

Eighth Grade Science Curriculum

Grade Level Goal

In eighth grade, students will apply their knowledge of life, earth, and physical science using an ethical perspective. They will evaluate the impact of human activities and determine appropriate solutions for these situations.

Unit Title	Chemical Change
Big Idea	TLW demonstrate an understanding that scientific inquiry and reasoning involves observing, questioning, investigating, recording, and developing solutions to problems by identifying evidence of chemical change.
Enduring Understandings	Chemical changes occur when matter reacts and produces new substances but physical changes yield different forms of the same substance rather than a new substance. Every experiment provides useful results, whether or not the results match the hypothesis. Evidence of chemical change includes color change, gas formation, solid formation, and temperature change. Scientific investigations follow processes that require systematic and logical development, observation, and careful analysis. Scientific investigations generally lead to new questions. Substances may be classified by their physical and/or chemical properties. The foundation of scientific theory is replicable investigations. Through repeated inquiry, patterns emerge and theories are proposed.
Essential Questions	How can substances be classified? How does science help us answer questions about the world around us? What are characteristics of a physical change? What does it mean to question? What happens to substances during a chemical change? What is evidence of a chemical change? What is scientific inquiry? Why do scientists conduct investigations?
Skills/Concepts	<ul style="list-style-type: none"> • TLW review physical properties of matter and changes in states of matter. • TLW identify evidence of chemical change through color, gas formation, solid formation, and temperature change and classify substances by their physical and chemical properties.
GLCE	P.CM.07.21; P.CM.07.22; P.CM.07.23; S.IA.07.12; S.IA.07.13; S.IP.07.11; S.IP.07.13; S.IP.07.14; S.RS.07.13; S.IP.07.15; S.IP.07.16; S.RS.07.11; S.RS.07.12; S.RS.07.13; S.RS.07.14; S.RS.07.15; P.PM.07.11; S.IA.07.11; S.IA.07.12; S.IA.07.14; S.IA.07.15; S.IP.07.11; S.IP.07.12
Catholic Social Teachings	--

Unit Title	Properties of Matter
Big Idea	TLW classify substances by their physical and chemical properties, and explain the relationship of elements to the periodic table.
Enduring	Atoms and molecules are respectively the smallest components of elements and compounds.

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Understandings	Elements and compounds have different physical and chemical properties. Elements are organized into families on the periodic table by similar properties. Elements are pure substances, compounds are chemically combined, and mixtures can be separated into their component parts.
Essential Questions	How are elements organized on the periodic table? What are the differences among elements, compounds, and mixtures? What are the differences between atoms and molecules?
Skills/Concepts	<ul style="list-style-type: none"> • TLW illustrate the structure of atoms and molecules. • TLW describe how the elements within the Periodic Table are organized by similar properties into families. • TLW explain how atoms combine to form molecules. • TLW compare elements, mixtures, and compounds. • TLW list examples of physical and chemical properties of elements and compounds. • TLW identify and describe common compounds and elements found at home and in school.
GLCE	P.PM.07.21; P.PM.07.23; P.PM.07.22; P.PM.07.21; P.PM.07.24;
Catholic Social Teachings	--

Unit Title	Reproduction
Big Idea	TLW compare sexual and asexual reproduction of organisms for the continuation of genetic characteristics.
Enduring Understandings	Characteristics of living things are passed on sexually and asexually. Sexual and asexual reproduction have advantages and disadvantages.
Essential Questions	How are characteristics of living things passed on sexually and asexually? What are advantages and disadvantages of sexual reproduction? Asexual reproduction?
Skills/Concepts	<ul style="list-style-type: none"> • TLW differentiate between acquired traits and inherited traits and investigate how the environment influences an organism's characteristics. • TLW explain how characteristics of living things are asexually passed on through generations. • TLW explain how characteristics of living things are sexually passed on through generations. • TLW identify the factors that control the inheritance of traits in organisms. • TLW collaboratively collect and interpret data about certain traits controlled by dominant and recessive genes in humans. • TLW use a Punnett square to calculate the probability that offspring with a certain characteristic will result. • TLW compare how characteristics of living things are passed on through generations, both asexually and sexually, and compare and contrast the advantages and disadvantages of each.
GLCE	S.RS.07.19; L.HE.07.21; L.HE.07.22;
Catholic Social Teachings	--

