify the independent and dependent variables in an experiment.
- uses appropriate experimental design, with consideration for rules, time, and materials required to solve a problem.
- knows selected scientists and their accomplishments.
- knows that scientists who make contributions to knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
- uses criteria necessary to determine the veracity of the data.
- knows that most natural events occur in patterns.
- knows that science ethics demand that scientists must not knowingly subject coworkers, students, the neighborhood, or the community to health or property risks.
- uses appropriate procedures for safety in the classroom, home, and community.
- knows that appropriate care, safe practices, and ethical treatment are necessary when animals are involved in scientific research.
- knows that in research involving human subjects, the ethics of science require that potential subjects be fully informed about the risks and benefits associated with the research and of their right to refuse to participate.
- knows some ways that scientific discoveries create new technologies that affect society (for example, geographic information systems, gene mapping, electronic communication).

- knows that the advancement of science, mathematics, and technology is ongoing and influenced by a diverse population of scientists.
- knows that scientific contributions may result in diverse technological products.
- uses a computer to collect, analyze, and report scientific findings.

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