Mississippi Science

Grade Five

Life Science L

3 Ecology and Interdependence L.5.3

Conceptual Understanding: All organisms need energy to live and grow. Energy is obtained from the sun. Cells transform the energy that organisms need to perform essential life functions through a complex sequence of reactions in which chemical energy is transferred from one system of interacting molecules to another.

A Students will demonstrate an understanding of photosynthesis and the transfer of energy from the sun into chemical energy necessary for plant growth and survival. L.5.3A

1 Research and communicate the basic process of photosynthesis that is used by plants to convert light energy into chemical energy that can be stored and released to fuel an organism's activities. L.5.3A.1

2 Analyze environments that do not receive direct sunlight and devise explanations as to how photosynthesis occurs, either naturally or artificially. L.5.3A.2

Conceptual Understanding: A major role an organism serves in an ecosystem can be described by the way in which it obtains its energy. Energy is transferred within an ecosystem by producers, consumers, or decomposers. A healthy ecosystem is one in which diverse populations of life forms can meet their needs in a relatively stable web of life.

B Students will demonstrate an understanding of a healthy ecosystem with a stable web of life and the roles of living things within a food chain and/or food web, including producers, primary and secondary consumers, and decomposers. L.5.3B

1 Obtain and evaluate scientific information regarding the characteristics of different ecosystems and the organisms they support (e.g., salt, and fresh water, deserts, grasslands, forests, rain forests, or polar tundra lands). L.5.3B.1

2 Develop and use a food chain model to classify organisms as producers, consumers, or decomposers. Trace the energy flow to explain how each group of organisms obtains energy. L.5.3B.2

3 Design and interpret models of food webs to justify what effects the removal or the addition of a species (i.e., introduced, or invasive) would have on a specific population and/or the ecosystem as a whole. L.5.3B.3

4 Communicate scientific or technical information that explains human positions in food webs and our potential impacts on these systems. L.5.3B.4

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Physical Science P

5 Organization of Matter and Chemical Interactions P.5.5

Conceptual Understanding: Matter can be segregated into tiny particles that are too small to see but can be detected by other methods. These tiny particles are referred to as atoms, which can be combined to form molecules. Substances exhibit specific properties that can be observed and measured.

A Students will demonstrate an understanding of the physical properties of matter. P.5.5A

1. Obtain and evaluate scientific information to describe basic physical properties of atoms and molecules. P.5.5A.1
2. Collect, analyze, and interpret data from measurements of the physical properties of solids, liquids, and gases (e.g., volume, shape, movement, and spacing of particles). P.5.5A.2
3. Analyze matter through observations and measurements to classify materials (e.g., powders, metals, minerals, or liquids) based on their properties (e.g., color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, solubility, or density). P.5.5A.3
4. Make and test predictions about how the density of an object affects whether the object sinks or floats when placed in a liquid. P.5.5A.4
5. Design a vessel that can safely transport a dense substance (e.g., syrup, coins, marbles) through water at various distances and under variable conditions. Use an engineering design process to define the problem, design, construct, evaluate, and improve the vessel. * P.5.5A.5

Conceptual Understanding: Substances of the same type can be classified by their similar observable properties. Substances can be combined in a variety of ways. A mixture is formed when two or more kinds of matter are physically combined. Solutions are a special type of mixture in which one substance is distributed evenly into another substance. When the physical properties of the components in a mixture are not changed, they can be separated in different physical ways.

B Students will demonstrate an understanding of mixtures and solutions. P.5.5B

1. Obtain and evaluate scientific information to describe what happens to the properties of substances in mixtures and solutions (solvent and solute). P.5.5B.1
2. Analyze and interpret data to communicate that the concentration of a solution is determined by the relative amount of solute versus solvent in various mixtures. P.5.5B.2
3. Investigate how different variables (e.g., temperature change, stirring, particle size, or surface area) affect the rate at which a solute will dissolve. P.5.5B.3
4. Design an effective system (e.g., sifting, filtration, evaporation, magnetic attraction, or floatation) for separating various mixtures. Use an engineering design process to define the problem, design, construct, evaluate, and improve the system. * P.5.5B.4

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Conceptual Understanding: Physical properties can be observed and measured without changing the composition of matter. A physical change occurs when the matter's physical appearance is altered while leaving the composition of the matter unchanged. When two or more substances are mixed, a new substance with different properties can sometimes be formed, but the total amount (i.e., mass) of the substances is conserved (i.e., total mass stays the same). In a chemical change, the chemical composition of the original matter is altered to create a new substance. A different compound is present at the completion of the chemical change.