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Unit Title	Climate Change
Big Idea	TLW describe the structure and composition of the atmosphere and explain how changes in environmental conditions can lead to climate change.
Enduring Understandings	How do scientists learn about the changing climate of Earth? How does Earth's climate change over time? What is the greenhouse effect and how does it have implications for society and ecosystems?
Essential Questions	Climates of the past are researched, usually using indirect indicators, to better understand and predict climate change. Earth's climate has changed over time due to complex interactions between many natural variables and events. Industrialization has caused an increase in carbon dioxide, which has contributed to a rise in atmospheric temperatures and changes in the biosphere, atmosphere, and hydrosphere (the greenhouse effect).
Skills/Concepts	<ul style="list-style-type: none"> • TLW compare and contrast major greenhouse gases. • TLW explain the natural mechanism of the greenhouse effect and differentiate between greenhouse effect and global warming. • TLW investigate the Earth's climate over long periods of time. • TLW explain the consequences of warmer oceans and changing climatic zones. • TLW describe natural mechanisms that could result in significant changes in climate. • TLW determine possible actions that can be taken in response to climate change and state an opinion.
GLCE	E5.4A; E5.4C; E5.4D; E5.4B; E5.r4i
Catholic Social Teachings	Care of God's Creation

Unit Title	Earth Systems Overview
Big Idea	TLW describe the interactions within and between Earth systems and explain how these systems are interrelated.
Enduring Understandings	Processes, events, and features on Earth result from energy transfer and movement of matter through interconnected Earth systems. The Earth operates as a system and all components (geosphere, atmosphere, biosphere, and hydrosphere) interact with one another.
Essential Questions	How can changes in one system affect another system? How does the Earth operate as a system?
Skills/Concepts	<ul style="list-style-type: none"> • TLW describe how systems interact. • TLW identify four systems of the Earth. • TLW analyze how the systems of the Earth interact.
GLCE	E2.1A; E2.1B; E2.1C;
Catholic Social Teachings	Care of God's Creation

Unit Title	Earth's History
Big Idea	TLW use geologic dating processes (relative age, index fossils, and radioactive dating) to explain how the Earth has changed through time.
Enduring Understandings	The Earth has changed over time as land, oceans, and atmosphere formed and life began, as evidenced by the fossil record. Usually, the older layers of rock in the Earth's crust are located below the younger layers. (Principle

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	of Superposition)
Essential Questions	How do scientists determine the age of rocks and layers of the Earth? How has the Earth changed over time?
Skills/Concepts	<ul style="list-style-type: none"> • TLW create a personal and geologic timeline including important events in the Earth's history. • TLW investigate fossils and rock layers and their use in determining relative geologic age and history. • TLW investigate methods of judging the absolute age of rocks through radioactive dating of fossils and rocks.
GLCE	E5.3C; E1.1D; E5.3D; E5.3g; E5.3B; E5.3e; E5.3f;
Catholic Social Teachings	--

Unit Title	Hydrogeology
Big Idea	TLW explain how water moves through the atmosphere, hydrosphere, and geosphere and how water resources are important to and impacted by humans.
Enduring Understandings	Groundwater is a dynamic feature on the Earth. Land use decisions affect water quality and supply. On a world-wide basis groundwater is the most significant source of water to sustain life.
Essential Questions	How does land use decisions by communities' impact water quality and supply for both groundwater and surface water? How does fresh water move?
Skills/Concepts	<ul style="list-style-type: none"> • TLW identify hydrosphere as one of the Earth's interrelated systems. • TLW identify water reservoirs and the percentage of Earth's water found in each, compare and contrast types of surface water systems, and compare their relative sizes to groundwater resources. • TLW compare the physical characteristics of the Great Lakes and explain the dynamics of water movement by generating a water budget for the Great Lakes. • TLW generate a water budget for a watershed/groundwater system to explain the features/ processes of groundwater systems and how the sustainability of North American aquifers has changed in recent history. • TLW explain how water quality in both groundwater and surface systems is impacted by land use decisions.
GLCE	E4.1A; E4.1B; E4.1C;
Catholic Social Teachings	Care of God's Creation

