Science Grade 7

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: recognizes that scientists are from diverse backgrounds, but that all 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 identifies 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 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.

S3b: thinks critically about risks and benefits of natural, chemical, biological, and personal hazards.

S3c: explains environmental degradation on a global scale.

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: explains how societal challenges may impact scientific research.

S4b: tests a design or invention and evaluates its effectiveness.

S4c: compares the intended benefits and unintended consequences of technology and how it impacts society.

S4d: describes how technology responds to societal 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: compares and contrasts chemical and physical properties of matter and groups materials according to those properties and their changes.

Components:

S5a.1: Atoms and molecules are perpetually in motion. Increased temperature means greater average energy, so most substances expand when heated. In solids, the atoms are closely locked in position and can only vibrate. In liquids, the atoms or molecules have higher energy, are more loosely connected, and can slide past one another; some molecules may get enough energy to escape into a gas. In gases, the atoms or molecules have still more energy and are free of one another except during occasional collisions.

S5a.2: Matter reacts chemically with other matter to form compounds with different chemical and physical properties. In chemical reactions, the total mass is conserved.

S5a.3: Substances often are placed in categories or groups if they react in similar ways; metals are an example of such a group.

Standard:

S5b: designs and conducts investigations to calculate the speed of moving objects and determine the forces acting on the object.

Components:

S5b.1: The motion of an object can be described by its position, direction of motion, and speed. That motion can be measured and represented on a graph.

S5b.2: Forces cause objects to speed up or slow down. Frictional force always works against the direction of motion and speed.

S5b.3: Every object exerts gravitational force on every other object. The force depends on how much mass the objects have and on how far apart they are. The force is hard to detect unless at least one of the objects has a lot of mass.

S5b.4: The sun's gravitational pull holds the Earth and other planets in their orbits, just as the planets' gravitational pull keeps their moons in orbit around them.

Standard:

S5c: compares types of energy and explains how energy is transformed.

Components:

S5c.1: Energy appears in different forms. Heat energy is in the disorderly motion of molecules; chemical energy is in the arrangement of atoms; mechanical energy is in moving bodies; gravitational energy is in the separation of mutually attracting masses.

S5c.2: When an object has potential energy because of its position, potential energy is transformed to kinetic energy when the object moves.

S5c.3: Most of what goes on in the universe—from exploding stars and biological growth to the operation of machines and the motion of people—involves some form of energy being transformed into another. Energy in the form of heat is almost always one of the products of an energy transformation.

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: communicates an understanding of the specialized structures and functions found in humans (multicellular organisms).

Components:

S6a.1: All organisms are composed of cells. Most organisms are single cells while others, including humans, are multicellular.

S6a.2: Multicellular organisms have specialized cells that perform specialized functions.

S6a.3: The human organism has specialized structures (i.e., tissues and organs) that perform specialized functions.

S6a.4: The human organism has systems for digestion, respiration, reproduction, circulation, excretion, movement, control, coordination, and protection from disease. These systems interact with one another.

Standard:

S6b: examines the influence of genes and the environment on trait expression in organisms.

Components:

S6b.1: Genes contain the genetic information for expressing traits.

S6b.2: Individual organisms with certain traits are more likely than others to survive and have offspring.

S6b.3: New varieties of cultivated plants and domestic animals have resulted from selective breeding for particular traits.

S6b.4: Characteristics of organisms can be described in terms of a combination of traits. Some traits are inherited while others result from interactions with the environment.

Standard:

S6c: predicts how environmental changes may impact the survival of organisms.

Components:

S6c.1: In all environments—freshwater, marine, forest, desert, grassland, mountain, and others—organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter. The growth and survival of organisms depend on the physical conditions of both the organism and the environment.

S6c.2: Changes in environmental conditions can affect the survival of individual organisms and entire species.

S6c.3: Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow it survival.

Strand:
S7 Earth and Space Sciences

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

Standard:	**S7a:**	compares constructive and destructive forces (e.g., plate tectonics, volcanoes, earthquakes) that cause rapid changes on the Earth's surface.
Components:	**S7a.1:**	Lithospheric plates on the scales of continents and oceans constantly move at very small rates per year in response to movements in the mantle. Rapid geological events (e.g., earthquakes, volcanic eruptions) result from these plate motions.
	S7a.2:	The interior of the Earth is hot. Heat flow and movement of material within the Earth result in earthquakes and volcanic eruptions.
Standard:	**S7b:**	analyzes the four major interacting components (i.e., geosphere, hydrosphere, atmosphere, and biosphere) of the Earth's system.
Components:	**S7b.1:**	Scientists study the geosphere, the Earth's core, mantle, and crust; the hydrosphere, its water; the atmosphere, the gases surrounding the Earth; and the biosphere, all life on Earth and the physical environment that supports it.
	S7b.2:	Fresh water, limited in supply, is essential for life and also for most industrial processes. Rivers, lakes, and groundwater can be depleted or polluted, becoming unavailable or unsuitable for life.
	S7b.2:	Changes in environmental conditions can affect the survival of individual organisms and entire species.
Standard:	**S7c:**	describes and illustrates the features and structure of the sun and moon.
Components:	**S7c.1:**	The Sun and the Moon have distinctive features.
	S7c.2:	The Sun is the major source of energy for phenomena on the Earth's surface.
	S7c.3:	The Sun, like all stars, is composed of gases.
	S7c.4:	The Moon is the Earth's single, natural satellite with no atmosphere, less gravitational force than Earth, no weather, and a surface that's consistent with frequent impact from space objects.