

GRADE 2

State Goal 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments, and solve problems.

LEARNING STANDARD/OUTCOME	SAMPLE ASSESSMENT	CONNECTIONS
<p>Critical to Understand and Master at Grade 2: 2.11.01 Ask an engaging question about objects, organisms, and events in the environment and discuss how the question can be answered.</p>	<ul style="list-style-type: none"> • Ask a question about the different needs of plants. • Discuss as a class the needs of plants and an experiment to see what happens under different growing conditions. 	<p>Language Arts: Read and share trade books relating to science themes (e.g., health issues). Art: Draw what you see when looking through a microscope.</p>
<p>2.11.02 Plan a simple investigation of objects, organisms, or systems and predict what might happen in the investigation.</p>	<ul style="list-style-type: none"> • Discuss an investigation in which 1 variable is changed to test its effect on plants (e.g., light, water, music, blowing air). • Write your prediction and share it with your class. • Discuss a problem with traffic patterns around your school and determine what interactions you can measure (e.g., numbers of cars passing school, numbers of students who get out of each car, time each car remains stopped). 	<p>Social Studies: Research and report about a famous scientist. Language Arts: Correctly write a paragraph describing an investigation.</p>
<p>2.11.03 Conduct the investigation using the senses, simple equipment, skills, and tools (e.g., rulers, thermometers, balances, magnifying glasses); collect data by observing, measuring, cutting, connecting, turning off/on, pouring, tying, taping, and gluing.</p>	<ul style="list-style-type: none"> • Find 3 things to observe or measure about a plant you are investigating (e.g., color, height, limpness, weight). • Measure, for a specified length of time, the traffic interactions you described in your plan. • Write down observations in an organized way in a list or chart. 	<p>Religion: Work together to use and share materials. Art: Do a senses walk during which you use all senses except sight; describe what you feel, smell, hear, and taste.</p>

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<p>2.11.04 Arrange data and observations into patterns and compare them with predictions.</p>	<ul style="list-style-type: none"> • Create a display of data that illustrates the most obvious patterns (e.g., less light results in slower plant growth; for the 30 minutes before school starts, the number of cars passing the school increases). 	<p>Math: Develop a pattern using numbers or letters and give it to a partner to decipher. Technology: Use a computer program to build an appropriate table for your data (e.g., with the right number of rows and columns).</p>
<p>2.11.05 Use observations to develop reasonable scientific explanations for student investigations.</p>	<ul style="list-style-type: none"> • Link explanations to observations (e.g., when I saw that plants did not grow well in low light, I learned that plants need light to grow). • Use the data from the traffic study to propose a solution to traffic problems to your principal. 	<p>Language Arts: Write a story that tells what you think happened between a set of before and after pictures based on evidence you observe in each picture.</p>
<p>2.11.06 Compare and contrast one's explanation with the explanations of other students or other teams.</p>	<ul style="list-style-type: none"> • Discuss results and interpretations with other teams. • Decide to continue observations to gather more data to help discern among contradictory explanations. • Compare explanations for pollution in a park near your school. 	<p>Religion: Listen respectfully to others when they present their findings and ask appropriate questions. Math: Graph the results of each student's or team's work on transparencies and display them on an overhead to compare the trends.</p>

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<p>2.11.07</p> <p>Describe and explain individual and group observations and results.</p>	<ul style="list-style-type: none"> • Be able to recognize sources of error in investigations that can lead to differences in individual results. • Use consistency among observations by a group of individuals as support for those observations. Use inconsistency among observations by a group of individuals as a reason to look again at the experimental design and find sources of error. 	<p>Language Arts: Create a cause and effect statement to describe your results.</p> <p>Language Arts: Read an age-appropriate science magazine to see how scientists describe their results.</p>
<p>2.11.08</p> <p>Explain a simple design problem directly related to students' experiences (e.g., coat hooks, dirty shoes, storing books) and formulate ways to solve the problem.</p>	<ul style="list-style-type: none"> • Investigate the best setup for growing plants (pot, soil, light, temperature). • Discuss ideas about plant growth that you want to test. • Discuss how you can pass a marble or small stone across a puddle to a friend without throwing it. 	<p>Physical Education: Identify a physical task that is difficult to do (e.g., reach high, run fast, jump high) and think of a tool that might help you.</p> <p>Business: Discuss how people in business provide services and materials to help solve problems. Describe businesses that could help you solve a design problem (e.g., tennis shoe, ladder, or sports drink companies).</p>
<p>2.11.09</p> <p>Design a device that will be useful in solving the problem.</p>	<ul style="list-style-type: none"> • Diagram a design for a boat made of aluminum foil that will support a marble or small stone. • Design a setup with a pot, soil, and surrounding environment that supports the best growth in plants. • Discuss the design with others in the class and make changes, if necessary. 	<p>Art: Create simple sketches of possible solutions.</p> <p>Social Studies: Discuss and describe design solutions and vote as a class on the best idea.</p>

