Strand:
S1 Scientific Inquiry

The student demonstrates abilities necessary to do scientific inquiry and an understanding about scientific inquiry; that is, the student:

Standards:

S1a: develops research questions that can be answered through scientific investigations.

S1b: accesses, evaluates and uses information from a variety of reliable scientific sources.

S1c: designs, conducts and records scientific investigations following the general procedures of scientific inquiry.

S1d: applies appropriate tools and techniques to systematically collect, record, analyze, and interpret data.

S1e: develops logical descriptions, explanations, predictions, and models using evidence.

S1f: recognizes and analyzes interpretations, conclusions, and predictions based upon alternative evidence and explanations.

S1g: communicates scientific procedures, explanations, and conclusions using appropriate scientific language and writing, and mathematics.

Strand:
S2 History and Nature of Science

The student demonstrates an understanding of science as a human endeavor and the history and nature of science; that is, the student:

Standards:

S2a: cites examples of scientists from diverse backgrounds, and explains how they use scientific habits of mind (such as: reasoning, insight, skill, creativity, intellectual honesty, tolerance for ambiguity, skepticisms, and openness to new ideas) in their work.

S2b: explains how scientists formulate and test their explanations, revising when necessary.

S2c: investigates and explains how scientists communicate their results and ideas, and describes and identifies situations in which scientists disagree about interpretation of evidence.

S2d: examines the effects of science on cultural development and states the relationship between scientific innovation and human history.

Strand:
S3 Science in Personal and Social Perspectives

The student demonstrates an understanding of safety, natural and human hazards, and their risks and benefits; that is, the student:

Standards:

S3a: demonstrates personal and group safety and resource conservation when engaged in science.

S3b: thinks critically and analyzes risks and benefits associated with natural, chemical, biological, and personal hazards.

S3c: evaluates the interrelationships of environmental degradation on the global community.

Strand:
S4 Science and Technology

The student demonstrates an understanding about science and technology and the nature of technological design; that is, the student:

Standards:

S4a: assesses societal challenges that may inspire scientific research.

S4b: evaluates an invention or design and proposes modifications.

S4c: identifies a technological problem and develops a plan for design, implementation, and evaluation.

S4d: explores how technological risks lead to new technologies and how unintended consequences impact society.

S4e: analyzes how technology responds to societal, political, and economic needs.

Strand:

S5 Physical Science

The student demonstrates a conceptual understanding of matter, motions and forces, and transfer of energy; that is, the student:

Standard:

S5a: examines density, boiling point, and chemical reactivity of materials and explains conservation of matter.

Components:

S5a.1: Density is a basic identifying property of matter. The density of a substance indicates how tight the particles of a substance are packed together within the substance. The tighter the particles are packed, the higher the density of the substance.

S5a.2: Solubility is the measure of how well substances dissolve with other substances. Water is the universal solvent. Many substances dissolve in water, which may greatly facilitate reactions between them.

S5a.3: The temperature at which a substance changes from a liquid state to a gaseous state is known as its boiling point.

S5a.4: Chemical reactivity is how matter behaves during a chemical reaction. Many factors can influence chemical reaction rates temperature, acidity, and concentration.

S5a.5: The number of atoms in a chemical or physical change stays the same. Their total mass remains the same, no matter how the atoms are rearranged.

S5a.6: The conservation of matter states that matter can neither be created nor destroyed, but its form may be changed.

Standard:

S5b: determines and communicates the relationship between motions and forces, including inertia and net effects of balanced and unbalanced forces.

Components:

S5b.1: Inertia exists when objects remain at rest or move at constant speed and direction because the forces acting on the objects are balanced.

S5b.2: An unbalanced force will cause changes in the speed or direction of an object's motion.

Standard:

S5c: compares and explains different forms of energy as heat, light, electrical, mechanical, sound, and chemical.

Components:

S5c.1: Vibrations (e.g., sound) move at different speeds in different materials, have different wavelengths, and set up wave-like disturbances that spread away from the source.

S5c.2: Light interacts with matter by refraction, reflection, scattering, and absorption.

S5c.3: The sun releases energy by emitting light and heat. A tiny fraction of that energy reaches the Earth as wavelengths in such forms as infrared, visible light, and ultraviolet radiation.

S5c.4: Chemical energy is produced by chemical reactions and is dependent upon the arrangements of atoms.

