

FIFTH GRADE

The *Fifth Grade* competencies and objectives build on the *Kindergarten* through *Fourth* grade concepts. Students explore structure and function in living systems, reproduction and heredity, behavior, populations and ecosystems, diversity, and adaptations of organisms. Students also investigate properties and changes of properties in matter, motions, forces, transfer of energy, structure of the Earth system, Earth's history, and Earth in the solar system. Throughout the teaching process, inquiry, safety skills, the scientific method process, measuring, use of scientific equipment, current events, environmental factors, and hands-on activities should be emphasized.

The *Mississippi Science Framework* is comprised of three content strands: **Life Science, Earth and Space Science, and Physical Science**. The five process strands are **Science as Inquiry, Unifying Concepts and Processes, Science and Technology, Science in Personal and Social Perspectives, and the History and Nature of Science**. The three content strands, along with the five process strands, combine to provide continuity to the teaching of K-12 science. Even though the process strands are not listed throughout the framework, these strands should be incorporated when presenting the content of the curriculum. **Science as Inquiry** is listed as a separate strand in order to place emphasis on developing the ability to ask questions, to observe, to experiment, to measure, to problem solve, to gather data, and to communicate findings. **Inquiry is not an isolated unit of instruction and must be embedded throughout the content strands.**

The competencies, printed in bold face type, are the part of the framework that is required to be taught to all students. The Elementary/Middle School Science Tests and Biology I Subject Area Test are aligned to the competencies. Competencies do not have to be taught in the order presented in the framework. The competencies are presented in outline form for consistency and easy reference throughout the framework. Competencies are intentionally broad in order to allow school districts and teachers the flexibility to create a curriculum that meets the needs of their students. They may relate to one, many, or all of the science framework strands and may be combined and taught with other competencies throughout the school year. Competencies provide a guideline of on-going instruction, not isolated units, activities, or skills. The competencies are not intended to be a list of content skills that are taught and recorded as “mastered.”

The objectives indicate how competencies can be fulfilled through a progression of content and concepts at each grade level and course. Many of the objectives are interrelated rather than sequential, which means that objectives are not intended to be taught in the specific order in which they are presented. Multiple objectives can and should be taught at the same time.

The Elementary/Middle School Science Test and Biology I Subject Area Test will be developed based on the objectives found in the framework. At least fifty percent (50%) of the test items on the Elementary/Middle School Science Test must match the Depth of Knowledge (DOK) level assigned to the objectives for each competency. The Depth of Knowledge (DOK) level is indicated at the end of each objective.

FIFTH GRADE

CONTENT STRANDS:

Inquiry
Physical Science

Life Science
Earth and Space Science

COMPETENCIES AND OBJECTIVES:

INQUIRY

1. **Develop and demonstrate an understanding of scientific inquiry using process skills.**
 - a. Form a hypothesis, predict outcomes, and conduct a fair investigation that includes manipulating variables and using experimental controls. (DOK 3)
 - b. Distinguish between observations and inferences. (DOK 2)
 - c. Use precise measurement in conjunction with simple tools and technology to perform tests and collect data. (DOK 1)
 - Tools (English rulers [to the nearest one-sixteenth of an inch], metric rulers [to the nearest millimeter], thermometers, scales, hand lenses, microscopes, balances, clocks, calculators, anemometers, rain gauges, barometers, hygrometers)
 - Types of data (height, mass, volume, temperature, length, time, distance, volume, perimeter, area)
 - d. Organize and interpret data in tables and graphs to construct explanations and draw conclusions. (DOK 2)
 - e. Use drawings, tables, graphs, and written and oral language to describe objects and explain ideas and actions. (DOK 2)
 - f. Make and compare different proposals when designing a solution or product. (DOK 2)
 - g. Evaluate results of different data (whether trivial or significant). (DOK 2)
 - h. Infer and describe alternate explanations and predictions. (DOK 3)

PHYSICAL SCIENCE

2. **Understand relationships of the properties of objects and materials, position and motion of objects, and transfer of energy to explain the physical world.**
 - a. Determine how the properties of an object affect how it acts and interacts. (DOK 2)
 - b. Differentiate between elements, compounds, and mixtures and between chemical and physical changes (e.g., gas evolves, color, and/or temperature changes). (DOK 2)

