

GRADE 1

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 1: 1.11.01 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 events in the environment, such as weather patterns or how mud forms. • Observe a volcano in a video and write 2 questions that you have about the lava or the people who live nearby. • Discuss ways in which weather information can be gathered (e.g., TVs, radios, weather stations, outside observations). 	<p>Language Arts: Share and discuss a theme found in a science books. Art: Create murals depicting plants, animals, and their environments.</p>
<p>1.11.02 Plan a simple investigation of objects, organisms, or systems and predict what might happen in the investigation.</p>	<ul style="list-style-type: none"> • Plan to observe and describe daily weather patterns. • Predict what trends you expect to see in weather patterns. • Draw a diagram with labels of an object that you can make that will fly 20 feet. 	<p>Physical Education: Take a nature hike or walk in your playground to observe and gather objects. Language Arts: Write a sentence about your environment before a nature hike.</p>
<p>1.11.03 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"> • Construct an object that can fly 20 feet and conduct a test with your class to see if the object achieves the goal. • Record daily weather patterns using instruments (e.g., thermometers, rain gauges, anemometers). • Make observations of the sky and compare them to cloud charts. 	<p>Math: Make a data table with the appropriate rows and columns to record data. Religion: Work together in small groups, share materials, help each other, and discuss results. Art: Paint a picture with only your hands, then paint a picture using an art tool (e.g., paint brush, sponge); compare the two pictures.</p>

LEARNING STANDARD/OUTCOME	SAMPLE ASSESSMENT	CONNECTIONS
<p>1.11.04 Arrange data and observations into patterns and compare them with predictions.</p>	<ul style="list-style-type: none"> • Create a table or chart using daily weather data. • Graph daily weather data patterns (e.g., temperature, wind speed, rainfall). • Make a table of months (12 columns) listing students' names with birthdays in each month. 	<p>Language Arts: Write a sentence about your environment after a nature hike and compare it to the sentence you wrote before your hike.</p> <p>Math: Find a pattern in a sequence of shapes and add to the pattern.</p>
<p>1.11.05 Use observations to develop reasonable scientific explanations for student investigations.</p>	<ul style="list-style-type: none"> • Describe weather patterns using data from observations (e.g., as summer approaches, the average daily high temperature increases due to the increase in the length of the day). • Describe the best shape for an object that can fly at least 20 feet. 	<p>Language Arts: Write a sentence that describes something that you can observe and what it means to you (e.g., I see that it is raining outside, so I will wear a raincoat to school).</p> <p>Social Studies: Listen to a story of a famous scientist and find out what he or she noticed that led to a discovery or invention.</p>
<p>1.11.06 Compare and contrast one's explanation with the explanations of other students or other teams.</p>	<ul style="list-style-type: none"> • Discuss performance of each flight design for the 20-foot flight experiment. • Discuss reasons for different explanations in design experiments. • Suggest new tests that could be done to help decide between conflicting explanations. 	<p>Language Arts: Prepare a presentation to share individual and group findings; ask questions of others when they do their presentations.</p> <p>Social Studies: Discuss why people long ago thought Earth was flat; find out what convinced people that this idea was not correct.</p>

LEARNING STANDARD/OUTCOME	SAMPLE ASSESSMENT	CONNECTIONS
<p>1.11.07 Describe and explain individual and group observations and results.</p>	<ul style="list-style-type: none"> • 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: Prepare a presentation to share individual and group findings. Home Economics: Present a recipe to the class and bring in a sample for tasting. Technology: Learn how to use a new tool and show the class what you can do with it.</p>
<p>1.11.08 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 ways to tell time without a clock (e.g., shadows on a sundial, temperature changes, apparent movement of the sun across windows). 	<p>Language Arts/Drama: Develop small skits to present a design problem and its possible solution. Social Studies: Conduct an election to vote on the solution your class wants to test.</p>
<p>1.11.09 Design a device that will be useful in solving the problem.</p>	<ul style="list-style-type: none"> • Create drawings or plans for a simple sundial, thermometer holder, or stencil of the sun's movement across the windows. • Discuss alternative designs for the same type of device and decide to test all of them, then compare results or select 1 design to test. • Design a vessel made of paper that will support a marble or small stone when placed in water. 	<p>Language Arts: Read a trade book story about problem solving. Business: Find out why a particular device was invented and the problem that it solved (e.g., ladder to reach high things, roller shades to block out light).</p>