S5c.5: Mechanical energy is in moving bodies.

Strand:
S6 Life Science

The student demonstrates a conceptual understanding of the structure and function of living systems, populations and ecosystems; that is, the student:

Standard:

S6a: applies the concept of system failure to disease in the human organism at the cellular, tissue, organ, and system levels.

Components:

S6a.1: Like other multicellular organisms, humans have body systems for obtaining and providing energy, defense, reproduction, and the coordination of body functions.

S6a.2: A disease is an abnormal condition in the structures or functions of an organism. Some diseases (e.g., heart disease, anemia, diabetes) are the result of internal failures of cells, tissues, organs and systems. Others are due to the damage caused by harmful chemicals (e.g., asbestos, lead, arsenic) and the infection by organisms (e.g., yellow fever, food poisoning).

S6a.3: Toxic substances, some dietary habits, and personal behavior may be harmful to one's health. Some effects show up right away, others may take many years to show signs of harmful effects.

S6a.4: Viruses, bacteria, fungi, and parasites may infect the human body and interfere with normal body structures and functions.

S6a.5: White blood cells engulf invaders or produce antibodies that attack them or mark them for killing by other white cells. The antibodies produced will remain and can fight off subsequent invaders of the same kind.

Standard:

S6b: determines and compares the role of heredity and natural selection for survival of human and non-human organisms.

Components:

S6b.1: Small differences between parents and offspring can accumulate through selective breeding and/or genetic mutations in successive generations. The descendants can be very different from their ancestors as a result of this process.

S6b.2: Individual organisms with certain favorable heritable characteristics (traits) are more likely than others to survive and have offspring. Changes in the environment can affect the survival of individual organisms or the entire species.

S6b.3: The proportion of individuals that have advantageous characteristics will increase. This is how natural selection serves as a mechanism for evolution.

Standard:

S6c: generalizes how adaptive characteristics of a species (a population) influence their chance for survival or possible extinction.

Components:

S6c.1: Animals and plants have a great variety of body plans and internal structures that contribute to their being able to make or find food and reproduce.

S6c.2: Species acquire many of their unique characteristics through biological adaptation, which involves the selection of naturally occurring variations in populations.

S6c.3: Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproduction success in a particular environment.

Strand:
S7 Earth and Space Sciences

The student demonstrates a conceptual understanding of the Earth's systems and history; that is, the student:

Standard: **S7a:** analyzes and evaluates the impact of constructive and destructive forces on the Earth and its inhabitants over geologic time.

Components:

S7a.1: The Earth's processes we see today, including erosion, movement of lithospheric plates, and changes in atmosphere composition, are consistent to those that occurred in the past.

S7a.2: Earthquakes and volcanoes can have a radical effect on the Earth and its inhabitants.

S7a.3: Comets and asteroids orbit the sun. On rare occasions their orbital paths cross Earth's orbit and sometimes impact the ground resulting in climatic changes.

S7a.4: Landforms are the result of a combination of constructive and destructive forces.

Standard: **S7b:** examines and interprets the Earth's stratigraphic record in relation to constructive and destructive forces.

Components:

S7b.1: Scientists examine the Earth's rock layers to learn more about its geologic history. They examine rock layers to determine the age, origin, history, catastrophic events and fossil/mineral content of rocks.

S7b.2: A study of the Earth's history provides evidence about the changes that took place with the planet's main features – distribution of land and sea, features of the crust, composition of the atmosphere, global climates, and populations of living organisms in the biosphere. Fossils provide evidence of how life and environmental conditions have changed.

Standard: **S7c:** compares the Sun to other stars and galaxies.

Components:

S7c.1: Stars differ from each other in many ways (e.g., size, temperature, age, location).

S7c.2: The Sun is many thousands of times closer to the Earth than any other star. Light from the sun takes a few minutes to reach the Earth, but light from the next nearest star takes a few years to arrive. The trip to that star would take the fastest rocket thousands of years. Some distant galaxies are so far away that their light takes several billion years to reach the Earth. People on Earth, therefore, see them as they were that long ago in the past.

S7c.3: The Sun is a medium-sized star located near the edge of a disk-shaped galaxy of stars, part of which can be seen as a glowing band of light that spans the sky on a very clear night. The universe contains many billions of galaxies, and each galaxy contains many billions of stars. To the naked eye, even the closest of these galaxies is no more than a dim, fuzzy spot.