

SCIENCE 2012

INTRODUCTION

The Science Curriculum is intended for use in all Catholic elementary and middle schools in the Diocese of Raleigh. It is the framework that should guide instruction with textbooks and other materials used as resources. The Curriculum is aligned to the *North Carolina Essential Standards* and includes additional Standards and Objectives as deemed appropriate by the Curriculum Committee for enhancement of instruction in Catholic Schools. The Curriculum allows for depth of study in areas of focus at each grade level. However, it is understood that certain constraints at the local level may interfere with implementing the curriculum in the sequence in which it is written. If Standards and Objectives are not met in the year recommended, the Catholic Schools Office mandates that content for elementary students be taught by the end of Grade 5 and all middle school content by the end of Grade 8.

To effectively implement the curriculum the teacher must first be familiar the format:

Values and Attitudes highlight key principles that will enable students to develop a critical conscience in each content area and recognize that all subjects must be viewed in the light of Gospel teachings. Values and Attitudes are the first Strand of every grade level. They are not necessarily quantifiable but rather identified in a student's respect toward the content area.

Strands are the five overarching areas that connect topics throughout grade levels:

Strand A Values and Attitudes

Strand B Physical Science ~ Forces and Motion; Matter; Energy

Strand C Life Science ~ Ecosystems; Structures and Functions; Evolution and Genetics; Biology; Molecular Biology

Strand D Earth Science ~ Earth Systems, Structures and Processes; Earth in the Universe; Earth History

Strand E Science Process Skills

Essential Standards and Objectives (column 1 and 2) are closely related and explain what a student should know and be able to apply in the Strand. The Standard is the broad concept. They increase in complexity from grade to grade. The Essential Standards are noted in parenthesis, e.g., K.E.1 = Kindergarten.Earth.Standard 1. The Curriculum Committee recommended after intense review to modify some of the standards for clarity of understanding. They also suggested the inclusion of additional standards that had not been identified but relevant to the grade. Modifications to Essential Standards are indicated in **bold** and *italicized*.

Strategies (column 3) are methods for a teacher to provide the most effective authentic experiences for students. Decisions for the selection of strategies are at the discretion of the teacher. This blank column provides space to document and comment on the methods used for implementation.

Assessment provides accountability for the progress of student learning. It is a means of determining the level of proficiency that a student has developed with an idea, skill or concept. Assessment also provides a means of evaluating the lessons for future instructional planning.

ACKNOWLEDGEMENTS

The Catholic Schools Offices gratefully acknowledges the expertise, dedication and tremendous time commitment of the Science Curriculum Committee:

Mary Barber, Teacher, St. Egbert, Morehead City
 Aerin Benavides, Teacher, St. Thomas More, Chapel Hill
 Barbara Brodsky-Post, Teacher, St. Patrick, Fayetteville
 Maria Gomez, Assistant Principal/Teacher, Blessed Sacrament, Burlington
 Alan Johnston, Teacher, Our Lady of Lourdes, Raleigh
 Lori Reese, Teacher, St. Mary Magdalene, Apex
 Tammy Stys, Teacher, St. Mary Magdalene, Apex
 Kerry Wolfe, Teacher, St. Mary, Goldsboro
 Mary Womack, Teacher, St. Peter, Greenville
 Rosalie Innacelli, Assistant Superintendent for Instructional Services, Catholic Schools Office

REVISIONS

Our Lady of Lourdes, Raleigh

Kristen Johnston
 Susan Liles
 Amy Parent

St. Thomas More, Chapel Hill

Karen Kingrea

St. Egbert, Morehead City

Kathleen Ford-Green
 Nancy Whipple
 Susan Craver
 Toni Leatherman
 Judy Rhodes

St. Mary Magdalene, Apex

Bonnie Agnew
 Sherri Flannigan
 Mary Pat Fronk
 Joel Groelle
 Maria Madsen
 Kelly Nations
 Lisbeth Pfeiffer
 Amy Reitz
 Elizabeth Wiegman

PILOT PROGRAM 2011-2012

Blessed Sacrament Maria Gomez

Our Lady of Lourdes Alan Johnston

St. Egbert Mary Barber

St. Mary Magdalene, Apex

Tammy Stys
 Christa Rhodes
 Bonnie Agnew
 Amy Reitz
 Lori Reese

GRADE 3 SCIENCE

STRAND A Values 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
1. Understand motion and factors that affect motion. (3.P.1)	1.1 Predict changes in speed or direction resulting from forces acting on an object. (3.P.1.1)	
	1.2 Compare the relative speeds (faster or slower) of objects that travel the same distance in different amounts of time. (3.P.1.2)	
	1.3 Explain the effects of earth's gravity on the motion of any object on or near the earth. (3.P.1.3)	
	1.4 Identify different ways objects move. (EX.3.P.1.1)	
	1.5 Demonstrate how the forces (pushes or pulls) affect the motion of an object.	
	1.6 Describe how forces affect an object's speed and direction of motion.	