Unit Title	Earth's Interior
Big Idea	TLW describe the layers of the Earth, compare the composition and physical characteristics of each layer, describe the lithosphere as being made of mobile tectonic plates, and explain the relationship of plates to earthquakes and volcanoes.
Enduring Understandings	Earthquakes and volcanoes are most common along plate boundaries and at hot spots. Plate boundaries are areas where plates are moving away from each other, crashing into each other, or sliding past each other. Plate movements result in potentially catastrophic events such as earthquakes and volcanic eruptions, which may create tsunamis, trenches, mountains, or islands. Plate tectonics theory is the central organizing theory of geology and is part of the explanation of every phenomenon and process that is observable in the geosphere and interconnects with the

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	other Earth systems.
Essential Questions	What evidence makes scientists believe the continents are moving? Why do earthquakes and volcanoes occur in some parts of the world and not in others?
Skills/Concepts	<ul style="list-style-type: none"> • TLW describe Earth’s interior (layers and magnetic field), explain how its layers are inferred using data from seismology, and describe the differences between oceanic and continental crust. • TLW explain how plate tectonics accounts for the features and processes that occur on or near the Earth’s surface and how tectonic plates move. • TLW explain that the boundaries where plates are moving can be marked by volcanoes and earthquakes and use plate movement to determine the average rate, time, and distance of plate motion. • TLW use the distribution of earthquakes and volcanoes to locate plate boundaries and determine the types of plate boundaries. • TLW describe how the size of earthquakes is measured, explain the effects of earthquakes on humans and Earth systems, and use the elastic rebound theory to explain why fences are offset after an earthquake. • TLW distinguish plate boundaries by the pattern of depth and magnitude of earthquakes. • TLW describe how the size of volcanoes is measured, explain the effects of volcanoes on humans and Earth systems, and explain the relationship of magma to volcanoes.
GLCE	E3.2A; E3.2B; E3.2C; E3.2d; E1.2C; E1.2h; E1.2i; E1.2k; E3.3A; E3.3B; E3.3C; E3.4A; E3.4B; E3.4C; E3.4f; E3.3d; E3.4d; E3.4e;
Catholic Social Teachings	Care of God’s Creation

Unit Title	Energy – Natural Resources and Human Impacts
Big Idea	TLW describe the impact of humans on Earth’s systems as renewable and nonrenewable resources are utilized and explain how energy exists in multiple forms which can be transformed and transferred from one reservoir to another.
Enduring Understandings	All sources of energy that humans use have advantages and disadvantages. Elements can exist in several different states and chemical forms and can move within and between Earth systems. Energy in Earth systems can exist in a number of forms, can be transferred from one form to another, and can move from one reservoir to another. Humans can have a positive or negative impact on Earth’s ecosystems.
Essential Questions	How do elements move within and between Earth systems? In which forms does energy exist on Earth and how is energy transferred from one system to another? Processes, events, and features on Earth result from energy transfer and movement of matter through interconnected Earth systems. What are the advantages and disadvantages of different sources of energy? What is the impact of humans on Earth’s ecosystems?
Skills/Concepts	<ul style="list-style-type: none"> • TLW review the interaction of the four Earth system components: geosphere, atmosphere, hydrosphere, and biosphere. • TLW describe Earth’s principal sources of internal and external energy and describe natural processes in which heat transfer in the Earth occurs. • TLW identify differences in the origin and use of energy.

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	<ul style="list-style-type: none"> • TLW describe renewable and nonrenewable sources of energy for human consumption and compare their effects on the environment. • TLW explain how carbon exists in different forms and how those forms can be beneficial or harmful to humans. • TLW explain how the impact of human activities on the environment can be understood through the analysis of interactions between the four Earth systems.
GLCE	E2.1A; E2.1B; E2.1C; E2.2A; E2.2C; E2.2D; E2.2B; E2.4A;E2.3A;
Catholic Social Teachings	--