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**Science Standards  
Grade 6**

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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 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, interpret and present 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 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: describes how doing science requires varying human abilities, interest and habits of mind (such as: reasoning, insight, skill, creativity, intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas.)
  - S2b: identifies contributions of individuals from diverse cultures who have extended the knowledge in science and technology.
  - S2c: explains how the effects of science and technology affect cultural development, innovation and human history.

Strand:

**S3 Personal & Social Perspectives:** The student demonstrates an understanding of safety and risks and benefits associated with natural and personal hazards; that is, the student:

Standards: S3a: demonstrates personal and group safety and resource conservation.

S3b: compares the safety precautions needed during different natural hazards.

S3c: describes the risks, costs, and benefits of human decisions related to natural hazards.

S3d: explores causes of environmental degradation and resources depletion.

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: explores how societal challenges may drive scientific research.

S4b: designs and conducts a test on an invention (or existing product) based on specified criteria.

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: examines characteristic physical properties of matter.

Components:

S5a1. explains that every substance has a distinct boiling point, and this property is independent of the quantity of the substance.

S5a2. demonstrates and distinguishes between ways to measure mass and volume of liquids, solids, and gases.

S5a3. analyzes data to determine the relationship between mass and volume for a variety of substances, and shows that the relationship is constant for a substance.

S5a4. explains that density is an identifying property that is independent of the quantity of material.

S5a5 Shows that equal volumes of different substances usually have different masses."

Standards: S5b: investigates how vibrations in materials set up wavelike disturbances that spread away from the source.

Components:

S5b1. models and describes the characteristic properties of waves, such as wavelength, frequency, amplitude, and speed.

S5b2. models and describes wave behaviors (i.e., reflection and refraction).

Standards: S5c: investigates how radiant energy (light) interacts with matter.

Components:

S5c1. demonstrates through investigations that light can be reflected, transmitted, and/or absorbed when it strikes an object.

S5c2. Explores how transmitted light is refracted to different degrees by a variety of materials.

S5c3. groups materials based on physical properties that affect the behavior of light (e.g., transparent, translucent, opaque, absorbent, reflective materials).

S5c4. investigates and explains that an object can be seen when light waves emitted or reflected by it enter the eye.

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: compares and contrasts structure and function in unicellular and multi-cellular organisms.

Components:

S6a1. describes basic functions that all cells must carry out (e.g., extracts energy from food, eliminates waste), citing evidence from microscopic examination of unicellular organisms.

S6a2. describes structures (e.g., cell membrane, nucleus) that many cells share to carry out essential functions.

S6a3. relates the structures used by unicellular organisms to the structures used by multi-cellular organisms.

S6a4. compares and contrasts plant and animal cells, using microscopes or video technology.

S6a5. Compares and contrasts the diverse structures that unicellular organisms use to survive, citing evidence from microscopic observations.

S6a6. Explains how diverse species of animals, plants, and micro-organisms share essential similarities in cell organelles and cell processes.

Standards: S6b: explains that reproduction is a characteristic of life and essential to the continuance of a species.

Components:

S6b1. compares and contrasts asexual and sexual reproduction.

S6b2. identifies examples of asexual reproduction and sexual reproduction.

S6b3. investigates and describes the functions of reproductive structures in plants.

S6b4. explains how, in sexual reproduction of animals and flowering plants, a male sperm cell and a female egg cell merge to form a fertilized cell.

S6b5. Describes ways in which physical traits (e.g., of a flowering plant) might maximize the chances of successful reproduction.

Standards: S6c: analyzes the functions of and relationships among producers, consumers, and decomposers in ecosystems.

Components:

S6c1. categorizes organisms according to the function they serve as consumers, producers, and decomposers.

S6c2. determines through investigations the raw materials plants need to photosynthesize.

S6c3. explains why photosynthetic organisms are called producers.

S6c4. investigates and explains the importance of decay in an ecosystem.

S6c5. describes the flow of energy and matter through food webs for various ecosystems.

S6c6. identifies sunlight as the original source of energy for most ecosystems.

S6c7 identifies the two main interconnected global food webs (i.e., one that includes microscopic ocean plants, and the other that includes land plants).

S6c8. distinguishes between biotic and abiotic factors in multiple ecosystems.

S6c9. distinguishes among individuals, populations, communities, and ecosystems.

S6c10. collects data on and describes the interactions among organisms and between organisms and the physical environment in multiple ecosystems.

Strand:

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

Standards: S7a: differentiates the layers of the geosphere, including the crust, the hot convecting mantle, and the dense metallic core.

Components:

S7a1. distinguishes among layers of the geosphere by their composition, state, positions relative to one another, and temperature

S7a2. explains how heat is transferred, by convection, from the core to the mantle and crust.

Standards: S7b: applies concepts of rotation, revolution, and alignment to explain the predictable patterns of phasing, eclipses and seasons.

Components:

S7b1. differentiates between rotation and revolution.

S7b2. demonstrates and explains that the rotation of earth produces the night and day cycle, and its revolution produces the year.

S7b3. models how the moon's phases can be explained by simulating the moon's orbit around the earth and its position relative to the earth and Sun.

S7b4. demonstrates the situations that will result in lunar and solar eclipses as seen from earth.

S7b5. relates seasons on earth to variations in the amount of the Sun's energy that strikes different latitudes on the surface of the earth, due to earth's tilted axis of rotation.

Standards: S7c: recognizes that gravity is the force that pulls all things towards earth's center, and governs the motions of objects in the solar system and the universe beyond.

Components:

S7c1. explains how earth's spherical shape and the force of gravity hold us on earth and cause all objects on earth to fall towards earth's center.

S7c2. Explains that most objects in the solar system are in regular and predictable motion and that this motion is caused largely by the force of gravity.

S7c3. illustrates how the gravitational attractions of the Sun and moon in different positions relative to earth cause tides on earth.