

**McKinley Presidential Library & Museum
Planetarium Show Ohio Science Standards
Fifth Grade**



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Strand:	<i>Cycles and Patterns in the Solar System</i>	<i>This topic focuses on the characteristics, cycles and patterns in the solar system and within the universe.</i>
Earth	<p>The solar system includes the sun and all celestial bodies that orbit the sun. Each planet in the solar system has unique characteristics.</p> <p>The sun is one of many stars that exist in the universe.</p> <p>Most of the cycles and patterns of motion between the Earth and sun are predictable</p>	<ul style="list-style-type: none"> The distance from the sun, size, composition and movement of each planet are unique. Planets revolve around the sun in elliptical orbits. Some of the planets have moons and/or debris that orbit them. Comets, asteroids and meteoroids orbit the sun. The sun appears to be the largest star in the sky because it is the closest star to Earth. Some stars are larger than the sun and some stars are smaller than the sun. Earth's revolution around the sun takes approximately 365 days. Earth completes one rotation on its axis in a 24-hour period, producing day and night. This rotation makes the sun, stars and moon appear to change position in the sky. Earth's axis is tilted at an angle of 23.5°. This tilt, along with Earth's revolution around the sun, affects the amount of direct sunlight that the Earth receives in a single day and throughout the year. The average daily temperature is related to the amount of direct sunlight received. Changes in average temperature throughout the year are identified as seasons.
Strand:	<i>Interactions within Ecosystems</i>	<i>This topic focuses on foundational knowledge of the structures and functions of ecosystems.</i>
Life	<p>All of the processes that take place within organisms require energy</p>	<ul style="list-style-type: none"> For ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred and transformed by producers into energy that organisms use through the process of photosynthesis. That energy then passes from organism to organism as illustrated in food webs. In most ecosystems, energy derived from the sun is transferred and transformed into energy that organisms use by the process of photosynthesis in plants and other photosynthetic organisms.
Strand:	<i>Light, Sound and Motion</i>	<i>This topic focuses on the forces that affect motion. This includes the relationship between the change in speed of an object, the amount of force applied and the mass* of the object. Light and sound are explored as forms of energy that move in predictable ways, depending on the matter through which they move.</i>
Physical	<p>Light and sound are forms of energy that behave in predictable ways.</p>	<ul style="list-style-type: none"> Light travels and maintains its direction until it interacts with an object or moves from one medium to another and then it can be reflected, refracted or absorbed. Sound is produced by vibrating objects and requires a medium through which to travel. The rate of vibration is related to the pitch of the sound.

Fifth Grade-Interconnections Within Systems: Cycles on Earth, such as those occurring in ecosystems, in the solar system, and in the movement of light and sound result in describable patterns. Speed is a measurement of movement. Change in speed is related to force and mass. The transfer of energy drives changes in systems, including ecosystems and physical systems.*

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:

- ***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.***

(Ohio Dept. of Education, adopted 2011)

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Strand:	Rocks, Minerals and Soil	<i>This topic focuses on the study of rocks, minerals and soil, which make up the lithosphere. Classifying and identifying different types of rocks, minerals and soil can decode the past environment in which they formed</i>
Earth		
Strand:	Cellular to Multicellular	<i>This topic focuses on the study of the basics of Modern Cell Theory. All organisms are composed of cells, which are the fundamental unit of life. Cells carry on the many processes that sustain life. All cells come from pre-existing cells</i>
Life		
Strand:	Matter and Motion	<i>This topic focuses on the study of foundational concepts of the particulate nature of matter, linear motion, and kinetic and potential energy</i>
Physical		

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**McKinley Presidential Library & Museum
Planetarium Show Ohio Science Standards
Seventh Grade**



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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>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"> • 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>

Seventh Grade-Order and Organization: Systems can exchange energy and/or matter when interactions occur within systems and between systems. Systems cycle matter and energy in observable and predictable patterns

Life	Matter is transferred continuously between one organism to another and between organisms and their physical environments.	<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.
Strand:	Conservation of Mass and Energy	
Physical	Energy can be transferred through a variety of ways.	<ul style="list-style-type: none"> 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><i>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:</i></p> <ul style="list-style-type: none"> <i>Identify questions that can be answered through scientific investigations</i> <i>Design and conduct a scientific investigation</i> <i>Use appropriate mathematics, tools and techniques to gather data and information</i> <i>Analyze and interpret data</i> <i>Develop descriptions, models, explanations and predictions</i> <i>Think critically and logically to connect evidence and explanations</i> <i>Recognize and analyze alternative explanations and predictions</i> <i>Communicate scientific procedures and explanations.</i> <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.

**McKinley Presidential Library & Museum
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Eighth Grade**



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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	<i>This topic is not covered in the Planetarium Show.</i>	<i>This topic is not covered in the Planetarium Show.</i>
Strand:	Species and Reproduction	<i>This topic focuses on continuation of the species.</i>
Life	<i>This topic is not covered in the Planetarium Show.</i>	<i>This topic is not covered in the Planetarium Show.</i>
Strand:	Forces and Motion	<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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