

**McKinley Presidential Library & Museum
Discover World Tour Ohio Science Standards
Seventh Grade**



MCKINLEY PRESIDENTIAL
Library & Museum

Strand:	<i>Cycles and Patterns of Earth and the Moon</i>	<i>This topic focuses on Earth's hydrologic cycle, patterns that exist in atmospheric and oceanic currents, the relationship between thermal energy and the currents, and the relative position and movement of the Earth, sun and moon.</i>
Earth	<p>The hydrologic cycle illustrates the changing states of water as it moves through the lithosphere, biosphere, hydrosphere and atmosphere.</p> <p>Thermal-energy transfers in the ocean and the atmosphere contribute to the formation of currents, which influence global climate patterns</p> <p>The atmosphere has different properties at different elevations and contains a mixture of gases that cycle through the lithosphere, biosphere, hydrosphere and atmosphere.</p> <p>The relative patterns of motion and positions of the Earth, moon and sun cause solar and lunar eclipses, tides and phases of the moon.</p>	<ul style="list-style-type: none"> • Thermal energy is transferred as water changes state throughout the cycle. The cycling of water in the atmosphere is an important part of weather patterns on Earth. The rate at which water flows through soil and rock is dependent upon the porosity and permeability of the soil or rock. • The sun is the major source of energy for wind, air and ocean currents and the hydrologic cycle. As thermal energy transfers occur in the atmosphere and ocean, currents form. Large bodies of water can influence weather and climate. The jet stream is an example of an atmospheric current and the Gulf Stream is an example of an oceanic current. Ocean currents are influenced by factors other than thermal energy, such as water density, mineral content (such as salinity), ocean floor topography and Earth's rotation. All of these factors delineate global climate patterns on Earth. • The atmosphere is held to the Earth by the force of gravity. There are defined layers of the atmosphere that have specific properties, such as temperature, chemical composition and physical characteristics. Gases in the atmosphere include nitrogen, oxygen, water vapor, carbon dioxide and other trace gases. Biogeochemical cycles illustrate the movement of specific elements or molecules (such as carbon or nitrogen) through the lithosphere, biosphere, hydrosphere and atmosphere • The moon's orbit and its change of position relative to the Earth and sun result in different parts of the moon being visible from Earth (phases of the moon). A solar eclipse is when Earth moves into the shadow of the moon (during a new moon). A lunar eclipse is when the moon moves into the shadow of Earth (during a full moon). Gravitational force between the Earth and the moon causes daily oceanic tides. When the gravitational forces from the sun and moon align (at new and full moons) spring tides occur. When the gravitational forces of the sun and moon are perpendicular (at first and last quarter moons), neap tides occur.
Strand:	<i>Cycles of Matter and Flow of Energy</i>	<i>This topic focuses on the impact of matter and energy transfer within the biotic component of ecosystems.</i>

<p style="text-align: center;">Life</p>	<p>Matter is transferred continuously between one organism to another and between organisms and their physical environments.</p> <p>In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.</p>	<ul style="list-style-type: none"> Plants use the energy in light to make sugars out of carbon dioxide and water (photosynthesis). These materials can be used and immediately stored for later use. Organisms that eat plants break down plant structures to produce the materials and energy they need to survive. Then they are consumed by other organisms. Energy can transform from one form to another in living things. Animals get energy from oxidizing food, releasing some of its energy as heat. The total amount of matter and energy remains constant, even though its form and location change. Biomes are regional ecosystems characterized by distinct types of organisms that have developed under specific soil and climatic conditions. The variety of physical (abiotic) conditions that exists on Earth gives rise to diverse environments (biomes) and allows for the existence of a wide variety of organisms (biodiversity). Ecosystems are dynamic in nature; the number and types of species fluctuate over time. Disruptions, deliberate or inadvertent, to the physical (abiotic) or biological (biotic) components of an ecosystem impact the composition of an ecosystem.
<p>Strand:</p>	<p>Conservation of Mass and Energy</p>	
<p style="text-align: center;">Physical</p>	<p>The properties of matter are determined by the arrangement of atoms.</p> <p>Energy can be transformed or transferred but is never lost.</p> <p>Energy can be transferred through a variety of ways.</p>	<ul style="list-style-type: none"> Elements can be organized into families with similar properties, such as highly reactive metals, less-reactive metals, highly reactive nonmetals and some gases that are almost completely nonreactive. Substances are classified according to their properties, such as metals and acids. When substances interact to form new substances, the properties of the new substances may be very different from those of the old, but the amount of mass does not change. When energy is transferred from one system to another, the quantity of energy before transfer equals the quantity of energy after transfer. When energy is transformed from one form to another, the total amount of energy remains the same. Mechanical energy can be transferred when objects push or pull on each other over a distance. Electromagnetic waves transfer energy when they interact with matter. Thermal energy can be transferred through radiation, convection and conduction. Electrical energy transfers when an electrical source is connected in a complete electrical circuit to an electrical device.
<p>During the years of grades 5-8, all students must use the following scientific processes, with appropriate laboratory safety techniques, to construct their knowledge and understanding in all science content areas:</p> <ul style="list-style-type: none"> Identify questions that can be answered through scientific investigations Design and conduct a scientific investigation Use appropriate mathematics, tools and techniques to gather data and information Analyze and interpret data Develop descriptions, models, explanations and predictions Think critically and logically to connect evidence and explanations Recognize and analyze alternative explanations and predictions Communicate scientific procedures and explanations. <p style="text-align: right;">(Ohio Dept. of Education, adopted 2011)</p>		

Eighth Grade-Order and Organization: Systems can be described and understood by analysis of the interaction of their components. Energy, forces and motion combine to change the physical features of the Earth. The changes of the physical Earth and the species that have lived on Earth are found in the rock record. For species to continue, reproduction must be successful.