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<p>2.11.10 Build the device (individually or collaboratively) using the materials and tools provided (e.g., hammers, scissors, screwdrivers, rulers).</p>	<ul style="list-style-type: none"> • Construct the device for growing plants or floating a marble or small stone. • Use materials and tools safely and appropriately. 	<p>Language Arts: Write the sequence of steps to create a peanut butter sandwich. Social Studies: Visit a factory where objects are made. Art: Construct a tool to help solve a problem with simple materials (wire, paper, etc.).</p>
<p>2.11.11 Test the device and record results using given instruments, techniques, and measurement methods.</p>	<ul style="list-style-type: none"> • Test a boat made with aluminum foil in a small tank to see if it can support a marble or pebble. • Transplant plants to the pot, soil, and environment you designed and record how well they grow. Do the same with plants not placed within your design. 	<p>Language Arts: Follow a classmate's directions for creating a peanut butter sandwich, and rewrite steps that are missing or unclear.</p>
<p>2.11.12 Decide if the solution worked based on test results.</p>	<ul style="list-style-type: none"> • Compare results of the test with the results of other students. • Compare results of the test with a regular plant that was not treated in a special way; did your plant grow more or less? • Discuss and decide which model of aluminum foil boat was most effective in supporting a marble or pebble. 	<p>Home Economics: Follow a recipe to make a mystery food and then compare it to a picture to evaluate your results.</p>
<p>2.11.13 Report the design of the device, the test process, and the results in solving a given problem.</p>	<ul style="list-style-type: none"> • Present the results to the class in an oral report using visuals. Include data you collected and your conclusion about how well your device solved the problem. • Make suggestions for improvements you would make in the future. 	<p>Language Arts: Write a clear and organized report. Social Studies: Share your report with a family member and answer questions he or she might have.</p>

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<p>2.11.14</p> <p>Apply simple tools of mathematics to measure data (e.g., counting, reading values from instruments) and simple operations to relate data (e.g., grouping in sets, addition, subtraction).</p>	<ul style="list-style-type: none"> • Use precise measurements when designing devices (e.g., volumes, lengths, weights, numbers of objects). • Use a graph to display relationships (e.g., changes in height of plants over time; number of marbles a boat can support). 	<p>Business: Calculate how many items you need to make for your business if you sell 5 items per day and you need enough inventory for 2 weeks.</p>
<p>2.11.15</p> <p>Use the skills needed for oral and written communication, such as describing and writing about findings, and asking questions of other students.</p>	<ul style="list-style-type: none"> • Write a lab report using the format given to you by your teacher. Include data you collected and your conclusion about how well your device solved the problem. • Present your device to the class and answer questions from other students. • Participate in a class discussion of the results of other students' devices. 	<p>Music: Create a jingle to share a scientific finding.</p> <p>Language Arts: Report findings in written form and summarize them orally for the group.</p>
<p>Significant to Develop at Grade 2:</p> <p>2.11.16</p> <p>Describe how scientists use their observations and measurements of the natural world to build upon and test what they already know. (11A)</p>	<ul style="list-style-type: none"> • Describe how the rapid growth of plants in a rain forest makes sense now that you understand some of the requirements for plant growth. • Discuss with your class how ideas in science must fit with observations scientists make every day. 	<p>Language Arts: Read about a scientist and his or her studies. Complete the following sentence about the scientist: He noticed (fill in the blank) and wanted to know (fill in the blank) (e.g., He noticed that pine trees were dying and wanted to know what caused their death).</p>
<p>2.11.17</p> <p>Use numbers to characterize and then to group objects or events in the sciences. (11C)</p>	<ul style="list-style-type: none"> • Use tree ring data to determine wet and dry cycles in the environment. • Record in a table the number of students from several classes with birthdays in a given month, graph the results, and discuss patterns and reasons for the patterns. 	<p>Math: Discuss and decide how to number the objects in a certain group (e.g., from biggest to smallest or alphabetically).</p>

