

## GRADE 7 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

### Forces in Motion

ESSENTIAL STANDARDS	OBJECTIVES	STRATEGIES
<p>1. Understand motion, the effects of forces on motion and the graphical representations of motion. (7.P.1)</p>	<p>1.1 Explain how the motion of an object can be described by its position, direction of motion, and speed with respect to some other object. (7.P.1.1)</p>	
	<p>1.2 Explain the effects of balanced and unbalanced forces acting on an object (including friction, gravity and magnets). (7.P.1.2)</p>	
	<p>1.3 Describe and measure quantities that characterize moving objects and their interactions within a system: time, distance, mass, force, velocity, and center of mass.</p>	
	<p>1.4 Understand <b>and identify</b> balanced and unbalanced forces. (EX.7.P.1)</p>	
	<p>1.5 Understand that unbalanced forces produce motion.</p>	
	<p>1.6 Illustrate the motion of an object using a graph to show a change in position over a period of time. (7.P.1.3)</p>	
	<p>1.7 Interpret distance versus time graphs for constant speed and variable motion. (7.P.1.4 )</p>	
	<p>1.8 Understand that gravity s an unbalanced force that causes objects to fall towards the earth. (EX.7.P.1.3)</p>	
	<p>1.9 Apply Newton’s Laws of Motion to the way the world works: inertia, acceleration, gravitation, action/reaction.*</p> <p>(* Newton’s Laws should not be memorized at this age but the principles should be conceptualized and applied.)</p>	

**Physical Science (continued)**

**Energy: Conservation and Transfer**

ESSENTIAL STANDARDS	OBJECTIVES	STRATEGIES
<p>2. Understand forms of energy, energy transfer and transformation and conservation in mechanical systems. (7.P.2)</p>	<p>2.1 Explain how kinetic and potential energy contribute to the mechanical energy of an object. (7.P.2.1)</p>	
	<p>2.2 Explain how energy can be transformed from one form to another (specifically potential energy and kinetic energy) using a model or diagram of a moving object (roller coaster, pendulum, or cars on ramps as examples). (7.P.2.2)</p>	
	<p>2.3 Recognize that energy can be transferred from one system to another when two objects push or pull on each other over a distance (work) and electrical circuits require a complete loop through which an electrical current can pass. (7.P.2.3)</p>	
	<p>2.4 Explain how simple machines such as inclined planes, pulleys, levers and wheel and axels are used to create mechanical advantage and increase efficiency. (7.P.2.4)</p>	
	<p>2.5 Investigate electricity and magnetism as universal forces. Examine the basic properties of each and the relationship between electricity and magnetism.</p>	

## STRAND B Earth Science

### Earth Systems, Structures and Processes

ESSENTIAL STANDARDS	OBJECTIVES	STRATEGIES
<p>1. Understand how the cycling of matter (water and gases) in and out of the atmosphere relates to Earth's atmosphere, weather and climate and the effect of the atmosphere on humans. (7.E.1)</p>	<p>1.1 Compare the composition, properties and structure of Earth's atmosphere to include: mixtures of gases and differences in temperature and pressure within layers. (7.E.1.1)</p>	
	<p>1.2 Explain how the cycling of water in and out of the atmosphere and atmospheric conditions relate to the weather patterns on earth. (7.E.1.2)</p>	
	<p>1.3 Explain the relationship between the movement of air masses, high and low pressure systems, and frontal boundaries to storms (including thunderstorms, hurricanes, and tornadoes) and other weather conditions that may result. (7.E.1.3)</p>	
	<p>1.4 Identify the atmospheric characteristics that nurture life on earth.</p>	
	<p>1.5 Predict weather conditions and patterns based on information obtained from:</p> <ul style="list-style-type: none"> <li>• Data collected from direct observations and measurement (windspeed and direction, air temperature, humidity and air pressure).</li> <li>• Weather maps, satellites and radar</li> <li>• Cloud shapes and types, and associated elevation. (7.E.1.4)</li> </ul>	
	<p>1.5 Explain the influence of convection, global winds and the jet stream on weather and climatic conditions. (7.E.1.5)</p>	
	<p>1.6 Examine evidence that atmospheric properties can be studied to predict atmospheric conditions and weather hazards: humidity, temperature, cloud type, elevation, wind speed and direction, air pressure, precipitation.</p>	
	<p>1.7 Conclude that the good health of humans requires: monitoring the atmosphere, maintaining air quality and stewardship. (7.E.1.6)</p>	

**Earth Systems, Structures and Processes (continued)**

	1.7 Explain the difference between weather and climate.	
	1.8 Recognize that changes in the amount of solar radiation an area receives cause changes in temperature, air movement, and precipitation.	
	1.9 Describe and identify prevailing wind direction at different latitudes.	
2. Analyze the properties that can be observed and measured to predict air quality: particulate matter, ozone, pollen, and temperature.	2.1 Identify the factors that affect air quality.	

## STRAND D Life Science

### Structures and Functions of Living Organisms

ESSENTIAL STANDARDS	OBJECTIVES	STRATEGIES
<p>1. Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. (7.L.1)</p>	<p>1.1 Compare the structures and life functions of single-celled organisms that carry out all of the basic functions of life including: Euglena, Amoeba, Paramecium, and Volox. (7.L.1.1)</p>	
	<p>1.2 Compare the structures and functions of plant and animal cells, including major organelles: cell membrane, cell wall, nucleus, chloroplasts, mitochondria, and vacuoles. (7.L.1.2)</p>	
	<p>1.3 Summarize how food provides the energy and the molecules required for building materials, growth and survival of all organisms (to include plants). (8.L.5.1)</p>	
	<p>1.4 Explain the relationship among a healthy diet, exercise, and the general health of the body (emphasis on the relationship between respiration and digestion). (8.L.5.2)</p>	
	<p>1.5 Summarize the hierarchical organization of multi-cellular organisms from cells to tissues to organs to systems to organisms. (7.L.1.3) <b>and recognize the human body is made of this organizational structure.</b></p>	
	<p>1.6 Summarize the general functions of the major systems of the human body (digestion, respiration, reproduction, circulation, and excretion) and ways that these systems interact with each other to sustain life. (7.L.1.4)</p>	

**STRAND D Life Science (continued)**

**Evolution and Genetics**

ESSENTIAL STANDARDS	OBJECTIVES	STRATEGIES
<p>2. Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring. (7.L.2)</p>	<p>2.1 Explain why offspring that result from sexual reproduction (fertilization and meiosis) have greater variation than offspring that result from asexual reproduction (budding and mitosis). (7.L.2.1)</p>	
	<p>2.2 Infer patterns of heredity using information from Punnett squares and pedigree analysis. (7.L.2.2)</p>	
	<p>2.3 Explain the impact of the environment and lifestyle choices on biological inheritance (to include common genetic diseases) and survival. (7.L.2.3)</p>	
<p>3. Analyze the ethical and scientific issues raised by selective breeding, biomedical research, and the moral issues of research in human genetics.</p>	<p>3.1 Describe and/ or debate some of the pros and cons raised by genetic modifications brought about by selective breeding.</p>	
	<p>3.2 Explain one or more moral difficulties that human genetic research presents with respect to our belief that God makes each of us as a unique individual.</p>	

**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				