

## GRADE 8 SCIENCE

### STRAND A Value and Attitudes

Catholic Schools exist so that curriculum may be taught in the light of Gospel teachings. Teachers must reinforce Gospel truths and values so that students may serve as witnesses to their Catholic faith. The values listed below will help students develop a critical conscience in every content area. Values and Attitudes are not necessarily quantifiable but rather identified in a student's respect toward the content area.

- All people are created with minds and the gift to reason.
- God makes each of us as a unique individual.
- Recognize our talents and share them with one another in order to do God's will.
- There is a sense of order, balance and symmetry in God's universe.
- God provides us with all we need to survive. We must appreciate, care for, and protect these gifts through conservation, preservation, and stewardship of natural resources.
- All living things are dependent on their environment to sustain life.
- The Earth is dynamic and resilient, yet fragile and finite.
- Demonstrate a respect for all forms of life and a growing appreciation for the beauty and diversity of God's world.
- Demonstrate responsible and ethical behavior that exemplifies Catholic values, including respect for all life.

(The first three bullets are common to all areas of curriculum.)

## STRAND B Physical Science

### Matter, Properties and Change

ESSENTIAL STANDARDS	OBJECTIVES	STRATEGIES
1. Understand the <b>chemical and physical</b> properties of matter and changes that occur when matter interacts in a closed <b>system</b> . (8.P.1)	2.1 Describe the historical development of the structure of the atom that leads to the development of the modern Periodic Table.	
	2.2 Classify matter as elements, compounds, or mixtures based on how the atoms are packed together in arrangements. (8.P.1.1)	
	2.3 Explain how the physical properties of elements and their reactivity have been used to produce the current model of the Periodic Table of elements. (8.P.1.2)	
	2.4 Compare physical changes such as size, shape and state to chemical changes that are the result of a chemical reaction to include changes in temperature, color, formation of a gas or precipitate. (8.P.1.3)	
	2.5 Examine the nature of the bonds that form between atoms such as covalent and ionic bonds and the role of electrons in forming bonds.	
	2.6 Explain how the idea of atoms and a balanced chemical equation support the law of conservation of mass. (8.P.1.4)	

### Energy: Conservation and Transfer

ESSENTIAL STANDARDS	OBJECTIVES	STRATEGIES
2. Explain the environmental implications associated with the various methods of obtaining, managing and using energy resources. (8.P.2)	3.1 Explain the environmental consequences of the various methods of obtaining, transforming, and distributing energy. (8.P.2.1)	
	3.2 Explain the implications of the depletion of renewable and nonrenewable energy resources and the importance of conservation. (8.P.2.2)	

## STRAND C Earth Science

### Earth Systems, Structures and Processes

ESSENTIAL STANDARDS	OBJECTIVES	STRATEGIES
<p>1. Understand the hydrosphere and the impact of humans on local systems and the effects of the hydrosphere on humans. (8. E.1)</p>	<p>1.1 Explain the structure of the hydrosphere including:</p> <ul style="list-style-type: none"> <li>• Water distribution on earth</li> <li>• Local river basin and water availability ( 8.E.1.1)</li> <li>• <b><i>Ocean and its properties</i></b></li> <li>• <b><i>Features at different depths</i></b></li> <li>• <b><i>Forces that cause tides, currents and waves.</i></b></li> </ul>	
	<p>1.2 Summarize evidence that Earth's oceans are a reservoir of nutrients, minerals, dissolved gases, and life forms:</p> <ul style="list-style-type: none"> <li>• Estuaries</li> <li>• Marine ecosystems</li> <li>• Upwelling</li> <li>• Behavior of gases in the marine environment</li> <li>• Value and sustainability of marine resources</li> <li>• Deep ocean technology and understandings gained. (8.E.1.2)</li> </ul>	
	<p>1.3 Predict the safety and potability of water supplies in North Carolina based on physical and biological factors, including: temperature, dissolved oxygen, pH, nitrates and phosphates, turbidity, bio-indicators. (8.E.1.3)</p>	
	<p>1.4 Determine human impact on water quality.</p>	
	<p>1.5 <b><i>Gather evidence that all living organisms</i></b> require:</p> <ul style="list-style-type: none"> <li>• Monitoring of the hydrosphere</li> <li>• Water quality standards</li> <li>• Methods of water treatment</li> <li>• Maintaining safe water quality</li> <li>• Stewardship <b><i>and human impact.</i></b> (8.E.1.4)</li> </ul>	

