

# Grade 7

## Overview

Students in grade seven continue to deepen their knowledge of the life, earth, and physical sciences through more complex investigations and explanations. The concepts they study become increasingly abstract in a developmentally appropriate manner to allow for the slow, incremental development of these cognitively complex ideas. Seventh graders also continue to develop their investigative skills by generating their own questions, recognizing and explaining the relationships among variables, and critiquing the conclusions that are drawn from scientific investigations. Specifically, these students explore the sciences within the framework of the following topics: “Cells and Heredity” (structure and function of cells and heredity), “Human Body Systems and Disease” (functions and interconnections within the human body and the breakdown of these functions due to disease); “Ecology: The Biotic and Abiotic Environment” (interactions and responses between biotic and abiotic components and organisms); and “The Chemical Nature of Matter” (classifications and properties of matter, changes in matter).

The science standards for grade seven 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.

The skills and tools listed in the scientific inquiry sections will be assessed on statewide tests independently from the content knowledge in the respective grade or high school core area under which they are listed. Moreover, scientific inquiry standards and indicators will be assessed *cumulatively*. Therefore, as students progress through the grade levels, they are responsible for the scientific inquiry indicators—including a knowledge of the use of tools—in all their earlier grades. A table of the scientific inquiry standards and indicators for kindergarten through grade twelve is provided in appendix A, which teachers are urged to print out and keep as a ready reference.

The science standards in grades three through eight will be the basis for the development of the science test questions for the Palmetto Achievement Challenge Tests (PACT). The PACT is based on the broad standards that address the life, earth, and physical sciences at each grade level. Individual test questions will be aligned with the indicators and will not go beyond the scope and intent of the more specific information in the indicators. While standards at lower grade levels will not be directly assessed, they may be used to formulate multiple-choice distracter items.

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### Scientific Inquiry

The skills of scientific inquiry, including a knowledge of the use of tools, will be assessed cumulatively on statewide tests. Students will therefore be responsible for the scientific inquiry indicators from all of their earlier grade levels. A table of the K–12 scientific inquiry standards and indicators is provided in appendix A.

**Standard 7-1:** 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

- 7-1.1 Use appropriate tools and instruments (including a microscope) safely and accurately when conducting a controlled scientific investigation.
- 7-1.2 Generate questions that can be answered through scientific investigation.
- 7-1.3 Explain the reasons for testing one independent variable at a time in a controlled scientific investigation.
- 7-1.4 Explain the importance that repeated trials and a well-chosen sample size have with regard to the validity of a controlled scientific investigation.
- 7-1.5 Explain the relationships between independent and dependent variables in a controlled scientific investigation through the use of appropriate graphs, tables, and charts.
- 7-1.6 Critique a conclusion drawn from a scientific investigation.
- 7-1.7 Use appropriate safety procedures when conducting investigations.

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### Cells and Heredity

**Standard 7-2:** The student will demonstrate an understanding of the structure and function of cells, cellular reproduction, and heredity.  
(Life Science)

#### Indicators

- 7-2.1 Summarize the structures and functions of the major components of plant and animal cells (including the cell wall, the cell membrane, the nucleus, chloroplasts, mitochondria, and vacuoles).
- 7-2.2 Compare the major components of plant and animal cells.
- 7-2.3 Compare the body shapes of bacteria (spiral, coccus, and bacillus) and the body structures that protists (euglena, paramecium, amoeba) use for food gathering and locomotion.
- 7-2.4 Explain how cellular processes (including respiration, photosynthesis in plants, mitosis, and waste elimination) are essential to the survival of the organism.
- 7-2.5 Summarize how genetic information is passed from parent to offspring by using the terms *genes*, *chromosomes*, *inherited traits*, *genotype*, *phenotype*, *dominant traits*, and *recessive traits*.
- 7-2.6 Use Punnett squares to predict inherited monohybrid traits.
- 7-2.7 Distinguish between inherited traits and those acquired from environmental factors.

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### Human Body Systems and Disease

**Standard 7-3:** The student will demonstrate an understanding of the functions and interconnections of the major human body systems, including the breakdown in structure or function that disease causes. (Life Science)

#### Indicators

- 7-3.1 Summarize the levels of structural organization within the human body (including cells, tissues, organs, and systems).
- 7-3.2 Recall the major organs of the human body and their function within their particular body system.
- 7-3.3 Summarize the relationships of the major body systems (including the circulatory, respiratory, digestive, excretory, nervous, muscular, and skeletal systems).
- 7-3.4 Explain the effects of disease on the major organs and body systems (including infectious diseases such as colds and flu, AIDS, and athlete's foot and noninfectious diseases such as diabetes, Parkinson's, and skin cancer).

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### **Ecology: The Biotic and Abiotic Environment**

**Standard 7-4:** The student will demonstrate an understanding of how organisms interact with and respond to the biotic and abiotic components of their environment. (Earth Science, Life Science)

#### **Indicators**

- 7-4.1 Summarize the characteristics of the levels of organization within ecosystems (including populations, communities, habitats, niches, and biomes).
- 7-4.2 Illustrate energy flow in food chains, food webs, and energy pyramids
- 7-4.3 Explain the interaction among changes in the environment due to natural hazards (including landslides, wildfires, and floods), changes in populations, and limiting factors (including climate and the availability of food and water, space, and shelter).
- 7-4.4 Explain the effects of soil quality on the characteristics of an ecosystem.
- 7-4.5 Summarize how the location and movement of water on Earth's surface through groundwater zones and surface-water drainage basins, called watersheds, are important to ecosystems and to human activities.
- 7-4.6 Classify resources as renewable or nonrenewable and explain the implications of their depletion and the importance of conservation.

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### The Chemical Nature of Matter

**Standard 7-5:** The student will demonstrate an understanding of the classifications and properties of matter and the changes that matter undergoes. (Physical Science)

#### Indicators

- 7-5.1 Recognize that matter is composed of extremely small particles called atoms.
- 7-5.2 Classify matter as element, compound, or mixture on the basis of its composition.
- 7-5.3 Compare the physical properties of metals and nonmetals.
- 7-5.4 Use the periodic table to identify the basic organization of elements and groups of elements (including metals, nonmetals, and families).
- 7-5.5 Translate chemical symbols and the chemical formulas of common substances to show the component parts of the substances (including NaCl [table salt], H<sub>2</sub>O [water], C<sub>6</sub>H<sub>12</sub>O<sub>6</sub> [simple sugar], O<sub>2</sub> [oxygen gas], CO<sub>2</sub> [carbon dioxide], and N<sub>2</sub> [nitrogen gas]).
- 7-5.6 Distinguish between acids and bases and use indicators (including litmus paper, pH paper, and phenolphthalein) to determine their relative pH.
- 7-5.7 Identify the reactants and products in chemical equations.
- 7-5.8 Explain how a balanced chemical equation supports the law of conservation of matter.
- 7-5.9 Compare physical properties of matter (including melting or boiling point, density, and color) to the chemical property of reactivity with a certain substance (including the ability to burn or to rust).
- 7-5.10 Compare physical changes (including changes in size, shape, and state) to chemical changes that are the result of chemical reactions (including changes in color or temperature and formation of a precipitate or gas).