C Students will demonstrate an understanding of the difference between physical and chemical changes. P.5.5C

1 Analyze and communicate the results of chemical changes that result in the formation of new materials (e.g., decaying, burning, rusting, or cooking). P.5.5C.1

2 Analyze and communicate the results of physical changes to a substance that results in a reversible change (e.g., changes in states of matter with the addition or removal of energy, changes in size or shape, or combining/separating mixtures or solutions). P.5.5C.2

3 Analyze and interpret data to support claims that when two substances are mixed, the total weight of matter is conserved. P.5.5C.3

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6 Motions, Forces, and Energy P.5.6

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Conceptual Understanding: Gravity is a force that draws objects to Earth. This force acting on an object near Earth's surface pulls that object toward the planet's center. The motion of an object can be described in terms of its position, direction, and speed. Multiple factors determine the rate and motion of an object. Other than Earth, any celestial object will exert varying gravitational pulls on other objects according to their mass and density.

A Students will demonstrate an understanding of the factors that affect the motion of an object through a study of Newton's Laws of Motion. P.5.6A

1 Obtain and communicate information describing gravity's effect on an object. P.5.6A.1

2 Predict the future motion of various objects based on past observation and measurement of position, direction, and speed. P.5.6A.2

3 Develop and use models to explain how the amount or type of force, both contact and non-contact, affects the motion of an object. P.5.6A.3

4 Plan and conduct scientific investigations to test the effects of balanced and unbalanced forces on the speed and/or direction of objects in motion. P.5.6A.4

5 Predict how a change of force, mass, and/or friction affects the motion of an object to convert potential energy into kinetic energy. P.5.6A.5

6 Design a system to increase the effects of friction on the motion of an object (e.g., non-slip surfaces or vehicle braking systems or flaps on aircraft wings). Use an engineering design process to define the problem, design, construct, evaluate, and improve the system. * P.5.6A.6

Earth and Space Science E

8 **Earth and the Universe** E.5.8

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Conceptual Understanding: Astronomy is the study of celestial objects in our solar system and beyond. A solar system includes one or more suns (stars) and all other objects orbiting in that system. Planets in our night sky change positions and are not always visible from Earth as they orbit our sun. Stars that can be seen in the night sky lie beyond our solar system and appear in patterns called constellations. Constellations can be used for navigation and appear to move together across the sky because of Earth's rotation and revolution around the sun.

A Students will demonstrate an understanding of the locations of objects in the universe. E.5.8A

1 Develop and use scaled models of Earth's solar system to demonstrate the size, composition (i.e., rock or gas), location, and order of the planets as they orbit the Sun. E.5.8A.1

2 Use evidence to argue why the sun appears brighter than other stars. E.5.8A.2

3 Describe how constellations appear to move from Earth's perspective throughout the seasons (e.g., Ursa Major, Ursa Minor, and Orion). E.5.8A.3

4 Construct scientific arguments to support claims about the importance of astronomy in navigation and exploration, including the use of telescopes, compasses, and star charts. E.5.8A.4

Conceptual Understanding: Earth orbits around the sun as the moon orbits around Earth. The revolution and rotation of Earth on a tilted axis provide evidence of patterns that can be observed, studied, and predicted.

B Students will demonstrate an understanding of the principles that govern moon phases, day and night, appearance of objects in the sky, and seasonal changes. E.5.8B

1 Analyze and interpret data from observations and research (e.g., from NASA, NOAA, or the USGS) to explain patterns in the location, movement, and appearance of the moon throughout a month and over the course of a year. E.5.8B.1

2 Develop and use a model of the Earth-Sun-Moon system to analyze the cyclic patterns of lunar phases, solar and lunar eclipses, and seasons. E.5.8B.2

3 Develop and use models to explain the factors (e.g., tilt, revolution, and angle of sunlight) that result in Earth's seasonal changes. E.5.8B.3

4 Obtain information and analyze how our understanding of the solar system has evolved over time (e.g., Earth-centered model of Aristotle and Ptolemy compared to the Sun-centered model of Copernicus and Galileo). E.5.8B.4

10 Earth's Recourses E.5.10

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Conceptual Understanding: Human activities can impact natural processes and availability of resources. To reduce impacts on the environment (including humans), various best practices can be used. New and improved conservation practices are constantly being developed and tested.

A Students will demonstrate an understanding of the effects of human interaction with Earth and how Earth's natural resources can be protected and conserved. E.5.10A

1 Collect and organize scientific ideas that individuals and communities can use to conserve Earth's natural resources and systems (e.g., implementing watershed management practices to conserve water resources, utilizing no-till farming to improve soil fertility, reducing emissions to abate air pollution, or recycling to reduce landfill waste). E.5.10A.1

2 Design a process for better preparing communities to withstand human-caused or natural disasters (e.g., removing oil from water or soil, systems that reduce the impact of floods, structures that resist hurricane forces). Use an engineering design process to define the problem, design, construct, evaluate, and improve the disaster plan. * E.5.10A.2