SEVENTH GRADE: OVERVIEW

The academic standards for seventh grade establish the content knowledge and skills for Tennessee students necessary to prepare them for the rigorous levels of higher education and future job markets. The course provides students with a wealth of experiences for both science practices and content knowledge. The academic standards for science in seventh grade are research-based and supported by the National Research Council's *Framework for K-12 Science Education.*

The academic standards herein establish the core content and practices of science and engineering, as well as what Tennessee students need to know by the end of seventh grade. Disciplinary core ideas for seventh grade include:

Seventh Grade			
Physical Sciences (PS)	Life Sciences (LS)	Earth and Space Sciences (ESS)	Engineering, Technology, and Applications of Science (ETS)
Matter and Its Interactions	From Molecules to Organisms: Structure and Process	Earth's Place in the Universe	Engineering Design
Motion and Stability: Forces and Interactions	Ecosystems: Interactions, Energy, and Dynamics	Earth's Systems	Links Among Engineering, Technology, Science, and Society
Energy	Heredity: Inheritance and Variation of Traits	Earth and Human Activity	Applications of Science
Waves and Their Applications in Technologies for Information Transfer	Biological Change: Unity and Diversity		

The standards incorporated into this grade have been streamlined for the students' K-12 coherent experience for a diversity of learners. The theme for seventh grade science is how matter and reactions are the basis for life science, particularly the molecules that make up life (LS1) DNA/proteins, and their hierarchy to organ systems and heredity; and biogeochemical cycles (LS2) carbon and oxygen cycling through photosynthesis and aerobic cellular respiration. Earth and space science standards are addressed from a perspective based on matter and reactions (atmospheric composition, combustion, and climate change). Tennessee's state mathematics standards are integrated into the science standards, specifically connecting proportional reasoning with whole number multiplication and division. Special attention is given to science literacy through the use of the science and engineering practices. Students are often required to gather information from reliable sources to construct evidenced-based arguments (e.g., 7.LS1.6).

By the end of seventh grade, it is expected that students should be able to demonstrate the skills and content knowledge emphasized in the following standards in preparation for future learning in science and its practice.

SEVENTH GRADE: ACADEMIC STANDARDS

7.PS1: Matter and Its Interactions

1) Develop and use models to illustrate the structure of atoms, including the subatomic particles with their relative positions and charge.

2) Compare and contrast elemental molecules and compound molecules.

3) Classify matter as pure substances or mixtures based on composition.

4) Analyze and interpret chemical reactions to determine if the total number of atoms in the reactants and products support the Law of Conservation of Mass.

5) Use the periodic table as a model to analyze and interpret evidence relating to physical and chemical properties to identify a sample of matter.

6) Create and interpret models of substances whose atoms represent the states of matter with respect to temperature and pressure.

7.LS1: From Molecules to Organisms: Structures and Processes

1) Develop and construct models that identify and explain the structure and function of major cell organelles as they contribute to the life activities of the cell and organism.

2) Conduct an investigation to demonstrate how the cell membrane maintains homeostasis through the process of passive transport.

3) Evaluate evidence that cells have structural similarities and differences in organisms across kingdoms.

4) Diagram the hierarchical organization of multicellular organisms from cells to organism.

5) Explain that the body is a system comprised of subsystems that maintain equilibrium and support life through digestion, respiration, excretion, circulation, sensation (nervous and integumentary), and locomotion (musculoskeletal).

6) Develop an argument based on empirical evidence and scientific reasoning to explain how behavioral and structural adaptations in animals and plants affect the probability of survival and reproductive success.

7) Evaluate and communicate evidence that compares and contrasts the advantages and disadvantages of sexual and asexual reproduction.

8) Construct an explanation demonstrating that the function of mitosis for multicellular organisms is for growth and repair through the production of genetically identical daughter cells.

9) Construct a scientific explanation based on compiled evidence for the processes of photosynthesis, cellular respiration, and anaerobic respiration in the cycling of matter and flow of energy into and out of organisms.

7.LS2: Ecosystems: Interactions, Energy, and Dynamics

1) Develop a model to depict the cycling of matter, including carbon and oxygen, including the flow of energy among biotic and abiotic parts of an ecosystem.

7.LS3: Heredity: Inheritance and Variation of Traits

1) Hypothesize that the impact of structural changes to genes (i.e., mutations) located on chromosomes may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

2) Distinguish between mitosis and meiosis and compare the resulting daughter cells.

3) Predict the probability of individual dominant and recessive alleles to be transmitted from each parent to offspring during sexual reproduction and represent the phenotypic and genotypic patterns using ratios.

7.ESS3: Earth and Human Activity

1) Graphically represent the composition of the atmosphere as a mixture of gases and discuss the potential for atmospheric change.

2) Engage in a scientific argument through graphing and translating data regarding human activity and climate.

7.ETS2: Links Among Engineering, Technology, and Applications of Science

1) Examine a problem from the medical field pertaining to biomaterials and design a solution taking into consideration the criteria, constraints, and relevant scientific principles of the problem that may limit possible solutions.