

Seventh Grade Science Curriculum

Grade Level Goal

In seventh grade, students will expand their knowledge base of life, physical and earth science. They will use this knowledge to explore their curiosity of science and to develop critical thinking skills.

Unit Title	Kinetic and Potential Energy
Big Idea	TLW demonstrate an understanding that scientific inquiry and reasoning involves observing, questioning, recording, communicating, and developing solutions to problems by identifying kinetic and potential energy and explaining the transformation between the two in simple mechanical systems.
Enduring Understandings	<p>Every experiment provides useful results, whether or not the results match the hypothesis.</p> <p>Gravitational, elastic, and chemical energy are all forms of potential energy.</p> <p>Objects and substances in motion have kinetic energy.</p> <p>Objects and substances may have potential energy (stored energy) due to their relative positions in a system.</p> <p>Potential energy can be transformed into kinetic energy in mechanical systems.</p> <p>Scientific investigations follow processes that require systematic and logical development, observation, and careful analysis.</p> <p>Scientific investigations generally lead to new questions.</p> <p>The foundation of scientific theory is replicable investigations.</p> <p>Through repeated inquiry, patterns emerge and theories are proposed.</p>
Essential Questions	<p>How can potential energy be transformed into kinetic energy?</p> <p>How does science help us answer questions about the world around us?</p> <p>What does it mean to question?</p> <p>What is kinetic energy and what are examples of kinetic energy?</p> <p>What is potential energy and what are examples of potential energy?</p> <p>What is scientific inquiry?</p> <p>Why do scientists conduct investigations?</p>
Skills/Concepts	<ul style="list-style-type: none"> • TLW use a guided inquiry investigation to identify kinetic and potential energy in everyday situations. • TLW demonstrate the transformation between potential and kinetic energy in simple mechanical systems.
GLCE	P.EN.06.11; S.IA.06.11; S.IA.06.12; S.IA.06.13; S.IA.06.14; S.IA.06.15; S.IP.06.11; S.IP.06.12; S.IP.06.13; S.IP.06.14; S.IP.06.15; S.IP.06.16; S.RS.06.11; S.RS.06.12; S.RS.06.13; S.RS.06.14; S.RS.06.15; P.EN.06.12; S.RS.06.16;
Catholic Social Teachings	--

Unit Title	Energy Transfer
Big Idea	TLW explain radiation, conduction, and convection and how heat is transferred from one place to another.

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Enduring Understandings	Energy can be transformed from one form to another. Energy is not lost or gained when it is transferred. Heat energy is transferred from one object to another by radiation, conduction, and convection.
Essential Questions	What are three ways that heat energy is transferred? What happens to the energy when heat is transferred? What happens when energy is transformed from one form to another?
Skills/Concepts	<ul style="list-style-type: none"> • TLW explain how different forms of energy can be transferred from one place to another. • TLW illustrate how energy can be transferred while no energy is lost or gained in the transfer. • TLW illustrate energy transformations with heat as a by-product.
GLCE	P.EN.06.41;P.EN.06.42;
Catholic Social Teachings	--

Unit Title	Waves and Energy
Big Idea	TLW identify examples of waves and explain how waves transfer energy when they interact with matter.
Enduring Understandings	There are different types of waves, including light, sound, water, and seismic waves. Waves are produced by vibrations in matter. Waves have energy that they transfer when they interact with matter.
Essential Questions	How are waves produced? How do waves transfer energy? What are the different types of waves?
Skills/Concepts	<ul style="list-style-type: none"> • TLW identify examples of waves, describe how waves are produced by vibrations in matter, and demonstrate how waves transfer energy when they interact with matter. • TLW investigate how light waves transfer energy when they interact with matter. • TLW investigate and illustrate how sound waves travel. • TLW identify the media through which sound travels, and their effect on the waves due to the density of the media. • TLW investigate how various surfaces and varying distances affect sound waves, their reflection (echo) or absorption. • TLW describe properties of vibrating objects and their resulting waves including period, wavelength, amplitude, and frequency. • TLW determine how waves move and transmit energy through a variety of media. • TLW compare and contrast water, sound, and earthquake waves.
GLCE	P.EN.07.31; P.EN.07.32;P.EN.07.33;
Catholic Social Teachings	

Unit Title	Cell Structure and Function
Big Idea	TLW explain that organisms are made of cells that may specialize for a particular purpose and that cells function in similar ways in all organisms.
Enduring Understandings	All organisms are composed of cells, and cells function in a similar way in all organisms.

