

FOURTH GRADE

The *Fourth Grade* competencies and objectives are designed to build on concepts and processes learned in Kindergarten through Third grade. Students explore and investigate the diversity of organisms, environmental concerns, matter, forces, and energy. Students apply their understanding of appropriate science concepts, principles, laws and theories in interacting with society and the environment and use the processes of science in solving problems, making decisions, and furthering understanding.

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.

FOURTH GRADE

CONTENT STRANDS:

Inquiry

Physical Science

Life Science

Earth and Space Science

COMPETENCIES AND OBJECTIVES:

INQUIRY

1. Explain and use skills necessary to conduct scientific inquiry.

- a. Form hypotheses and predict outcomes of problems to be investigated. (DOK 3)
- b. Use the senses and simple tools to gather qualitative information about objects or events (size, shape, color, texture, sound, position, change). (DOK 1)
- b. Demonstrate the accurate use of simple tools to gather and compare information (DOK 1)
 - Tools (English rulers [to the nearest eighth of an inch], metric rulers [to the nearest centimeter], thermometers, scales, hand lenses, microscopes, balances, clocks, calculators, anemometers, rain gauges)
 - Types of data (height, mass/weight, temperature, length, distance, volume, area, perimeter)
- d. Use simple sketches, diagrams, tables, charts, and writing to draw conclusions and communicate data results. (DOK 2)
- e. Interpret and describe patterns of data using drawings, diagrams, charts, tables, graphs, and maps. (DOK 2)
- f. Explain why scientists and engineers often work in teams with different individuals doing different things that contribute to the results. (DOK 2)
- g. Draw conclusions about important steps (e.g., making observations, asking questions, trying to solve a problem, etc.) that led to inventions and discoveries. (DOK 3)

PHYSICAL SCIENCE

2. Use the properties of objects and materials, position and motion of objects, and transfer of energy to develop an understanding of physical science concepts.

- a. Recognize that materials may be composed of parts that are too small to be seen without magnification. (DOK 1)

- b. Distinguish between physical and chemical changes and between objects composed of a single substance from those composed of more than one substance. (DOK 2)
- c. Determine the causes and effects of forces on motion. (DOK 2)
 - Force exerted over a distance causes work to be done and that the result (work) is the product of force and distance
 - Friction on moving objects and actions that increase or decrease friction
 - Momentum and inertia
- d. Explain how energy flowing through an electrical circuit can be converted from electrical energy to light, sound, or heat energy. (DOK1)
 - Parts of an electric circuit and resulting actions when circuits are opened or closed
 - Construction and uses of electromagnets
 - Energy transferred through an electrical circuit to a bulb or bell to its surroundings as light, sound, and heat (thermal) energy
- e. Describe how light behaves (travels in a straight line, is absorbed, reflected, refracted, or appears transparent or translucent). (DOK 1)
- f. Investigate and draw conclusions about the relationship between the rate of vibrating objects and the pitch of the sound. (DOK 3)
- g. Describe how heat flows from a warm object to a cold one and categorize examples of materials that may or may not be used as insulators. (DOK 2)

LIFE SCIENCE

3. Analyze the characteristics, structures, life cycles, and environments of organisms.

- a. Describe the cause and effect relationships that explain the diversity and evolution of organisms over time. (DOK 2)
 - Observable traits due to inherited or environmental adaptations
 - Variations in environment (over time and from place to place)
 - Variations in species as exemplified by fossils
 - Extinction of a species due to insufficient adaptive capability in the face of environmental changes
- b. Classify the organs and functions of the nervous, circulatory, and respiratory systems of the body. (DOK 1)
- c. Compare characteristics of organisms, including growth and development, reproduction, acquisition and use of energy, and response to the environment. (DOK 2)
 - Life cycles of various animals to include complete and incomplete metamorphosis
 - Plant or animal structures that serve different functions in growth, adaptation, and survival
 - Photosynthesis

- d. Distinguish the parts of plants as they relate to sexual reproduction and explain the effects of various actions on the pollination process (e.g., wind, water, insects, adaptations of flowering plants, negative impacts of pesticides). (DOK 2)
- e. Analyze food webs to interpret how energy flows from the sun. (DOK 2)
- f. Describe the structural and functional relationships among the cells of an organism. (DOK 2)
 - Benefit from cooperating
 - Vary greatly in appearance
 - Perform very different roles

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. Classify sedimentary, metamorphic, and igneous rocks. (DOK 2)
- b. Compare and contrast Earth's geological features and the changes caused by external forces. (DOK 2)
 - Bodies of water, beaches, ocean ridges, continental shelves, plateaus, faults, canyons, sand dunes, and ice caps
 - External forces including heat, wind, and water
 - Movement of continental plates
- c. Investigate, record, analyze and predict weather by observing, measuring with simple weather instruments (thermometer, anemometer, wind vane, rain gauge, barometer and hygrometer), recording weather data (temperature, precipitation, sky conditions, and weather events), and using past patterns to predict future patterns. (DOK 2)
- d. Describe how human activities have decreased the capacity of the environment to support some life forms. (DOK 2)
 - Reducing the amount of forest cover
 - Increasing the amount of chemicals released into the atmosphere
 - Farming intensively
- e. Compare and contrast the seasons and explain why seasons vary at different locations on Earth. (DOK 2)
- f. Describe objects in the universe including their movement. (DOK 2)
 - Physical features of the moon (craters, plains, mountains)
 - Appearance and movement of Earth and its moon (e.g., waxing/waning of the moon and lunar/solar eclipses)
 - Why a planet can be seen in different constellations (locations) at different times
- g. Summarize the process that results in deposits of fossil fuels and conclude why fossil fuels are classified as nonrenewable resources. (DOK 2)