Physical Science (continued)

Matter, Properties And Change

ESSENTIAL STANDARDS	OBJECTIVES	STRATEGIES
2. Understand the structure and properties of matter before and after they undergo a change. (3.P.2)	2.1 Recognize that air is a substance that surrounds us, takes up space and has mass. (3.P.2.1)	
	2.2 Compare solids, liquids, and gases based on their basic properties. (3.P.2.2)	
	2.3 Summarize changes that occur to the observable properties of materials when different degrees of heat are applied to them, such as melting ice or ice cream, boiling water or an egg, or freezing water. (3.P.2.3)	
3. Understand the water cycle.	3.1 Explain how water becomes a gas by the phase from liquid to steam and back by condensation.	

Energy Conservation And Transfer

ESSENTIAL STANDARDS	OBJECTIVES	STRATEGIES
4. Recognize how energy can be transferred from one object to another. (3.P.3)	4.1 Recognize that energy can be transferred from one object to another by rubbing them against each other. (3.P.3.1)	
	4.2 Recognize that energy can be transferred from a warmer object to a cooler one by contact or at a distance and the cooler object gets warmer. (3.P.3.2)	

STRAND C Earth Science

Earth In The Universe

ESSENTIAL STANDARDS	OBJECTIVES	STRATEGIES
<p>1. Recognize the major components and patterns observed in the solar system. (3.E.1)</p>	1.1 Identify the parts of our solar system, including Earth.	
	1.2 Recognize the earth is part of a system called the solar system that includes the sun (a star), planets, and many moons and that the earth is the third planet from the sun. (3.E.1.1)	
	1.2 Recognize the revolution of Earth and moon as a cyclical path.	
	1.3 Recognize the difference between earth rotation and earth revolution.	
	1.4 Understand how the revolution and tilt of Earth affect seasons and weather. (EX.3.E.1)	
	1.5 Recognize that changes in the length and direction of an object's shadow indicate the apparent changing position of the sun during the day, and the moving patterns of the stars in the sky, to include the sun, stay the same. (3.E.1.2)	
	1.6 Identify stars as being large bodies of burning gases that appear small because they are so distant.	
<p>2. Explain the causes of day and night and phases of the moon. (4.E.1)</p>	2.1 Explain the cause of day and night based on the rotation of Earth on its axis. (4.E.1.1)	
	2.2 Describe the change in shape of the moon from day to day over several months to determine a pattern.	

STRAND D Life Science

Ecosystems

ESSENTIAL STANDARDS	OBJECTIVES	STRATEGIES
1. Understand how plants survive in their environment. (3.L.2)	1.1 Analyze plant structures for specific functions: growth and survival.	
	1.2 Recall the function of the following plant structures as it relates to the survival of plants in their environment: roots-absorb nutrients; stems-provide support; leaves-synthesize food; flowers-attract pollinators and produce seeds for reproduction. (3.L.2.1)	
	1.3 Explain how environmental conditions determine how well plants survive and grow. (3.L.2.2)	
	1.4 Explain how the basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soil determine the ability of soil to support the growth and survival of many plants. (3.L.2.4)	
	1.5 Evaluate composting to show how plant and animal materials break down to form soil.	

Structure And Functions Of Living Organisms

ESSENTIAL STANDARDS	OBJECTIVES	STRATEGIES
2. Understand human body systems and how they are essential for life: protection, movement and support. (3.L.1)	2.1 Compare the different functions of the skeletal and muscular system. (3.L.1.1)	
	2.2 Explain why skin is necessary for protection and for the body to remain healthy. (3.L.1.2)	
3. Understand plant life cycles.	3.1 Compare and contrast life cycle of different plants.	
	3.2 Label and describe anatomical structures of plants.	
	3.3 Demonstrate understanding of distinct stages in life cycle in plants; draw pictures, sequence illustrations, and give verbal explanation. (3.L.2.3)	

STRAND E Process Skills (Grade 3 appropriate skills necessary for asking meaningful questions and conducting careful investigation.)

