Science Curriculum

Third Grade

The performance expectations in third grade are to help students formulate answers to questions such as: "What is typical weather in different parts of the world and during different times of the year? How can the impact of weather - related hazards be reduced? How do organisms vary in their traits? How are plants, animals, and environments of the past similar or different from current plants, animals, and environments? What happens to organisms when their environment changes? How do equal and unequal forces on an object affect the object? How can magnets be used?"

Students are able to identify relationships between the roles of science, technology, and Catholic ethics in the global community and demonstrate stewardship instilled with Catholic values in the care of local and global environments.

Students are able to organize and use data to describe typical weather conditions expected during a particular season. By applying their understanding of weather-related hazards, students are able to make a claim about the merit of a design solution that reduces the impacts of such hazards. Students are expected to develop an understanding of the similarities and differences of organisms' life cycles. An understanding that organisms have different inherited traits, and that the environment can also affect the traits that an organism develops, is acquired by students at this level. In addition, students are able to construct an explanation using evidence for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. Students are expected to develop an understanding of types of organisms that lived long ago and also about the nature of their environments. Third graders are expected to develop an understanding of the idea that when the environment changes some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die. Students are able to determine the effects of balanced and unbalanced forces on the motion of an object and the cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. They are then able to apply their understanding of magnetic interactions to define a simple design problem that can be solved with magnets.

The crosscutting concepts of patterns; cause and effect; scale, proportion, and quantity; systems and system models; interdependence of science, engineering, and technology; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas.

In the third grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in asking questions and defining problems; developing and using models, planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the core ideas.

Primary Source: Next Generation Science Standards, April, 2013

See www.nextgnscience.org for national science standards and detailed descriptions of cross-cutting concepts, science and engineering practices, flow of core ideas, and ties to Common Core math and language arts standards.

THIRD-FIFTH GRADE CROSS-CUTTING CONCEPTS (to be integrated throughout the curriculum) **Students will:**
Patterns –Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them. • Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena and designed products. • Patterns of change can be used to make predictions. • Patterns can be used as evidence to support an explanation.
Cause and Effect: Mechanism and Prediction – Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering. • Cause and effect relationships are routinely identified, tested, and used to explain change. • Events that occur together with regularity might or might not be a cause and effect relationship.
Scale, Proportion, and Quantity –In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change. • Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long time periods, • Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.
Systems and System Models –A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems. • A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. • A system can be described in terms of its components and their interactions.
Energy and Matter: Flows, Cycles, and Conservation –Tracking energy and matter flows, into, out of, and within systems helps one understand their system's behavior. • Matter is made of particles. • Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and within systems. • Energy can be transferred in various ways and between objects.
Structure and Function–The way an object is shaped or structured determines many of its properties and functions. • Different materials have different substructures, which can sometimes be observed. • Substructures have shapes and parts that serve functions.
Stability and Change–For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand. • Change is measured in terms of differences over time and may occur at different rates. • Some systems appear stable, but over long periods of time will eventually change.

CATHOLIC IDENTITY LEARNING (to be integrated throughout the curriculum) **Students will:** ARCHSF-1. Identify relationships between the roles of science, technology, and Catholic ethics in the global community. ARCHSF-2. Demonstrate stewardship instilled with Catholic values in the care of local and global environments.
SCIENTIFIC METHOD (to be integrated throughout the curriculum) **Students will:** Ask questions and defining problems Form a hypothesis Develop and use models Plan and carry out investigations Analyze and interpret data Construct explanations (for science) and design solutions (for engineering) Obtain, evaluate, and communicate information
ENGINEERING METHOD (to be integrated throughout the curriculum) **Students will:** 3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. 3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. 3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

LIFE SCIENCE LEARNING OUTCOMES (What students will be able to do, know, understand and value)	**SAMPLE ASSESSMENTS/ STRATEGIES (**What evidence will demonstrate that students have achieved the Learning outcome)	**BEST PRACTICES**
Students will:		
3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. [*Clarification Statement*: Changes organisms go through during their life form a pattern.] [*Assessment Boundary:* Assessment of plant life	• Draw the life cycles of two or more different animals. Label similarities and differences.	

cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.]		
3-LS2-1. Construct an argument that some animals form groups that help members survive.	• Research and explain how the behaviors of animals that herd or flock help survival rates.	
Use observations and models to design a simple process to classify plants based on their structures.	• Create a dichotomous key to identify coniferous and deciduous trees based on leaf shapes.	
3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. [*Clarification Statement:* Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings of animals. [*Assessment Boundary:* Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.]	• Examine pictures of several generations of animals. Document similarities and differences in coloration.	
3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment. [*Clarification Statement:* Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.]	• Conduct an experiment and gather data to determine how the environment affects traits.	
3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. [*Clarification Statement*: Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments	• Construct maps of the changes in the world's oceans based on fossils evidence.	

