Parent Guide

Grade Eight Science Curriculum

Diocese of Cleveland

Below is a list of the skills your child will be taught in Grade Eight.
As parents, you are encouraged to support the work of your child's teacher in helping your child acquire each of these skills.

Capacities of the Literate Individual	
	They demonstrate independence.
	They build strong content knowledge.
	They respond to the varying demands of audience, task, purpose.
	They comprehend as well as critique.
	They value evidence.
	They use technology and digital media strategically and capably.
	They come to understand other perspectives and cultures.
Scientific Process and Inquiry	
Scientific Inquiry and Application (Ohio Revised Science Standards and Model Curriculum)	
	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 predications.
	Communicate scientific procedures and explanations.
Scientific Process (Diocesan Curriculum)	
	Read, record, organize and interpret data in various forms produced by self and others in both written and oral form (i.e., tables, charts, maps, graphs, diagrams and symbols).
	Choose questions that can be answered through scientific investigations.
	Design and conduct scientific experiments.
	Communicate scientific findings to others through a variety of methods (written, oral, recorded and pictorial).
Scientific Interpretation (Diocesan Curriculum)	
	Describe the concepts of sample size and control, and explain how these affect scientific experiments.
	Apply appropriate math skills to interpret quantitative data (i.e., mean, median and mode).
	Distinguish the difference between description (i.e., observation and summary) and explanation (i.e., inference, prediction, significance and importance).
Scientific Tools and Safety (Diocesan Curriculum)	
	Choose the appropriate tools or instruments and use relevant safety procedures to complete scientific experiments.
	Use appropriate math equations/functions to express scientific findings.
Ethical Practices Reflecting Catholic Social Justice Teaching (Diocesan Curriculum)	
	Interact with living things and the environment in ways that promote respect.
	Recognize that scientific developments can have positive and negative effects on everyday life and society.
	Explain why it is important to examine data objectively and not let bias affect observations.
	Recognize that bias affects outcomes. People tend to ignore evidence that challenges their beliefs but accept evidence that supports their beliefs. Scientists attempt to avoid bias in their work.

Earth and Space Science – Earth's Interior	
	The composition and properties of Earth's interior are identified by the behavior of seismic waves.
	a. 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.
	b. Earth has an inner and outer core, an upper and lower mantle, and a crust.
	c. The formation of the planet generated heat from gravitational energy and the decay of radioactive elements, which are still present today.
	d. Heat released from Earth's core drives convection currents throughout the mantle and the crust.
	e. The thicknesses of each layer of Earth can vary and be transitional, rather than uniform and distinct.
Earth and Science – Plate Tectonics	
	Earth's crust consists of major and minor tectonic plates that move relative to each other.
	a. Historical data and observations such as fossil distribution, paleomagnetism, continental drift and sea-floor spreading contributed to the theory of plate tectonics.
	b. The rigid tectonic plates move with the molten rock and magma beneath them in the upper mantle.
	c. Convection currents in the crust and upper mantle cause the movement of the plates.
	d. The energy that forms convection currents comes from deep within the Earth.
	e. There are three main types of plate boundaries: divergent, convergent and transform.
	f. 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.
	A combination of constructive and destructive geologic processes formed Earth's surface.
	a. Earth's surface is formed from a variety of different geologic processes, including but not limited to plate tectonics.
Earth and Space Science – Geologic Processes and Time Scale	
	Evidence of the dynamic changes of Earth's surface through time is found in the geologic record.
	a. Earth is approximately 4.6 billion years old.
	b. 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).
	c. There are different methods to determine relative and absolute age of some rock layers in the geologic record.
	d. Within a sequence of undisturbed sedimentary rocks, the oldest rocks are at the bottom (superposition).
	e. The geologic record can help identify past environmental and climate conditions.
	f. Environmental and climate conditions also can be documented through the cryosphere as seen through ice cores.
Life Science – Species and Reproduction	
	Diversity of species occurs through gradual processes over many generations. Fossil records provide evidence that changes have occurred in number and types of species.
	a. Fossils provide important evidence of how life and environmental conditions have changed.
	b. 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.
	c. 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.
	Reproduction is necessary for the continuation of every species.
	a. Every organism alive today comes from a long line of ancestors who reproduced successfully every generation.
	b. Reproduction is the transfer of genetic information from one generation to the next.
	c. Reproduction can occur with mixing of genes from two individuals (sexual reproduction).