PLANNING INVESTIGATIONS	COLLECTING DATA	INTERPRETING RESULTS	SAFETY
<ul style="list-style-type: none"> Use observations of the environment to ask and answer a scientific question. 	<ul style="list-style-type: none"> Recognize patterns in data to make a conclusion about the data. 	<ul style="list-style-type: none"> Carry out the scientific method by making predictions, collecting data, analyzing data and communicating results. 	<ul style="list-style-type: none"> Understand the importance of safety in science and follow simple safety rules including listening and asking questions.
<ul style="list-style-type: none"> Follow written instructions for scientific investigation. 	<ul style="list-style-type: none"> Classify objects using specific criteria. 	<ul style="list-style-type: none"> Collect and analyze data to formulate logical conclusions. 	
<ul style="list-style-type: none"> Predict the outcome of an investigation based on observation and/or experience. 	<ul style="list-style-type: none"> Collect data, compare and contrast data. 		
	<ul style="list-style-type: none"> Use scientific instruments such as magnifiers thermometers, glassware, clamps, balances and stopwatches to collect data and take measurements. 		
	<ul style="list-style-type: none"> Construct bar graphs to record data using appropriately labeled axes and titles. 		

TOPICS BY GRADE

PHYSICAL SCIENCE	K	1	2	3	4	5	6	7	8
FORCES AND MOTION	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
MATTER: PROPERTIES AND CHANGE	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
ENERGY: CONSERVATION TRANSFER				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
EARTH SYSTEMS, STRUCTURES AND PROCESSES	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
EARTH IN THE UNIVERSE		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		
EARTH HISTORY					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
ECOSYSTEMS		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
STRUCTURES AND FUNCTIONS OF LIVING ORGANISMS	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
EVOLUTION AND GENETICS			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
MOLECULAR BIOLOGY					Need for nutritional energy				

SCIENCE PROCESS SKILLS ~ GRADES K to 5

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

	K	1	2	3	4	5
PLANNING INVESTIGATIONS	<ul style="list-style-type: none"> Observe, ask questions, predict. 	<ul style="list-style-type: none"> Observe, ask questions, predict and investigate. 	<ul style="list-style-type: none"> Ask questions and explore ways to get answers through simple investigation. 	<ul style="list-style-type: none"> Use observations of the environment to ask and answer a scientific question. 	<ul style="list-style-type: none"> Use observations of the environment to ask and answer a scientific question. 	<ul style="list-style-type: none"> Recognize and ask testable questions.
	<ul style="list-style-type: none"> Describe relative position of objects to a reference point. 	<ul style="list-style-type: none"> Follow oral instructions for a scientific investigation. 	<ul style="list-style-type: none"> Follow oral instructions for a scientific investigation. 	<ul style="list-style-type: none"> Follow written instructions for scientific investigation. 	<ul style="list-style-type: none"> Work in groups to plan and conduct a simple investigation 	<ul style="list-style-type: none"> Based on student-developed questions, students should write simple instructions to carry out a procedure to follow.
	<ul style="list-style-type: none"> Predict. 	<ul style="list-style-type: none"> Predict. 	<ul style="list-style-type: none"> Predict the outcome of an investigation based on observations as opposed to guessing. 	<ul style="list-style-type: none"> Predict the outcome of an investigation based on observation and/or experience. 	<ul style="list-style-type: none"> Predict the outcome of an investigation based on observation and/or experience. 	<ul style="list-style-type: none"> Investigate predictions by conducting multiple trials for consistent results.
				<ul style="list-style-type: none"> Collect and recognize patterns in data to make a conclusion about the data. 	<ul style="list-style-type: none"> Formulate and justify predictions based on cause and effect relationships. 	<ul style="list-style-type: none"> Understand cause and effect relationships.
COLLECTING DATA	<ul style="list-style-type: none"> Observe a variety of materials using all five senses. 	<ul style="list-style-type: none"> Explore a variety of materials using all senses to make observations. 	<ul style="list-style-type: none"> Collect data from observations using the senses to classify objects. 	<ul style="list-style-type: none"> Recognize patterns in data to make a conclusion about the data. 	<ul style="list-style-type: none"> Record data for a scientific investigation. 	<ul style="list-style-type: none"> Keep accurate records of data over time for a scientific investigation.
	<ul style="list-style-type: none"> Identify multiple physical properties of common objects. 	<ul style="list-style-type: none"> Classify physical properties of common objects. 	<ul style="list-style-type: none"> Classify physical properties of common objects. 	<ul style="list-style-type: none"> Classify objects using specific criteria. 	<ul style="list-style-type: none"> Classify objects using specific criteria. 	<ul style="list-style-type: none"> Classify objects using specific criteria.
	<ul style="list-style-type: none"> Collect and sort common objects by one physical attribute. 	<ul style="list-style-type: none"> Use observed physical characteristics to classify objects. 	<ul style="list-style-type: none"> Compare and sort common objects according to two or more physical attributes. 	<ul style="list-style-type: none"> Collect data, compare and contrast data. 	<ul style="list-style-type: none"> Collect data, compare and contrast data, draw conclusions. 	<ul style="list-style-type: none"> Make predictions, collect and analyze data, and draw conclusions.
	<ul style="list-style-type: none"> Identify tools used in science to measure length, weight and temperature, e.g., ruler, balance, thermometer. 	<ul style="list-style-type: none"> Use simple tools appropriately, such as magnifiers, thermometers, rulers, and balances to observe and measure objects. 	<ul style="list-style-type: none"> Use simple tools, such as magnifiers, thermometers, rulers, and balances to observe and measure objects. 	<ul style="list-style-type: none"> Use scientific instruments such as magnifiers thermometers, glassware, clamps, balances and stopwatches to collect data and take measurements. 	<ul style="list-style-type: none"> Collect data and measurements with increasing accuracy using more sophisticated instruments such as a graduated cylinder, triple beam balance, and microscope. 	<ul style="list-style-type: none"> Determine appropriate tools to make quantitative measurements including calculators, computers, graduated cylinders, balances, meter sticks, and stopwatches.

