Science Curriculum

First Grade

VISION OF STUDENT

The performance expectations in first grade help students formulate answers to questions such as: "What happens when materials vibrate? What happens when there is no light? What are some ways plants and animals meet their needs so that they can survive and grow? How are parents and their children similar and different? What objects are in the sky and how do they seem to move?" First grade performance expectations include PS4, LS1, LS3, and ESS1 Disciplinary Core Ideas from the NRC Framework. Students are expected to develop understanding of the relationship between sound and vibrating materials as well as between the availability of light and ability to see objects. The idea that light travels from place to place can be understood by students at this level through determining the effect of placing objects made with different materials in the path of a beam of light. Students are also expected to develop understanding of how plants and animals use their external parts to help them survive, grow, and meet their needs as well as how behaviors of parents and offspring help the offspring survive. The understanding is developed that young plants and animals are like, but not exactly the same as, their parents. Students are able to observe, describe, and predict some patterns of the movement of objects in the sky. The crosscutting concepts of patterns; cause and effect; structure and function; 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 first grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the core ideas. They will think and act in a Christ like way, demonstrating a positive attitude when exploring, solving problems and making decisions about God's universe, world and planet.

Next Generation Science Standards

The Archdiocese of Santa Fe Standard 1. Investigation and Inquiry Process

Students will be exposed to various tools and use these tools in the world of science. They will be introduced to and participate in the Scientific Inquiry Process while being actively involved in science concepts through "hands-on" guided labs and experiences.

Critical for Mastery in Grade 1

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**
A. Know and apply the concepts, principles and processes of scientific inquiry		
1. Ask scientific questions.	• Ask questions about an object, event or organism in the environment.	
2. Design scientific investigations.	• Devise a plan to investigate an object, event or organism and predict what will happen in the investigation.	
3. Conduct scientific investigations.	• Participate in guided investigations, demonstrating safe behavior while using simple tools (e.g., rulers, magnifiers, thermometers, scales) and the senses, to collect data through observation, measuring, cutting, gluing, taping, and/or pouring.	
4. Analyze data using appropriate methods and technologies.	• Record and arrange observations and data from guided investigation in a lab book, log, notebook or chart paper. Compare findings with predictions.	
5. Construct reasonable explanations.	• Use data to develop reasonable scientific explanations for results and compare with other students or teams.	
6. Communicate explanations and results.	• Describe and explain individual and group observations and results.	
7. Demonstrate understandings of scientific inquiry.	• Describe how scientists use their observations and measurements of the natural world to build upon and test what they already know.	
8. Identify relationships between the roles of science, technology, and Catholic ethics in the global community.	• The St. Francis Pledge - I/We Pledge to: o PRAY and reflect on the duty to care for God's Creation and protect the poor and vulnerable.	

	○ LEARN about and educate others on the causes and moral dimensions of climate change. ○ ASSESS how we-as individuals and in our families, parishes and other affiliations-contribute to climate change by our own energy use, consumption, waste, etc. ○ ACT to change our choices and behaviors to reduce the ways we contribute to climate change. ○ ADVOCATE for Catholic principles and priorities in climate change discussions and decisions, especially as they impact those who are poor and vulnerable.	

The Archdiocese of Santa Fe Standard 2: Life Science

Students will explore, investigate, identify and distinguish between living organisms, plants, animals and other creatures while developing an awareness of how they grow, move and interact with their environment expressing concern for life. Students will be able to differentiate between living, non-living, and once-living organisms.

Critical for Mastery in Grade 1

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**
A. Characteristics of Organisms (Basic structures in plants and animals serve a function)		
1. Discover basic needs of living things (i.e., food, water, air and shelter) non-living	• Compare living and non-living things	