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	Cells comprise different body tissues, organs, and organ system. Organisms grow and develop through an increase in cell number and/or cell size. Through cell division, cells can become specialized for specific functions.
Essential Questions	How do organisms grow and develop? Why are specialized cells needed in multicellular organisms?
Skills/Concepts	<ul style="list-style-type: none"> • TLW review the difference between living and non-living things based on the characteristics of each. • TLW recognize that all organisms are composed of cells, and compare multicellular and unicellular organisms. • TLW recognize that cells function in a similar way in all organisms. • TLW observe and record changes in the development of a plant from its germination to the appearance of its first photosynthetic leaves. • TLW explain how cells make up different body tissues, organs, and organ systems. • Using a microscope, TLW differentiate between a plant and an animal cell. • TLW examine how through cell division, cells can become specialized for specific functions. • TLW dissect a flower and draw and label the parts including the reproductive structures.
GLCE	S.IA.07.13; L.OL.07.21; L.OL.07.23; L.OL.07.24; S.IA.07.14; S.IP.07.14; L.OL.07.22;S.IP.07.13; L.OL.07.32;
Catholic Social Teachings	Care of God’s Creation

Unit Title	Photosynthesis
Big Idea	TLW explain the process of photosynthesis.
Enduring Understandings	Light energy from the Sun is transferred to chemical energy through the process of photosynthesis, allowing plants to use carbon dioxide and water to produce food (carbohydrates, proteins, and fats). Plants make, use, and store their own food through the process of photosynthesis.
Essential Questions	What evidence indicates that plants make, use and store food? What is photosynthesis and how does it help plants make, use, and store their own food?
Skills/Concepts	<ul style="list-style-type: none"> • TLW explain how light energy is transferred to chemical energy through the process of photosynthesis. • TLW explain the process of how plants make and use food using the word equations for photosynthesis and respiration. • TLW investigate using produce to show where food is stored in the plant.
GLCE	P.EN.07.43; L.OL.07.62; L.OL.07.63; L.OL.07.61;L.OL.07.63;
Catholic Social Teachings	--

Unit Title	Weather and Atmosphere
Big Idea	TLW describe weather conditions and explain the influence of the atmosphere and oceans on weather and climate.

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Enduring Understandings	<p>Climate is a long-term average of weather which is affected by the oceans.</p> <p>Nuclear reactions take place on the Sun, producing heat and light, but only a fraction of the light energy is transformed to heat energy on the Earth.</p> <p>The atmosphere is a mixture of gases that have different compositions at different altitudes.</p> <p>The atmosphere is in constant motion, with different weather conditions associated with frontal boundaries.</p> <p>The warming of the Earth by the Sun causes convection within the atmosphere and oceans, producing winds and ocean currents.</p>
Essential Questions	<p>How are winds and ocean currents produced?</p> <p>How does climate compare to weather?</p> <p>How does the Sun produce energy and how is the Earth affected?</p> <p>What causes different weather conditions?</p> <p>What is the composition of the atmosphere?</p>
Skills/Concepts	<ul style="list-style-type: none"> • TLW identify that nuclear reactions take place in the Sun, producing heat and light, and explain that a tiny fraction of the Sun's light energy is transformed to heat energy on Earth. • TLW describe the atmosphere as a mixture of gases and compare and contrast the composition of the atmosphere at different elevations. • TLW describe the relationship between the warming of the atmosphere of the Earth by the Sun and convection within the atmosphere and oceans which produces winds and currents. • TLW compare and contrast the difference and relationship between climate and weather and explain how oceans affect the different climates on Earth. • TLW use a weather map to describe weather conditions associated with frontal boundaries and the movement of major air masses and the jet stream across North America.
GLCE	P.EN.07.61; P.EN.07.62; E.FE.07.11; E.FE.07.12; S.IA.07.11; S.IP.07.15; E.ES.07.12; E.ES.07.13; E.ES.07.71; E.ES.07.73; E.ES.07.72; E.ES.07.74; S.IP.07.13; S.IP.07.14; S.IP.07.16;
Catholic Social Teachings	--

Unit Title	Oceans and Climates
Big Idea	TLW explain how the Sun and rotation of the Earth control global atmospheric and oceanic circulation and how matter and energy are redistributed through currents, waves, and interactions with other Earth systems.
Enduring Understandings	<p>Oceans redistribute matter and energy around the Earth.</p> <p>The Earth's rotation generates currents that influence global and regional climates.</p>
Essential Questions	<p>How do the oceans affect climate and weather?</p> <p>How would Earth be different if it didn't rotate?</p> <p>What causes ocean currents?</p> <p>What would Earth be like with no oceans?</p>
Skills/Concepts	<ul style="list-style-type: none"> • TLW identify factors affecting seawater density and salinity and describe how density affects oceanic layering and currents. • TLW describe the major causes for the ocean's surface and deep water currents and explain how the Coriolis effect controls oceanic circulation. • TLW explain how interactions between the oceans and the atmosphere influence global