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<p>2.11.18 Identify shapes and patterns that are found in nature and in things that people make (e.g., circles, rectangles, triangles, cubes); identify how measurements can be displayed with simple graphs. (11C)</p>	<ul style="list-style-type: none"> • Measure tree ring thickness from a log and discuss how this relates to patterns of climate change across time. • Display the relationship between time and thickness of tree rings on a simple graph. 	<p>Art: Using shapes (e.g., circles, rectangles, triangles) design a nature picture. Math: Describe how graphs illustrate various patterns (e.g., a line sloping up indicates an increase, a line sloping down indicates a decrease).</p>
<p>2.11.19 Develop skills to communicate ideas and findings in science with accurate representations, such as models, diagrams, flowcharts, and sketches. (11C)</p>	<ul style="list-style-type: none"> • Create a graph that displays data collected in an investigation and accurately compares 2 variables. • Carefully draw design plans using measurements and noting specific materials needed. 	<p>Language Arts: Develop a “K-W-L” chart to be used during the investigation of a specific theme.</p>

State Goal 12: Understand fundamental concepts, principles, and interconnections of the life, physical, and earth and space sciences.

LEARNING STANDARD/OUTCOME	SAMPLE ASSESSMENT	CONNECTIONS
<p>Critical to Understand and Master at Grade 2: Life Sciences 2.12.01 Describe living things that depend on one another for survival in food chains (e.g., some animals eating plants, other animals eating animals).</p>	<ul style="list-style-type: none"> • Draw a simple food chain. • Chart your own daily or weekly meals to determine your place on the food chain. • Diagram the position of a rabbit or rodent in food chain. 	<p>Math/Art: Make 3 different-sized fish. Sequence the fish from smallest to largest. Compare your fish with fish made by other students. Work in small groups to determine which of all your fish would be at the top and bottom of the food chain.</p> <p>Social Studies: Think of a food, and describe how it travels to arrive at your neighborhood grocery store.</p>
<p>2.12.02 Give examples of behavior or responses of organisms, including humans, that ensure survival.</p>	<ul style="list-style-type: none"> • Identify why organisms eat (e.g., because they need energy to grow and survive). • Describe how organisms behave to ensure their survival (e.g., run away, hide, attack, attract, reproduce). 	<p>Math: Make bar graphs to show how fast some animals can run (e.g., gazelle, 50 miles per hour; zebra, 40 mph; cheetah, 70 mph).</p> <p>Language Arts: Write a story that describes why animals run (e.g., some animals run to catch their prey and others run to escape predators).</p> <p>Language Arts: Read the story <i>Chicken Little</i> and discuss the survival behavior of Chicken Little.</p>

LEARNING STANDARD/OUTCOME	SAMPLE ASSESSMENT	CONNECTIONS
<p>2.12.03</p> <p>Compare living and nonliving things in several of the many types of environments and habitats in the world (e.g., rain forest, desert, tundra, coral reef).</p>	<ul style="list-style-type: none"> • Match a living thing and a nonliving thing to their environment (e.g., penguin, iceberg, ocean; tarantula or lizard, sand, desert). • Write reasons why an organism might not survive in a particular environment because of other living and nonliving things in the environment. 	<p>Language Arts: Make graphic organizers to show key characteristics of different habitats.</p> <p>Art: Make a collage of living things and nonliving things out of pictures from old magazines.</p>
<p>Physical Sciences</p> <p>2.12.04</p> <p>Describe how mixing materials together can change their properties (e.g., color, appearance).</p>	<ul style="list-style-type: none"> • Explore and describe the changes that occur when 2 materials are mixed together (e.g., clay and water; vinegar and baking soda). • Use examples to explain why some mixtures can be separated into their parts after mixing and some cannot be separated (e.g., baking cookies). 	<p>Math: Use measuring cups and spoons to make a powdered drink or instant tea. Measure the right amount of condensed flavor, sugar, and water.</p> <p>Home Economics: Compare and contrast salad and salad dressing. Which one can be separated after mixing and which cannot?</p>
<p>2.12.05</p> <p>Experiment with sources of energy (e.g., light, heat, electricity, magnetism, sound) and make observations and measurements of these physical phenomena.</p>	<ul style="list-style-type: none"> • Describe different sources of energy in your classroom or home. • Use appropriate senses and tools to observe and measure energy (e.g., eyes and light meter for light; ears, touch, and tuner for sound; eyes, touch, and thermometer for heat). 	<p>Language Arts: Discuss what happens to water when it is exposed to heat energy and what causes the changes.</p> <p>Music/Technology: Use PBS Cyber Chase Patter Player to make music. Discuss how repeated sounds make music.</p>