things do not need these things.	based on the basic needs of living things. Prove what plants need during an investigation where the plant is deprived of a need.	
2. Identify the **senses** needed to meet survival needs for a given scenario.	• Document how people use their senses to find out about their surroundings and meet their needs. Create a class chart listing the senses. Under each sense state how that sense helps satisfy need for food, satisfy need to avoid danger, and satisfy the need to explore surroundings.	
3. Compare the following observable features of living things: • Movement - legs, wings. • Protection - skin, feathers, tree bark. • Respiration - lungs, gills. • Support - plant stem, tree trunk, human spine and bones. • Human body parts (i.e., head, toes, face, fingers, hair, eyes, ears, mouth, arms, legs, and neck).	• Compose a list of various animals and plants: ○ Discuss how they move (i.e., walk, swim, fly). ○ Identify and explain how they protect themselves (i.e., humans have skin and hair, birds have feathers, trees have bark, bears have fur, roses have thorns). ○ Sort pictures of animals according to how they breathe using lungs or gills. ○ Draw a picture of a plant, tree, human and animal of choice and label the part that gives it support. ○ Label pictures of the human body. Describe the body part and its function. Allow students to label a template on the computer in computer lab (template made by teacher).	
4. Identify observable similarities and differences (e.g., number of legs, body coverings, size) between different groups of animals.	• Complete a chart using cut out pictures of animals sorted according to their number of legs, body covering, antennae, tail, shell, size, etc.	

B. Life Cycles		
1. Identify stages of human life (e.g., infancy, adolescence, adulthood).	• Create a booklet. Draw and label the stages of development to include birth, growing into adulthood, reproducing (male and female) and dying.	
2. Identify similarities and differences between animals and their parents.	• Complete worksheets matching baby animals to their parents.	
3. Explore the life cycle of an insect.	• Through scientific inquiry processes observe and collect data on the life cycles of butterflies and meal worms. Document information in life cycle booklets on each.	
C. Organisms and Environments (relationships among various organisms and their environment)		
1. Identify what plants and animals exist in the local environment.	• Create a book about the local environment that includes the plants and animal found there.	
2. Compare habitats like the desert, prairie, water, mesa, underground, and forest where plants and animals live.	• Construct a diorama depicting a chosen habitat inclusive of : o living (e.g., plants and animals) and non-living (e.g., soil, water system) things.	
3. Describe how plants and animals coexist in the environment and how they depend on each other.	• Use the food chain to help understand how plants and animals depend on each other.	

The Archdiocese of Santa Fe Standard 3: Physical Science

Students will observe, recognize and develop a primary understanding of the properties of energy and matter, their interaction, the forces of motion, simple machines and sound.

Critical for Mastery in Grade 1

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**
A. Recognize that matter has different forms and properties.		
1. Develop vocabulary used to describe some observable properties (e.g., color, shape, size, texture, odor, weight and type of material) of objects.	• Discuss observable properties of matter, create a vocabulary list (e.g., chart, picture dictionary).	
2. Observe matter in the three states (solids, liquids and gases).	• Show water in three states (show piece of ice, melt it into water and then boil water to make steam.	
3. Identify and describe matter in each state using their properties.	• Explore various items and based on its properties determine the state of matter.	
4. Recognize that matter can change by altering its properties through freezing, boiling, mixing, dissolving, melting, etc.	• Work at various workstations with a partner to explore the ways that matter can be changed or not changed by freezing, boiling, mixing, dissolving, melting, etc.	
B. Know that energy is needed to get things done and that energy has different forms.		
1. Recognize that heat can be produced in many ways (solar, burning, rubbing/friction).	• Describe how a solar oven cooks food, how the sun heats water, that burning produces heat. Show that rubbing two objects together produces friction which causes heat. • Bring in a solar over and cook an egg. • Show a camping shower bag and put it in the sun to heat water.	

	• Demonstrate that the water temperature changed.	
2. Observe that sound is made by vibrating objects.	• Investigate sound and vibration using rubber bands, tuning forks, etc. Create a guitar with rubber bands and a shoe box.	
3. Observe that gravity makes things fall to the ground unless something holds them up.	• Prove Newton's Law. Show that the force of gravity pulls things downward. • Perform investigation using a pen and coins dropped from same height and record what happens. • Using marbles of various sizes and weights on an inclined plane see that regardless of size and weight they will accelerate at the same rate.	
C. Identify forces and describe the motion of objects.		
1. Observe simple machines (wedge, inclined plane and screws) and explore how they work.	• With parents choose a simple machine and show how it is used in our present society.	
2. Know that magnets can be used to make things move without being touched.	• Manipulate objects with magnets. Explore attract and repel properties.	
3. Describe ways to make things move, what causes them to stop, and what causes a change in speed or direction.	• Through hands-on activities play with many objects to see how they move.	

