

# Grade 6

## Overview

The focus for science in grade six is to provide students with a foundation for hands-on experiences that allow for the active engagement and concrete examples that these students require in order to understand basic science concepts. Sixth graders continue to develop the investigative skills they have been acquiring since kindergarten, now expanding them to include the skill of differentiating between observation and inference. Specifically, students explore the life, earth, and physical sciences within the framework of the following topics: “Structures, Processes, and Responses of Plants” (structure and function of plants); “Structures, Processes, and Responses of Animals” (structure and function of animals); “Earth’s Atmosphere and Weather” (atmospheric properties and processes); and “Conservation of Energy” (properties of energy, work, and machines).

The science standards for the sixth grade provide the foundation for a course that is based on a rich and wide variety of learning experiences that actively engage students and accommodate a broad range of student learning styles through varied materials and instructional strategies. Students should observe, interact with materials and with people, and ask questions as they explore new concepts and expand their knowledge.

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### Scientific Inquiry

The skills of scientific inquiry, including knowledge and use of tools, are not taught as separate skills in science, but are embedded throughout because these process skills are fundamental to all science instruction and content. A table of the PK–12 of scientific inquiry standards and Indicators: is provided in appendix A.

**Standard:**     **6Sa:**           **The student will demonstrate an understanding of technological design and scientific inquiry, including process skills, mathematical thinking, controlled investigative design and analysis, and problem solving.**

**Indicators:**   **6Sa.1:**           Use appropriate tools and instruments (including a spring scale, beam balance, barometer, and sling psychrometer) safely and accurately when conducting a controlled scientific investigation.

**6Sa.2:**           Differentiate between observation and inference during the analysis and interpretation of data.

**6Sa.3:**           Classify organisms, objects, and materials according to their physical characteristics by using a dichotomous key.

**6Sa.4:**           Use a technological design process to plan and produce a solution to a problem or a product (including identifying a problem, designing a solution or a product, implementing the design, and evaluating the solution or the product).

**6Sa.5:**           Use appropriate safety procedures when conducting investigations.

### Structures, Processes, and Responses of Plants

**Standard:**     **6Sb:**           **The student will demonstrate an understanding of structures, processes, and responses of plants that allow them to survive and reproduce. (Life Science)**

**Indicators:**   **6Sb.1:**           Summarize the characteristics that all organisms share (including the obtainment and use of resources for energy, the response to stimuli, the ability to reproduce, and process of physical growth and development).

**6Sb.2:**           Recognize the hierarchical structure of the classification (taxonomy) of organisms (including the seven major levels or categories of living things—namely, kingdom, phylum, class, order, family, genus, and species).

**6Sb.3:**           Compare the characteristic structures of various groups of plants (including vascular or nonvascular, seed or spore-producing, flowering or cone-bearing, and monocot or dicot).

**6Sb.4:**           Summarize the basic functions of the structures of a flowering plant for defense, survival, and reproduction.

**6Sb.5:**           Summarize each process in the life cycle of flowering plants (including germination, plant development, fertilization, and seed production).

**6Sb.6:**           Differentiate between the processes of sexual and asexual reproduction of flowering plants.

**6Sb.7:**           Summarize the processes required for plant survival (including photosynthesis, respiration, and transpiration).

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**6Sb.8:** Explain how plants respond to external stimuli (including dormancy and the forms of tropism known as phototropism, gravitropism, hydrotropism, and thigmotropism).

**6Sb.9:** Explain how disease-causing fungi can affect plants.

### Structures, Processes, and Responses of Animals

**Standard:** **6Sc:** **The student will demonstrate an understanding of structures, processes, and responses of animals that allow them to survive and reproduce. (Life Science)**

**Indicators:** **6Sc.1:** Compare the characteristic structures of invertebrate animals (including sponges, segmented worms, echinoderms, mollusks, and arthropods) and vertebrate animals (fish, amphibians, reptiles, birds, and mammals).

**6Sc.2:** Summarize the basic functions of the structures of animals that allow them to defend themselves, to move, and to obtain resources.

**6Sc.3:** Compare the response that a warm-blooded (endothermic) animal makes to a fluctuation in environmental temperature with the response that a cold-blooded (ectothermic) animal makes to such a fluctuation.

**6Sc.4:** Explain how environmental stimuli cause physical responses in animals (including shedding, blinking, shivering, sweating, panting, and food gathering).

**6Sc.5:** Illustrate animal behavioral responses (including hibernation, migration, defense, and courtship) to environmental stimuli.

**6Sc.6:** Summarize how the internal stimuli (including hunger, thirst, and sleep) of animals ensure their survival.

**6Sc.7:** Compare learned to inherited behaviors in animals.

### Earth's Atmosphere and Weather

**Standard:** **6Sd:** **The student will demonstrate an understanding of the relationship between Earth's atmospheric properties and processes and its weather and climate. (Earth Science)**

**Indicators:** **6Sd.1:** Compare the composition and structure of Earth's atmospheric layers (including the gases and differences in temperature and pressure within the layers).

**6Sd.2:** Summarize the interrelationships among the dynamic processes of the water cycle (including precipitation, evaporation, transpiration, condensation, surface-water flow, and groundwater flow).

**6Sd.3:** Classify shapes and types of clouds according to elevation and their associated weather conditions and patterns.

**6Sd.4:** Summarize the relationship of the movement of air masses, high and low pressure systems, and frontal boundaries to storms (including thunderstorms, hurricanes, and tornadoes) and other weather conditions.

**6Sd.5:** Use appropriate instruments and tools to collect weather data (including wind speed and direction, air temperature, humidity, and air pressure).

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- 6Sd.6:** Predict weather conditions and patterns based on weather data collected from direct observations and measurements, weather maps, satellites, and radar.
- 6Sd.7:** Explain how solar energy affects Earth's atmosphere and surface (land and water).
- 6Sd.8:** Explain how convection affects weather patterns and climate.
- 6Sd.9:** Explain the influence of global winds and the jet stream on weather and climatic conditions.

### Conservation of Energy

**Standard:**    **6Se:**           **The student will demonstrate an understanding of the law of conservation of energy and the properties of energy and work. (Physical Science)**

- Indicators:**   **6Se.1:**           Identify the sources and properties of heat, solar, chemical, mechanical, and electrical energy.
- 6Se.2:**           Explain how energy can be transformed from one form to another (including the two types of mechanical energy, potential and kinetic, as well as chemical and electrical energy) in accordance with the law of conservation of energy.
- 6Se.3:**           Explain how magnetism and electricity are interrelated by using descriptions, models, and diagrams of electromagnets, generators, and simple electrical motors.
- 6Se.4:**           Illustrate energy transformations (including the production of light, sound, heat, and mechanical motion) in electrical circuits.
- 6Se.5:**           Illustrate the directional transfer of heat energy through convection, radiation, and conduction.
- 6Se.6:**           Recognize that energy is the ability to do work (force exerted over a distance).
- 6Se.7:**           Explain how the design of simple machines (including levers, pulleys, and inclined planes) helps reduce the amount of force required to do work.
- 6Se.8:**           Illustrate ways that simple machines exist in common tools and in complex machines.