	K	1	2	3	4	5
COLLECTING DATA (continued)					<ul style="list-style-type: none"> Recognize variable and constants in a scientific investigation. 	<ul style="list-style-type: none"> Recognize that a single independent variable must exist to provide a conclusion in an investigation.
	<ul style="list-style-type: none"> Create simple graphs as a group. 	<ul style="list-style-type: none"> Create simple graphs as a group. 	<ul style="list-style-type: none"> Construct bar graphs to record data using appropriately labeled axes and titles. 	<ul style="list-style-type: none"> Construct bar graphs to record data using appropriately labeled axes and titles. 	<ul style="list-style-type: none"> Develop tables and graphs. based on data collected; develop questions as a result of data collected. 	<ul style="list-style-type: none"> Identify the elements such as labels, title, graph key, to construct a line graph with the proper scale and spacing.
						<ul style="list-style-type: none"> Interpret data from a bar, circle and line graph and decide which type of graph best displays given data.
INTERPRETING RESULTS	<ul style="list-style-type: none"> Communicate observations orally. 	<ul style="list-style-type: none"> Communicate sequence of steps or observations. 	<ul style="list-style-type: none"> Communicate sequence of steps or observations in a simple scientific investigation. 	<ul style="list-style-type: none"> Carry out the scientific method by making predictions, collecting data, analyzing data and communicating results. 	<ul style="list-style-type: none"> Carry out the scientific method by making predictions, collecting data, analyzing data and drawing a conclusion about the results. 	<ul style="list-style-type: none"> Analyze data in a data table to draw conclusions and explain results of a scientific investigation.
	<ul style="list-style-type: none"> Recognize patterns in data. 	<ul style="list-style-type: none"> Recognize patterns in data. 	<ul style="list-style-type: none"> Communicate results of investigations orally, through drawings, and/or with models. 	<ul style="list-style-type: none"> Collect and analyze data to formulate logical conclusions. 	<ul style="list-style-type: none"> Draw conclusions about predictions and results in a scientific investigation. 	<ul style="list-style-type: none"> Analyze data and formulate logical conclusions.
						<ul style="list-style-type: none"> Differentiate opinion and fact based on evidence.
SAFETY	<ul style="list-style-type: none"> Understand and follow simple safety rules including listening and asking questions. 	<ul style="list-style-type: none"> Understand and follow simple safety rules including listening and asking questions. 	<ul style="list-style-type: none"> Understand and follow simple safety rules including listening and asking questions. 	<ul style="list-style-type: none"> Understand the importance of safety in science and follow simple safety rules including listening and asking questions. 	<ul style="list-style-type: none"> Understand the importance of safety in science and follow simple safety rules and behavior including listening and asking questions. 	<ul style="list-style-type: none"> Understand the importance of safety in science and follow simple safety rules and behavior including listening and asking questions.