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<p>2.12.06</p> <p>Explore and describe experiments with heat, temperature, and energy.</p>	<ul style="list-style-type: none"> • Discuss what happens when an object cools off (e.g., Where does the heat go? Does it disappear?). • Give examples of situations when heat is transferred. 	<p>Language Arts: Create a weather journal. Use a thermometer to measure the temperature every day and write in your journal about the activities that you do each day. Keep the journal for two to three weeks. Review and reflect on how the weather affected your activities.</p> <p>Math: Graph the change in temperature during the time you kept the weather journal.</p>
<p>Earth and Space Sciences</p> <p>2.12.07</p> <p>Identify various Earth materials (e.g., minerals, rocks, soil, water, atmosphere) and their distinctive properties.</p>	<ul style="list-style-type: none"> • Classify rocks, minerals, and soil according to their properties (e.g., colors, luster, textures). • Compare the properties of freshwater and saltwater. • Discuss the difference between air with high humidity and air with low humidity. • Observe and describe the relationship between minerals and rocks (e.g., rocks are made of one or more minerals) and rocks and soil (e.g., rocks break down to form soil). 	<p>Language Arts: Collect rocks and make a list of adjectives to describe the rocks that you collected.</p> <p>Math: Use three paper plates and label them small, smaller, and smallest. Group the rocks that were collected from small to smallest. Put the rocks on the appropriate plate. After all of the rocks have been sorted, estimate how many rocks are on each plate.</p> <p>Religion: Make a list of mineral (metal) and stone building materials in your church that are from the Earth.</p>

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<p>2.12.08</p> <p>Explore and describe the properties of soils (e.g., color and texture, water retention, plant support) and soils as vital parts of ecosystems.</p>	<ul style="list-style-type: none"> • Sort soils according to grain size: pebble, sand, silt. • Experiment with and then rate soils for use in plantings according to their properties. • Describe the soils in different places on Earth and some of the plants and animals that live there. 	<p>Language Arts: Read <i>A Diary of a Worm</i>. Discuss how worms are important to Earth. If <i>A Diary of a Worm</i> is not available, use another book about worms that is grade-appropriate.</p> <p>Math: Predict whether water will drain more quickly through sand, soil, small pebbles, or large pebbles. Use a stopwatch to time how long it takes for 1 cup of water to drain through the same amount of different materials; chart the results.</p>
<p>Significant to Develop at Grade 2:</p> <p>2.12.09</p> <p>Give examples of changes in the environment that affect plants and animals (e.g., seasons, human influence). (12B)</p>	<ul style="list-style-type: none"> • Identify ways that people depend on living and nonliving things in their homes and schools. • Describe a local issue that has an impact on the plants and animals in your community. 	<p>Math/Art: Use a calendar to identify the months and days when the seasons change. Draw pictures of things that you would do and wear for each season.</p> <p>Religion: Discuss examples of changes in the environment in the Bible that affect plants and animals.</p>
<p>2.12.10</p> <p>Describe the external features of animals and plants that help them survive in different environments. (12A)</p>	<ul style="list-style-type: none"> • Identify features of plants that help them survive in their ecosystem (e.g., thorns on a shrub). • Identify features of animals that help them survive in their ecosystem (e.g., shell on a turtle). • Describe what can happen if a plant or animal is relocated into a new ecosystem. 	<p>Language Arts: Write diamante poems for your favorite animal.</p> <p>Technology: Use encyclopedia software or the Internet to research information about animals and their habitats.</p>

