Science Standards
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 scienceas 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 Personal & 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:

Standards: S5a: investigates how substances combine to form homogeneous mixtures, and how those mixtures can be separated.

Components:

S5a1. distinguishes between a solution and a mixture.

S5a2. demonstrates ways in which mixtures of substances can be physically separated into the original substances (e.g., filtering, chromatography).

S5a3. shows and explains how the concentration of a solution can be changed by varying the amount of solute or solvent.

S5a4. demonstrates that many substances dissolve in water.

S5a5. shows through investigations that the solubility of a solute can vary in different solvents.

S5a6. distinguishes between a mixture and a compound.

S5a7. determines that the mass of a mixture is equal to the sum of the masses f its components.

Standards: S5b: compares chemical and physical properties of matter and groups substances according to those properties and their changes.

Components:

S5b1. recognizes and distinguishes chemical and physical properties.

S5b2. cites evidence to show that groups of substances have similar properties (e.g., metals).

S5b3. demonstrates that substances can be sorted into categories or groups based on their physical and chemical properties.

Standards: S5c: investigates sequences of energy transformations in circuits.

Components:

S5c1. explains that energy can appear in different forms and can be changed from one form to another (describes the flow of energy from a source [e.g., a battery], through a circuit, to a device [e.g., a light bulb, a motor]).

S5c2. investigates and compares how different circuits (e.g., parallel, series) affect the amount of electrical energy transferred to a device.

S5c3. cites evidence to explain how electrical energy is transformed into heat energy through resistance.

S5c4. explains that energy in the form of heat is often one of the products of an energy transformation.

S5c5. uses current, voltage, and resistance to describe how much electrical energy is delivered to a device within a circuit.

Standards: S5d: investigates the relationships among force, mass, and motion of an object or system.

Components:

S5d1. conducts investigations to determine the speed of moving objects.

S5d2. measures and describes the motion of an object in term of its position, direction of motion and speed, and represents that motion on a graph.

S5d3. cites evidence to explain that unbalanced forces cause changes in the speed and direction of an object's motion.

S5d4. analyzes the forces that are involved in maintaining the motion of an object (i.e., objects at rest and objects moving at a constant velocity).

S5d5. relates mass to the tendency of an object to maintain its motion.

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:

Standards: S6a: communicates an understanding of the specialized structures and functions found in multi-cellular organisms including humans.

Components:

S6a1. assesses through observations and investigations the functions of the digestive, respiratory, reproductive, circulatory, excretory, nervous, and immune systems.

S6a2. analyzes the complementary nature of structure and function at all levels of organization in organisms including humans.

S6a3. observes and draws examples of specialized cells, and illustrates how these cells perform specialized functions in multi-cellular organisms.

S6a4. shows, using microscopes or video technology, how groups of specialized cells cooperate to form a tissue (e.g., muscle).

S6a5. investigates and illustrates how groups of tissue cooperate to form organs.

S6a6. explains that cells, tissues, and organs have functions that serve the whole organism.

Standards: S6b: assesses similarities and differences among internal structures in diverse organisms.

Components:

S6b1. compares and contrasts, through observations and investigations, the internal structures of a variety of multi-cellular organisms.

S6b2. recognizes the unity among diverse organisms by providing examples of similar internal structures that accomplish similar functions.

Standards: S6c: analyzes mechanisms for disease at the cellular, tissue, organ, and system levels.

Components:

S6c1. describes that disease is a breakdown in the structures or functions of an organism.

S6c2. explains how infectious agents can disrupt system, organ, tissue, and cell function.

S6c3. compares and contrasts bacterial, viral, and parasitic infections.

S6c4. recognizes that some diseases are the result of intrinsic failure of the system.

Standards: S6d: explains the influence of genes and the environment on trait expression in organisms.

Components:

S6d1. identifies that, in sexual reproduction, half of the genes come from each parent.

S6d2. explains that a fertilized egg carries genetic information from both parents.

S6d3. explains why sexual reproduction results in genetic variation.

S6d4. Observes and explains that organisms are a combination of traits, some inherited and others resulting from interactions with the environment.

S6d5. Explains that chromosomes contain genes, and that each gene carries a single unit of hereditary information.

S6d6. Collects and analyzes data on the transmission of inherited traits.

S6d7. Shows through experimental results that parents can be selected to achieve desired traits (selective breeding).

Standards: S6e: Describes growth processes.

Components:

S7e1. Observes (using microscopes or video technology) and illustrates how multi-cellular organisms grow from a single fertilized cell through cell division.

S7e2. Explains that as a fertilized cell divides, the same genetic information is copied in each cell.

Strand:

S7 Earth & Space Sciences: The student demonstrates a conceptual understanding of Earth's systems, history, and place in the solar system; that is, the student:

Standards: S7a: recognizes how the movement of earth's lithospheric plates causes both slow changes in earth's surface (e.g., formation of mountains and ocean basins) and rapid ones (e.g., volcanic eruptions and earthquakes).

Components:

S7a1. models how heat flow and movement of material within the mantle results in the constant movement of lithospheric plates on the surface, at rates of centimeters per year.

S7a2. differentiates between types of plate boundaries and the kinds of slow and rapid changes that can occur at these boundaries.

S7a3. distinguishes the characteristics and formation of sedimentary, metamorphic, and igneous rock, in the process described as the "rock cycle."

S7a4. explains how each type of rock can be transformed into the other under condition of time, pressure, and heat.

Standards: S7b: analyzes the constructive and destructive forces that impact earth and its inhabitants over geologic time.

Components:

S7b1. explains how the natural processes that cause changes in earth's surface today are consistent with those that occurred in the past.

S7b2. verifies, using a variety of evidence (such as the fossil record, rock formations, and glaciation patterns) the idea of continental drift.

S7b3. demonstrates how the stratigraphic record (rock layers) can be used to create a timeline of events, climate conditions, and life forms in earth's history.

Standards: S7c: compares and contrasts the motion, properties and characteristics of objects in the solar system.

Components:

S7c1. differentiates groups of objects in the solar system—including the Sun, the planets and their moons and rings, smaller objects such as asteroids and comets—by their physical properties and position in the solar system.

S7c2. compares and contrasts the properties and characteristics of earth with those of the other planets in our solar system.

S7c3. explains, based on naked eye and telescopic observation, how objects in the solar system change position against the background of stars.