LEARNING STANDARD/OUTCOME	SAMPLE ASSESSMENT	CONNECTIONS
<p>1.11.10 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"> • Work with a team to build a device to tell time, such as a sundial. • Build a device designed to fly at least 20 feet. • Build a vessel out of paper that will support a marble or small stone when placed in water. 	<p>Religion: Follow directions, share materials, offer each other help, and work as a team. Home Economics: Follow directions and measurements to assemble packages of trail mix for a hike.</p>
<p>1.11.11 Test the device and record results using given instruments, techniques, and measurement methods.</p>	<ul style="list-style-type: none"> • Use the devices the class built to tell time throughout the day. • Record observations on a data chart for the distance flown by an object designed to fly 20 feet. • Test paper devices to see if they support a marble or small stone in water. 	<p>Physical Education: Make an aerodynamic paper airplane and see how far it can fly. Math: Measure the distance the airplane flies and find out which airplane flew greatest distance.</p>
<p>1.11.12 Decide if the solution worked based on test results.</p>	<ul style="list-style-type: none"> • Compare the time you estimated using the device to the actual time of day at which you were taking the measurements. Discuss consistencies or inconsistencies. • Discuss how well your designs worked to accomplish their intended goal (e.g., how well the objects flew or the paper vessel floated or the device told time). • Make plans to improve your device. 	<p>Language Arts: State a reason for why you have made a particular decision. Art: Study a drawing of a Rube Goldberg device and decide if you think it would work.</p>

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<p>1.11.13 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). • Compare amounts to determine when there are increasing or decreasing trends (e.g., temperatures, volumes). • Measure the distances objects fly or the time that the paper-with-marble assembly remains afloat. 	<p>Math: Use numbers to describe your observations (e.g., I see 3 birds, there are 15 boys in the class, we have had 2 inches of rain). Home Economics: Double a recipe.</p>
<p>1.11.14 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"> • Present data in an organized chart, table, or graph in a science notebook. • Present findings by sharing data with the class. • Participate in discussions of class investigations. 	<p>Language Arts: Correctly write a short conclusion describing the results obtained from an investigation. Religion: Listen carefully to others, take turns, and ask appropriate questions.</p>
<p>Significant to Develop at Grade 1: 1.11.15 Use numbers to characterize and then to group objects or events in the sciences. (11C)</p>	<ul style="list-style-type: none"> • Use precise measurements when designing devices. • Write in a table in a science notebook the number of students with birthdays in each month. • Compare events that take a long time (e.g., changing seasons, growing up to be an adult) to events that happen quickly (e.g., weather changes, scraping a knee, burning paper). 	<p>Social Studies: Question family members regarding changes they have observed in their lifetimes; find out how many years ago the changes occurred. Math: Be able to see a trend from a graph (e.g., temperature increases as summer approaches, more boys than girls go to baseball games).</p>

LEARNING STANDARD/OUTCOME	SAMPLE ASSESSMENT	CONNECTIONS
<p>1.11.16 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"> • Identify the patterns in nature such as day and night, phases of the moon, seasons, animals having babies, or when plants make flowers. • Discuss patterns of the sun, and begin to develop a model for Earth rotating on its axis as a reason for day and night. 	<p>Social Studies: Share pictures of several famous structures and compare their designs (e.g., ornate vs. plain, flat vs. rounded).</p> <p>Math: Use several different graphs (e.g., bar, circle, line) to share the same information.</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 1: Life Sciences 1.12.01 Explain structures in organisms (e.g., plants, animals) that serve specific functions in growth and survival (e.g., birds have feathers; fish have fins; trees have leaves).</p>	<ul style="list-style-type: none"> • Give examples of structures that help animals survive (e.g., feathers for warmth or flight). • Describe structures that help plants survive (e.g., thorns for protection, trunks for support). 	<p>Math: Remembering that a trunk is a large stem, decide how to measure the distance around a tree trunk; go outside and measure the distance around two different trees and then compare the measurements using a pictograph.</p>
<p>1.12.02 Describe some structures and their functions for parts of human bodies (i.e., humans have bones, blood, hair, skin, legs, eyes, mouths, noses, and arms).</p>	<ul style="list-style-type: none"> • Group pictures of organisms based on their similar features (e.g., fur for mammals, gills for fish, wings for birds). 	<p>Language Arts: Pretend you are a forest animal and give clues to your classmates using describing words or gestures; guess which animal each student is pretending to be.</p>
<p>1.12.03 Show how organisms can be grouped or classified based on how similar or different their features are.</p>	<ul style="list-style-type: none"> • Match structures of the human body (e.g., bones, skin, legs) with their functions (e.g., structural support, protection, locomotion). • Link structures in the human body to the ability of humans to survive (e.g., answer the question, What would happen if you didn't have ...?). 	<p>Technology: Discuss how you could carry out simple tasks without using normal body parts (e.g., convey a message without a mouth or voice, do schoolwork without hands). Discuss how people with disabilities must learn to do these things, sometimes with the aid of special equipment.</p> <p>Business: Develop a scheme to classify pictures of cars and trucks.</p>