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	and regional climate.
GLCE	E4.2A; E4.2B; E4.2d; E4.2f;
Catholic Social Teachings	--

Unit Title	Seasons
Big Idea	TLW explain how the Earth's position and motion cause the seasons and define a year.
Enduring Understandings	A year is defined as the amount of time it takes for the Earth to revolve around the Sun. Seasons on the Earth are the result of variations in the intensity of sunlight caused by the tilt of the Earth on its axis and revolution around the Sun.
Essential Questions	How are seasons impacted by the tilt of the Earth and its revolution around the sun? What are the apparent movements of the Sun, Moon, and Earth?
Skills/Concepts	<ul style="list-style-type: none"> • TLW use a model to demonstrate the seasons. • TLW explain that a year is defined as the amount of time it takes for Earth to make one revolution around the Sun.
GLCE	E.ES.05.61; S.IA.05.11; S.IA.05.12; S.IA.05.13; S.IA.05.14; S.IA.05.15; S.IP.05.11; S.IP.05.12; S.IP.05.13; S.IP.05.14; S.IP.05.15; S.IP.05.16; S.RS.05.11; S.RS.05.12; S.RS.05.13; S.RS.05.15; E.ES.05.62; S.RS.05.15;
Catholic Social Teachings	--

Unit Title	Weather and Atmosphere
Big Idea	TLW explain how the hydrosphere and atmosphere affect weather patterns and how changes in atmospheric conditions can lead to severe weather.
Enduring Understandings	Changes in atmosphere can lead to severe weather. The hydrosphere and atmosphere affect weather patterns.
Essential Questions	How do air masses and fronts affect weather? What safety precautions should be taken with each severe weather condition? What weather conditions are associated with severe weather including thunderstorms, tornadoes, hurricanes, winter storms and drought?
Skills/Concepts	<ul style="list-style-type: none"> • TLW review the importance of air masses and fronts to weather activity and plot the different types of severe weather around the world on a map. • TLW describe how mountains, frontal wedging, convection, and convergence form clouds and precipitation including the process of adiabatic cooling. • TLW describe weather conditions associated with thunderstorms and their forecasting, identify seasonal and regional variation of thunderstorms, describe thunderstorm safety precautions and explain the societal impact of thunderstorms. • TLW describe weather conditions associated with tornadoes, identify seasonal and regional variation of tornadoes, and describe tornado safety precautions and societal impact of tornadoes. • TLW describe weather conditions associated with hurricanes, identify seasonal and regional variation of hurricanes, and describe hurricane safety precautions and societal

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	<p>impact of hurricanes.</p> <ul style="list-style-type: none"> • TLW describe weather conditions, safety precautions, and societal impacts of winter storms. • TLW describe weather conditions, safety precautions, and societal impacts associated with drought. • TLW analyze the magnitude and the social impact of various forms of severe weather. • TLW describe seasonal variation in severe weather.
GLCE	E4.3B; E4.3D; E4.3A; E4.3C; E4.3F; E4.3g; E4.3E;
Catholic Social Teachings	--

Unit Title	Human Impact on the Environment
Big Idea	TLW explain how human activities have consequences on the environment.
Enduring Understandings	<p>Human activities change the surface of the Earth and affect the survival of organisms.</p> <p>Pollution impacts habitats, climate change, and the survival of organisms.</p> <p>The strongest force in rapid habitat loss is human activity.</p> <p>There are many origins of pollution, including car exhaust, industrial emissions, acid rain, and natural sources.</p>
Essential Questions	<p>How do human activities change the surface of the Earth?</p> <p>How does pollution impact the environment and organisms?</p> <p>What are examples and sources of pollution?</p> <p>What is the strongest force in rapid habitat loss?</p>
Skills/Concepts	<ul style="list-style-type: none"> • TLW investigate the impact of pollution on a watershed. • TLW describe the origins of pollution in the atmosphere, geosphere, and hydrosphere and how pollution impacts habitats, climatic change, threatens or endangers species. • TLW explain how human activities change the surface of the Earth and affect the survival of organisms.
GLCE	S.RS.07.17; E.ES.07.41; E.ES.07.42; S.RS.07.16; S.RS.07.17; S.RS.07.18
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