**Earth Science (continued)**

**Earth History**

ESSENTIAL STANDARDS	OBJECTIVES	STRATEGIES
<p>2. Understand the history of Earth and its life forms based on evidence of change recorded in fossil records and landforms. (8.E.2)</p>	<p>2.1 Describe how the features of earth's crust have changed over time.</p>	<ul style="list-style-type: none"> <li>• Explain how the surface of the Earth has changed over time.</li> <li>• Identify the forces which acted to cause changes in earth's land and water features.</li> </ul>
	<p>2.2 Identify major divisions (eras) of geologic time and the life forms found in each.</p>	<ul style="list-style-type: none"> <li>• Explain how some landforms originated. – island arc, volcanic islands, coastal plains, etc.</li> <li>• Explain the differences in life forms and climate for each Era: Precambrian, Paleozoic, Mesozoic, and Cenozoic.</li> </ul>
	<p>2.3 Infer the age of Earth and relative age of rocks and fossils from index fossils and ordering of rock layers (relative dating and radioactive dating). (8.E.2.1)</p>	
	<p>2.4 Explain the use of fossils, ice cores, composition of sedimentary rocks, faults, and igneous rock formations found in rock layers as evidence of the history of the Earth and its changing life forms. (8.E.2.2)</p>	<ul style="list-style-type: none"> <li>• Examine evidence that the movement of continents has had significant global impact on the distribution of living things.</li> <li>• Examine evidence that movement of continents has had significant impact on major geological events.</li> </ul>

**STRAND D Life Science**

**Ecosystems**

ESSENTIAL STANDARD	OBJECTIVES	STRATEGIES
<p>1. Understand how organisms interact with and respond to the biotic and abiotic components of their environment. (8.L.3)</p>	<p>1.1 Explain how factors such as food, water, shelter, and space affect populations in an ecosystem. (8.L.3.1)</p>	
	<p>1.2 Summarize the relationships among producers, consumers, and decomposers including the positive and negative consequences of such interactions including coexistence and cooperation, competition (predator/prey), parasitism, and mutualism. (8.L.3.2)</p>	
	<p>1.3 Analyze how a major habitat change will affect the numbers of organisms of a species living in the habitat.</p>	
	<p>1.4 Explain how the flow of energy within food webs is interconnected with the cycling of matter (including water, nitrogen, carbon dioxide, and oxygen). (8.L.3.3)</p>	

**Life Science (continued)**

**Structures and Functions Of Living Organisms**

ESSENTIAL STANDARD	OBJECTIVES	STRATEGIES
2. Understand the hazards caused by agents of diseases that affect living organisms. (8.L.1)	2.1 Summarize the basic characteristics of viruses, bacteria, fungi and parasites relating to the spread, treatment and prevention of disease. (8.L.1.1)	
	2.2 Explain the difference between epidemic and pandemic as it relates to the spread, treatment and prevention of disease. (8.L.1.2)	
3. Understand that <b>biological particles</b> cause disease. (EX.8.L.1)	3.1 Recognize that <b>biological particles</b> can cause illness. (EX.8.L.1.1)	
	3.2 Demonstrate hygienic practices that reduce the presence of germs. (EX.8.L.1.3)	
4. Understand how biotechnology is used to affect living organisms. (8.L.2)	4.1 Summarize various aspects of biotechnology including: <ul style="list-style-type: none"> <li>• Economic benefits</li> <li>• Ethical issues. (8.L.2)</li> </ul>	

**EVOLUTION AND GENETICS**

ESSENTIAL STANDARD	OBJECTIVES	STRATEGIES
4. Understand the evolution of organisms and landforms based on evidence, theories and processes that impact the earth over time. (8.L.4)	4.1 Summarize the use of evidence drawn from geology, fossils, and comparative anatomy as the basis of the theory of evolution. (8.L.4.1)	
	4.2 Explain the relationship between genetic variation and an organism's ability to adapt to its environment. (8.L.4.2)	

**STRAND E Process Skills (Grade 6-8 appropriate skills necessary for asking meaningful questions and conducting careful investigation.)**