- c. Investigate the motion of an object in terms of its position, direction of motion, and speed. (DOK 2)
 - The relative positions and movements of objects using points of reference (distance vs. time of moving objects)
 - Force required to move an object using appropriate devices (e.g., spring scale)
 - Variables that affect speed (e.g., ramp height/length/surface, mass of object)
 - Effects of an unbalanced force on an object's motion in terms of speed and direction
- d. Categorize examples of potential energy as gravitational (e.g., boulder on a hill, child on a slide), elastic (e.g., compressed spring, slingshot, rubber band), or chemical (e.g., unlit match, food). (DOK 2)
- e. Differentiate between the properties of light as reflection, refraction, and absorption. (DOK 1)
 - Image reflected by a plane mirror and a curved-surfaced mirror
 - Light passing through air or water
 - Optical tools such as prisms, lenses, mirrors, and eyeglasses
- f. Describe physical properties of matter (e.g., mass, density, boiling point, freezing point) including mixtures and solutions. (DOK 1)
 - Filtration, sifting, magnetism, evaporation, and flotation
 - Mass, density, boiling point, and freezing point of matter
 - Effects of temperature changes on the solubility of substances
- g. Categorize materials as conductors or insulators and discuss their real life applications (e.g., building construction, clothing, animal covering). (DOK 2)

LIFE SCIENCE

3. Predict characteristics, structures, life cycles, environments, evolution, and diversity of organisms.

- a. Compare and contrast the diversity of organisms due to adaptations to show how organisms have evolved as a result of environmental changes. (DOK 2)
 - Diversity based on kingdoms, phyla, and classes (e.g., internal/external structure, body temperature, size, shape)
 - Adaptations that increase an organism's chances to survive and reproduce in a particular habitat (e.g., cacti needles/leaves, fur/scales)
 - Evidence of fossils as indicators of how life and environmental conditions have changed
- b. Research and classify the organization of living things. (DOK 2)
 - Differences between plant and animal cells
 - Function of the major parts of body systems (nervous, circulatory, respiratory, digestive, skeletal, muscular) and the ways they support one another
 - Examples of organisms as single-celled or multi-celled
- c. Research and cite evidence of the work of scientists (e.g., Pasteur, Fleming,

- Salk) as it contributed to the discovery and prevention of disease. (DOK 3)
- d. Distinguish between asexual and sexual reproduction. (DOK 1)
- Asexual reproduction processes in plants and fungi (e.g., vegetative propagation in stems, roots, and leaves of plants, budding in yeasts, fruiting bodies in fungi)
 - Asexual cell division (mushroom spores produced/dispersed)
 - Sexual reproduction (e.g., eggs, seeds, fruit)
- e. Give examples of how consumers and producers (carnivores, herbivores, omnivores, and decomposers) are related in food chains and food webs. (DOK 1)

EARTH AND SPACE SCIENCE

4. Develop an understanding of the properties of Earth materials, objects in the sky, and changes in Earth and sky.

- a. Categorize Earth's materials. (DOK 1)
- Rocks, minerals, soils, water, and atmospheric gases
 - Layers of the atmosphere, hydrosphere, and lithosphere
- b. Explain how surface features caused by constructive processes (e.g., depositions, volcanic eruptions, earthquakes) differ from destructive processes (e.g., erosion, weathering, impact of organisms). (DOK 2)
- c. Summarize how weather changes. (DOK 2)
- Weather changes from day to day and over the seasons
 - Tools by which weather is observed, recorded, and predicted
- d. Describe changes caused by humans on the environment and natural resources and cite evidence from research of ways to conserve natural resources in the United States, including (but not limited to) Mississippi. Examples of Mississippi efforts include the following: (DOK 2)
- Associated Physics of America, a private company located in Greenwood Mississippi, develops ways to convert a variety of agricultural products into efficient, environment-friendly and cost-effective energy sources.
 - The Natural Resource Enterprises (NRE) Program of the Department of Wildlife and Fisheries and the Cooperative Extension Service at MSU educate landowners in the Southeast about sustainable natural resource enterprises and compatible habitat management practices.
 - The Engineer Research and Development Center of the Vicksburg District of the U.S. Army Corps of Engineers provides quality engineering and other professional products and services to develop and manage the Nation's water resources, reduce flood damage, and protect the environment.
- e. Predict the movement patterns of the sun, moon, and Earth over a specified time period. (DOK 1)
- f. Compare and contrast the physical characteristics of the planets (e.g., mass, surface gravity, distance from the sun, surface characteristics, moons). (DOK 2)

- g. Conclude that the supply of many Earth resources (e.g., fuels, metals, fresh water, farmland) is limited and critique a plan to extend the use of Earth's resources (e.g., recycling, reuse, renewal). (DOK 3)