LEARNING STANDARD/OUTCOME	SAMPLE ASSESSMENT	CONNECTIONS
<p>2.12.11</p> <p>Identify products that are made from natural resources from Earth and whether those products can be classified as recyclable or nonrecyclable after they are used. (12E)</p>	<ul style="list-style-type: none"> • Make a chart of natural resources used in homes (e.g., wood, natural gas, stone, paper, water). • Indicate which of the resources you listed in the chart are recyclable and which you actually are recycling. 	<p>Math: Make a tally chart of the students in your class who recycle at home and those who do not. Discuss the importance of recycling.</p> <p>Art: Use discarded household materials to make art constructions.</p>
<p>Useful to Work on at Grade 2:</p> <p>2.12.12</p> <p>Show how light travels in a straight line until it strikes an object; light can be reflected by a mirror, absorbed by an object, or be divided into colors (e.g., rainbow, laser). (12C)</p>	<ul style="list-style-type: none"> • Describe what makes up white light and how you know. • Draw the path of light from the sun to an object to your eyes and describe what you see and why. 	<p>Religion: Read the story of Noah’s Ark and discuss God’s promise to Noah. Use white construction paper for clouds and multicolored tissue paper for a rainbow.</p> <p>Social Studies: Describe the ways that communities use light at night and during the day.</p>
<p>2.12.13</p> <p>Explain how people burn fuels such as wood, oil, coal, or natural gas or use electricity to cook their food and warm their houses. (12C)</p>	<ul style="list-style-type: none"> • Discuss how people have cooked food and kept warm across recorded history. • Evaluate the benefits and risks of modern access to energy sources for cooking and heating (e.g., ease, safety, possible misuse, waste). 	<p>Social Studies: Use timelines to show when inventions were made that change how we use fuels like stoves, furnaces, and microwaves.</p>

State Goal 13: Understand the relationships among science, technology, and society in historical and contemporary contexts.

LEARNING STANDARD/OUTCOME	SAMPLE ASSESSMENT	CONNECTIONS
<p>Critical to Understand and Master at Grade 2: <i>Safety in science</i> 2.13.01 Demonstrate a knowledge of basic safety practices at home and when doing science at school (e.g., nothing in mouth without permission, “stop, drop, and roll”).</p>	<ul style="list-style-type: none"> • Practice safety when doing science at school (e.g., never taste materials, wear safety goggles, wash hands after working with objects and materials, pick up after yourself, use tools safely). • Describe the procedure for evacuation in case of a fire or other emergency. • Never use electrical outlets without the help or permission of an adult. 	<p>Language Arts: Work with your parents to write step-by-step directions that describe what you should do if there is a fire in your home.</p> <p>Language Arts: Write an acrostic poem using the letters from the word “safety.”</p> <p>Art: Draw a floor plan of your home and identify all possible exits.</p>
<p><i>Science, technology, and society</i> 2.13.02 Identify and describe ways that science and technology affect people’s everyday lives (e.g., transportation, medicine, agriculture, sanitation, communication occupations).</p>	<ul style="list-style-type: none"> • Describe the role of immunizations in staying healthy and preventing the spread of disease. • Practice recycling classroom materials as a way to preserve natural resources. • Describe a technology that you use to get to school (e.g., car, bus, bike) and draw a map of the route that you take. 	<p>Art: Draw pictures of the different ways that kids get to school (e.g., cars, bikes, skates, scooters, buses, or on foot).</p> <p>Social Studies: Interview parents, grandparents, or other adults to find out how technology has changed the world since they were children and about how they use technology in their jobs.</p>

LEARNING STANDARD/OUTCOME	SAMPLE ASSESSMENT	CONNECTIONS
<p>2.13.03</p> <p>Discuss and describe examples of several important careers in science.</p>	<ul style="list-style-type: none"> • Identify scientists who live in your community and describe the benefit they provide for society (e.g., doctors, dentists, foresters, nutritionists). • Write a description of members of your family or neighbors who might have careers in science, math, engineering, and technology. • Discuss as a class a typical progression of school levels to develop the skills to get a job in science and technology (e.g., middle school, high school, trade school, college, graduate school). 	<p>Social Studies: Participate in a “Science Career Day.” Select pieces of paper with science careers written on them (e.g., paleontologist, oceanographer, astronaut, chemist, science teacher, geologist, biologist). On Career Day, dress up for your career, if appropriate; make or draw instruments or tools that you would use; and describe the place that you work.</p> <p>Business and Economics: List and describe professions of all people that enable a hospital to function.</p>
<p><i>Natural hazards and level of risk</i></p> <p>2.13.04</p> <p>Describe changes in the environment that are natural, and can become hazardous (e.g., floods, earthquakes, hurricanes, tornadoes).</p>	<ul style="list-style-type: none"> • Using a stream table, demonstrate how increased stream flow or change in gradient can cause flooding. • Report on an environmental change that has had a negative impact on your community (e.g., ice storm, flood, forest fire, mud slide). • Discuss as a class a recent natural hazard that happened around the globe. 	<p>Religion: Read the story of Noah’s Ark. Discuss the great flood and what happened to all of the animals, people, and life forms that were not on the ark.</p>