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	d. Most species (approximately 99 percent) that have lived on Earth are now extinct.
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	b. Reproduction is the transfer of genetic information from one generation to the next.
	c. Reproduction can occur with mixing of genes from two individuals (sexual reproduction).
	d. Reproduction can occur with the transfer of genes from one individual to the next generation (asexual reproduction).
	e. The ability to reproduce defines living things.
	The characteristics of an organism are a result of inherited traits received from parent(s).
	a. Expression of all traits is determined by genes and environmental factors to varying degrees.
	b. Many genes influence more than one trait, and many traits are influenced by more than one gene.
	c. During reproduction, genetic information (DNA) is transmitted between parent and offspring.
	d. In asexual reproduction, the lone parent contributes DNA to the offspring.
	e. In sexual reproduction, both parents contribute DNA to the offspring.
	The Catholic Church teaches "from the moment of conception, the life of every human being is to be respected in an absolute way because man is the only creature on earth that God has 'wished for himself' and the spiritual soul of each man is 'immediately created by God;' his whole being bears the image of the Creator."
	Physical Science – Forces
	Forces between objects act when the objects are in direct contact or when they are not touching.
	a. Magnetic, electrical and gravitational forces can act at a distance.
	b. An object is thought to have a region of influence, called a field, surrounding it.
	c. A field model can be used to explain how two objects can exert forces on each other without touching.
	d. Electric fields exist around objects with charge.
	e. Magnetic fields exist around magnetic objects.
	f. Gravitational fields exist around objects with mass.
	g. Every object exerts a gravitational force on every other object with mass.
	h. Electric force, magnetic force, and gravitational force weaken rapidly with increasing distance.
	Forces have magnitude and direction.
	a. The motion of an object is always measured with respect to a reference point.
	b. 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.
	c. When the net force is greater than zero, the object's speed and/or direction will change.
	d. When the net force is zero, the object remains at rest or continues to move at a constant speed in a straight line.
	Newton's Laws of Motion
	Coulomb's Law

Physical Science – Potential Energy	
	There are different types of potential energy.
	a. Gravitational potential energy changes in a system as the masses or relative positions of objects are changed.
	b. 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.
Literacy in Science & Technical Subjects – Reading Science & Technical Subjects (See Standards for further delineation of each of the following statements.)	
	Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
	Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
	Analyze how and why individuals, events, or ideas develop and interact over the course of a text.
	Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
	Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.
	Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.
	Assess how point of view or purpose shapes the content and style of a text.
	Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.
	Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.
	Read and comprehend complex literary and informational texts independently and proficiently.
Literacy in Science & Technical Subjects – Writing (See Standards for further delineation of each of the following statements.)	
	Write arguments to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence.
	Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
	Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.
	Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.
	Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
	Draw evidence from literary or informational texts to support analysis, reflection, and research.
	Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.
Literacy in Science & Technical Subjects – Speaking and Listening (See Standards for further delineation of each of the following statements.)	
	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
	Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.
	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric.

Literacy in Science & Technical Subjects – Speaking and Listening (continued) (See Standards for further delineation of each of the following statements.)	
	Presentation of Knowledge and Ideas 4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
	Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
	Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

Notes:

National Governors Association Center for Best Practices, Council of Chief State School Officers. *Common Core State Standards*. National Governors Association Center for Best Practices, Council of Chief State School Officers, Washington, D.C., 2010.