The Archdiocese of Santa Fe Standard 4: Earth and Space Science

Students will observe, record, and describe seasonal and weather changes. Students will be able to observe and distinguish between the physical characteristics of our earth including rocks, minerals, soil, land forms and water systems. Student will also observe, describe and investigate planets, stars and moons as they move through the universe. Students will begin to learn respect for our natural resources by being introduced to renewable and non-renewable resources and how human choice can affect the sustenance of our planet.

Critical for Mastery in Grade 1

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**
A. Earth		
1. Describe basic Earth materials: water, rocks and soil and the effects of erosion.	• Label illustrations. Make a relief map. Discuss the effects of erosion from wind, rain, and water on landforms.	
2. Identify Earth's natural resources: air, water, soil, trees and wildlife that we as humans need to survive.	• Identify the process/sequence of how paper is made from trees. Make a poster of the byproducts of petroleum.	
3. Identifying the uses of Earth's Natural Resources.	• Describe how natural resources are relied upon; how water is used to grow plants; and how animals/plants are used for food. Make a paper windmill.	
4. Examine ways to conserve natural resources – reduce, reuse and recycle.	• Participate in Recycling programs like Capri Sun's Recycling Program, collecting aluminum cans, Yoplait Yogurt foil tops, soda pop flip tops for Breast Cancer and McDonald's flip tops to support Ronald McDonald House. • Make a compost pile. • Use recycled cans to build a class robot and use solar panel motor to illuminate its eyes.	
B. Weather		
1. Identify the following characteristics of	• Graph daily weather on a classroom chart.	

seasonal weather patterns: temperature, type of precipitation, and wind.	Compare monthly weather patterns to see seasonal weather changes. Illustrate the leaves on a tree and show how its leaves change through each season.	
2. Know that short term weather conditions (temperature, rain, snow, wind) can change daily/seasonally and how it affects our daily activities.	• Discuss how to dress in seasonally appropriate clothing and how our activities change by the weather. Classify types of weather and activities that can be performed at that time – swimming, hiking, ice skating, football, when animal babies are born, hibernation of animals/plants.	
C. Space		
1. Identify evidence that the sun is the natural source of heat and light on the Earth (e.g., warms surfaces, creates shadows, shade).	• Lie outside and allow the sun to warm your face/body. Write a simple paragraph about how it makes students feel. Stand outside in the sun on a piece of paper and trace the outline of students shadow at various times of the day. Trace their silhouette on the wall outside.	
2. Compare celestial objects and our Solar System (Sun, Moon, Planet and Stars).	• Create a Venn diagram of similarities/differences between planets. Make a solar system mobile. • Watch a DVD- Magic School Bus, "Planets" or DK "Planets".	
3. Describe observable changes that occur in the sky (e.g., clouds, how they form and move, the position of the moon, etc.).	• Use cotton balls and illustrate by compare/contrast different types of clouds. Label different types of clouds. • Watch a video about clouds.	
4. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations and identify science related career opportunities.	• Research and learn about the many explorers, scientists, doctors, etc. that have contributed to the world of science. (Have an Invention Convention). • Research a career in the science world and learn how the career contributes to the future of our world.	

The Archdiocese of Santa Fe Standard 5: Engineering

Student will create and construct models where they will utilize decision making skills while building with different types of materials.

Critical for Mastery in Grade 1

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**
A. Building Materials		
1. Recognize different types of materials used for building.	• Explore different types of buildings; identify the materials used to construct them. Using basic solid geometric forms, build a tower.	
2. Explore the many types of building materials and identify the strengths and weaknesses of each.	• Make adobe bricks and compare them to bricks, wood, cement, and steel. Read "The Three Little Pigs".	
B. Construction of Model(s)		
1. Design and construct a model.	• Using one or more types of building materials students construct a model of their choice and explain why the model was built (need and purpose).	
C. Discussion and Analysis		
1. Determine the viability of built model.	• Analyze and determine whether the model built will serve the purpose for which it was built: o Was the problem solved? o Were the materials chosen adequate?	