**Concept: Science process skills need to be practiced in the learning of science content.**

<p><b>PLANNING</b></p>	<ul style="list-style-type: none"><li>• Practice habits of careful observation.</li><li>• Develop and recognize testable questions.</li><li>• Relate past experience to a current problem.</li><li>• Develop habits of predicting outcomes of experiments.</li><li>• Develop habits of questioning information that lacks supporting data (do results make sense?).</li><li>• Write direction statements and simple procedures of an investigation.</li><li>• Identify and write a plausible hypothesis for a testable question.</li><li>• Use a variety of print and electronic resources to collect information and evidence for research.</li><li>• Develop a hypothesis by evaluating observations and known information.</li></ul>
<p><b>COLLECTING DATA</b></p>	<ul style="list-style-type: none"><li>• Select and use appropriate tools and technology to perform tests, collect and display data.</li><li>• Identify and analyze variables in a data table.</li><li>• Construct a data table and record changes in values of two related variables obtained during an investigation.</li><li>• Identify the type of graph to use to display and analyze data collected.</li><li>• Understand that measurement is a quantitative observation.</li><li>• Analyze data and write conclusion statements.</li><li>• Describe observations made during investigations using appropriate vocabulary.</li><li>• Identify, understand, and compare SI (metric) and customary units and prefixes of measurement.</li></ul>
<p><b>INTERPRETING RESULTS</b></p>	<ul style="list-style-type: none"><li>• Identify the elements required to construct a line graph from a data table obtained in an investigation putting independent variable on x-axis; dependent variable on y-axis.</li><li>• Understand the difference between data collection, analysis and conclusions in a scientific investigation.</li><li>• Interpret data from a bar, circle and line graph.</li><li>• Communicate steps and results from investigation in written reports and oral presentations.</li><li>• Recognize whether evidence is consistent with a proposed explanation.</li><li>• Make inferences, draw conclusions, and differentiate the two.</li><li>• Understand the meaning of the steps of the scientific method.</li><li>• Understand and use necessary components of a graph including a meaningful title, labels and units for both axis, and uniform, consistent scale for axis.</li></ul>
<p><b>SAFETY</b></p>	<ul style="list-style-type: none"><li>• Recognize the safety symbols used in science.</li><li>• Follow all safety rules including dress and behavior in a laboratory situation.</li><li>• Understand the correct methods of disposal of chemicals and use of scientific instrumentation.</li><li>• Understand the correct method of using scientific instrumentation.</li></ul>

## TOPICS BY GRADE

PHYSICAL SCIENCE	K	1	2	3	4	5	6	7	8
<b>FORCES AND MOTION</b>	Position and motion of objects	How forces affect motion	Relationship between sound and vibration	Motion and factors that affect motion	Motion due to magnetism and electricity	Force and motion in relation to simple machines	Waves and energy	Effects of forces on motion and graphical representations	Relationship between sound and energy
<b>MATTER: PROPERTIES AND CHANGE</b>	Physical properties of objects		Physical properties; changes in solids and liquids	Structure and properties of matter  Water cycle	Composition and properties before and after a change	Interaction of matter and energy	Structure and physical properties of matter		Chemical and physical properties of matter
<b>ENERGY: CONSERVATION TRANSFER</b>				Energy transfer from object to object	Simple circuits  Different forms of energy	Property changes due to heating and cooling	Energy transfer and interactions with matter	Forms, transfer and transformation and conservation of energy	Environmental issues of obtaining, managing and using energy
EARTH SCIENCE	K	1	2	3	4	5	6	7	8
<b>EARTH SYSTEMS, STRUCTURES AND PROCESSES</b>	Change and patterns of weather	Physical properties of earth materials	Patterns and factors that affect weather  Need for clean air		Composition and properties of minerals and rocks  Landforms	Weather patterns and phenomena	Structure and changes in the Earth's surface over time  Properties of soil	Cycling of matter in Earth's atmosphere and effect on weather, climate and humans  Air Quality	Earth's hydrosphere  Humans impact and effects on the hydrosphere
<b>EARTH IN THE UNIVERSE</b>		Features and patterns of sun/earth/moon system		Components and patterns of the solar system  Causes of day and night  Phases of moon			Solar System  Structure and motions of celestial bodies  Space technology spin-off		
<b>EARTH HISTORY</b>					Fossils as evidence of earth's history				Evidence of change recorded in fossils and landforms



## TOPICS BY GRADE

LIFE SCIENCE	K	1	2	3	4	5	6	7	8
<b>ECOSYSTEMS</b>		Characteristics of environments  Characteristics of living organisms  Needs of living organisms	Characteristics and resources of environments	Needs of plants for survival	Factors enabling organisms to survive in different environments  North Carolina ecosystems	Interdependence of living organisms  Organisms in an ecosystem	Flow of energy through ecosystems		Organisms interactions and response to components in the environment
<b>STRUCTURES AND FUNCTIONS OF LIVING ORGANISMS</b>	Living and non-living objects		Animal life cycles	Plant life cycles  Essential components of human body systems		Structures and systems necessary to perform life functions	Structures, processes and behaviors of plants  Plant parts	Processes, structures and functions of organisms for survival and reproduction	Hazards of agents of disease  Biological particles that cause disease  Biotechnology used for living organisms
<b>EVOLUTION AND GENETICS</b>			Differences and similarities between parents and their young			Why organisms have similarities and differences to their parents		Cellular reproduction, inheritance and external factors to variation in offspring  Ethical and scientific issues of research and application of genetic alterations	Evidence, theories, and processes of the evolution of organisms and landforms
<b>MOLECULAR BIOLOGY</b>					Need for nutritional energy				