could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.]		
3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. [*Clarification Statement:* Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.]	• Design your own animal, then play a game of chance to determine if you survive (i.e., long tail – swing from branches, big nose – can smell danger) etc.	
3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. [*Clarification Statement:* Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]	• Research a biome in a book. Create a table of animals that live in the biome and characteristics that help them survive.	
3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. [*Clarification Statement:* Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food] [*Assessment Boundary:* Assessment is limited to a single environmental change. Assessment does not include climate change.]	• Make a Cause and Effect Chart. Think ways the biome could changes and the effects on the plants/animals.	
Make a model of different life zones including desert, forest, grasslands, salt water, and	• Make a shoebox model of a biome. Include plants, animals, and weather	

arctic. Include information about animals, plants, and weather.	information.	
Classify animals as vertebrates and invertebrates.	• Classify vertebrates and invertebrates.	

EARTH SCIENCE LEARNING OUTCOMES (What students will be able to do, know, understand and value)	**SAMPLE ASSESSMENTS/ STRATEGIES (**What evidence will demonstrate that students have achieved the Learning outcome)	**BEST PRACTICES**
Students will:		
3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. [*Clarification Statement:* Examples of data at this grade level could include average temperature, precipitation, and wind direction.] [*Assessment Boundary:* Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.]	• Keep weekly records of temperature (Celsius and Fahrenheit), (precipitation, and wind speed direction). Graph the data in bar graphs and analyze the differences between Fall, Winter, and Spring.	
3-ESS2-2. Obtain and combine information to describe climates in different regions of the world.	• Collect and compare temperature and precipitation data for different regions' seasons.	
3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard. [*Clarification Statement*: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lighting rods.]	• Investigate different solutions to reducing the impacts of tornados in schools.	

PHYSICAL SCIENCE LEARNING OUTCOMES (What students will be able to do, know, understand and value)	SAMPLE ASSESSMENTS/ STRATEGIES **(**What evidence will demonstrate that students have achieved the Learning outcome)	BEST PRACTICES
Students will:		
3-PS2-1. Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. [*Clarification Statement:* Examples could include an unbalanced force on one side of a ball can make it start moving; and, balanced forces pushing on a box from both sides will not produce any motion at all.] [*Assessment Boundary*: Assessment is limited to one variable at a time: number, size, or direction of forces. Assessment does not include quantitative force size, only qualitative and relative. Assessment is limited to gravity being addressed as a force that pulls objects down.]	• Ask questions, conduct research in textbook, and design an experiment with the scientific method to test the effects of balanced or unbalanced forces on objects.	
Identify simple machines and describe how they give advantage to users (e.g., levers, pulleys, wheels and axels, inclined planes, screws, and wedges).	• Describe a real-life example of each of the simple machines and explain the advantage it gives to the user.	
3-PS2-2. Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. [*Clarification Statement:* Examples of motion with a predictable pattern could include a child swinging in a swing, a ball rolling back and forth in a bowl, and two children on a see-saw.] [*Assessment Boundary*: Assessment does not include technical terms such as period and frequency.]	• Make a hypothesis about how the length or weight of a string and washer pendulum affect the time it takes to swing back and forth. Design and conduct an experiment to determine which variable has the greatest affect.	
Classify substances by their physical and chemical properties (e.g., state, pure substances, mixtures, magnetism,	• Design and conduct experiments to classify objects by their state, magnetism, conductivity, and buoyancy.	

conductivity, density).		
3-PS2-3. Ask questions to determine cause - effect relationships of electric or magnetic interactions between two objects not in contact with each other. [*Clarification Statement:* Examples of an electric force could include the force on hair from an electrically charged balloon and the electrical forces between a charged rod and pieces of paper; examples of a magnetic force could include the force between two permanent magnets, the force between an electromagnet and steel paperclips, and the force exerted by one magnet versus the force exerted by two magnets. Examples of cause and effect relationships could include how the distance between objects affects strength of the force and how the orientation of magnets affects the direction of the magnetic force.] [*Assessment Boundary*: Assessment is limited to forces produced by objects that can be manipulated by students, and electrical interactions are limited to static electricity.]	• Design and conduct an experiment to determine how distance and magnetic orientation affect magnets that are not in contact with each other. Document findings.	
3-PS2-4. Define a simple design problem that can be solved by applying scientific ideas about magnets. [*Clarification Statement:* Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other.]	• Research uses of magnets. Use the Engineering Method to brainstorm ideas for a design. Construct and modify your own device that utilizes a magnet.	