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Strand:	Physical Earth	<i>This topic focuses on the physical features of Earth and how they formed. This includes the interior of Earth, the rock record, plate tectonics and landforms.</i>
Earth	<p>The composition and properties of Earth's interior are identified by the behavior of seismic waves.</p> <p>Earth's crust consists of major and minor tectonic plates that move relative to each other.</p> <p>A combination of constructive and destructive geologic processes formed Earth's surface.</p> <p>Evidence of the dynamic changes of Earth's surface through time is found in the geologic record.</p>	<ul style="list-style-type: none"> • The refraction and reflection of seismic waves as they move through one type of material to another is used to differentiate the layers of Earth's interior. Earth has an inner and outer core, an upper and lower mantle, and a crust. The formation of the planet generated heat from gravitational energy and the decay of radioactive elements, which are still present today. Heat released from Earth's core drives convection currents throughout the mantle and the crust. • Historical data and observations such as fossil distribution, paleomagnetism, continental drift and sea-floor spreading contributed to the theory of plate tectonics. The rigid tectonic plates move with the molten rock and magma beneath them in the upper mantle. Convection currents in the crust and upper mantle cause the movement of the plates. The energy that forms convection currents comes from deep within the Earth. There are three main types of plate boundaries: divergent, convergent and transform. Each type of boundary results in specific motion and causes events (such as earthquakes or volcanic activity) or features (such as mountains or trenches) that are indicative of the type of boundary • Earth's surface is formed from a variety of different geologic processes, including but not limited to plate tectonics • Earth is approximately 4.6 billion years old. Earth history is based on observations of the geologic record and the understanding that processes observed at present day are similar to those that occurred in the past (uniformitarianism). There are different methods to determine relative and absolute age of some rock layers in the geologic record. Within a sequence of undisturbed sedimentary rocks, the oldest rocks are at the bottom (superposition). The geologic record can help identify past environmental and climate conditions.
Strand:	Species and Reproduction	<i>This topic focuses on continuation of the species.</i>

Eighth Grade-Order and Organization: Systems can be described and understood by analysis of the interaction of their components. Energy, forces and motion combine to change the physical features of the Earth. The changes of the physical Earth and the species that have lived on Earth are found in the rock record. For species to continue, reproduction must be successful.

Life	<p>Diversity of species occurs through gradual processes over many generations. Fossil records provide evidence that changes have occurred in number and types of species.</p> <p>Reproduction is necessary for the continuation of every species.</p> <p>The characteristics of an organism are a result of inherited traits received from parent(s).</p>	<ul style="list-style-type: none"> Fossils provide important evidence of how life and environmental conditions have changed. Changes in environmental conditions can affect how beneficial a trait will be for the survival and reproductive success of an organism or an entire species. Throughout Earth's history, extinction of a species has occurred when the environment changes and the individual organisms of that species do not have the traits necessary to survive and reproduce in the changed environment. Most species (approximately 99 percent) that have lived on Earth are now extinct. Every organism alive today comes from a long line of ancestors who reproduced successfully every generation. Reproduction is the transfer of genetic information from one generation to the next. It can occur with mixing of genes from two individuals (sexual reproduction). It can occur with the transfer of genes from one individual to the next generation (asexual reproduction). The ability to reproduce defines living things. Expression of all traits is determined by genes and environmental factors to varying degrees. Many genes influence more than one trait, and many traits are influenced by more than one gene. During reproduction, genetic information (DNA) is transmitted between parent and offspring. In asexual reproduction, the lone parent contributes DNA to the offspring. In sexual reproduction, both parents contribute DNA to the offspring.
Strand:	<i>Forces and Motion</i>	<i>This topic focuses on forces and motion within, on and around the Earth and within the universe.</i>
Physical	<p>Forces between objects act when the objects are in direct contact or when they are not touching.</p> <p>Forces have magnitude and direction.</p> <p>There are different types of potential energy.</p>	<ul style="list-style-type: none"> Magnetic, electrical and gravitational forces can act at a distance. The motion of an object is always measured with respect to a reference point. Forces can be added. The net force on an object is the sum of all of the forces acting on the object. The net force acting on an object can change the object's direction and/or speed. When the net force is greater than zero, the object's speed and/or direction will change. When the net force is zero, the object remains at rest or continues to move at a constant speed in a straight line. Gravitational potential energy changes in a system as the masses or relative positions of objects are changed. Objects can have elastic potential energy due to their compression or chemical potential energy due to the nature and arrangement of the atoms that make up the object.
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