LEARNING STANDARD/OUTCOME	SAMPLE ASSESSMENT	CONNECTIONS
<p>Physical Sciences 1.12.04 Identify with the senses or simple tools several observable properties of objects (e.g., size, weight, shape, color, odor, temperature).</p>	<ul style="list-style-type: none"> • Use a sense other than your eyes to differentiate among objects (e.g., How do they smell, feel, and sound?). • Use simple tools (e.g., thermometers, scales, magnifying lenses) to differentiate among objects. 	<p>Music: Take turns guessing which classmate is speaking when you are blind folded to test your sense of hearing.</p> <p>Home Economics: Conduct a taste test using foods like peanut butter, olives, and apples to see if you can differentiate foods without using your sense of sight or smell.</p>
<p>1.12.05 Measure and record properties of objects with simple tools such as rulers, timers, balances, and thermometers.</p>	<ul style="list-style-type: none"> • Use 1 tool to measure the same property of a variety of objects. • Create a simple data table to represent your measurements. 	<p>Physical Education: Time each other as you jump rope and count the number of jumps you can make in a certain amount of time.</p> <p>Math: Record each student's number of jumps and use a bar graph to show the number of jumps per student.</p>
<p>1.12.06 Identify forces in nature that can be observed (e.g., pushes, pulls, gravity, magnetism, sound) and explain ways to change or modify the forces.</p>	<ul style="list-style-type: none"> • Identify objects that are attracted to magnets; describe ways to magnetize objects. • Explore ways that a push or pull makes objects move faster, slower, or in a different direction. • Use a spring scale to explore gravity; describe gravity's effect on different objects. • Conduct simple experiments with static electricity; create and destroy static electricity. 	<p>Physical Education: In an open space, work in a group of three or four students to see how long you can keep a balloon in the air; discuss the forces of gravity, pushes, and pulls.</p>

LEARNING STANDARD/OUTCOME	SAMPLE ASSESSMENT	CONNECTIONS
<p>1.12.07 Explain how the position and motion of objects can be changed by pushing or pulling by different amounts, directions, or by varying the strength of the push or pull.</p>	<ul style="list-style-type: none"> • Use simple materials and objects to demonstrate that the greater the force (e.g., push or pull), the greater the change in position, motion, or direction. • Predict the effect of a force on an object. • Be able to determine the force on an object by looking at before and after pictures (e.g., rocket at rest, taking off). 	<p>Music: Use musical instruments such as drums, guitars, and recorders to demonstrate how different levels of force affect the volume and pitch of the instruments.</p> <p>Physical Education: Participate in a game of tug of war and try to balance the forces on each side of the rope.</p>
<p>Earth and Space Sciences 1.12.08 Describe how weather changes are daily and seasonal and how they relate to energy from the sun.</p>	<ul style="list-style-type: none"> • Identify and describe weather (e.g., warm, cold, sunny, rainy) and seasonal changes (e.g., changes in weather, trees). • Investigate what happens to water left in the sun and in the dark. 	<p>Social Studies: Research and discuss seasonal changes in other parts of the world such as Iceland, Ireland, and Mexico.</p> <p>Technology: Use the Internet to find daily weather anywhere in the United States.</p>
<p>1.12.09 Identify how weather can be measured by quantities such as rainfall, temperature, or wind speed.</p>	<ul style="list-style-type: none"> • Measure and record in a notebook local weather (e.g., temperature, air pressure, wind direction and speed). • Graph daily weather and note daily and seasonal patterns. 	<p>Math: Record the changes in weather for the current month (e.g., sunny, partly cloudy, rainy). At the end of the month, tally how many sunny days, rainy days, and so on to see which occurred the most and least frequently.</p>

LEARNING STANDARD/OUTCOME	SAMPLE ASSESSMENT	CONNECTIONS
<p>1.12.10 Observe and describe the properties, locations, and movement patterns of objects in the sky (sun, moon, stars, clouds, birds, airplanes).</p>	<ul style="list-style-type: none"> • Observe the sun, moon, and stars and describe that they appear to move slowly across the sky (e.g., trace and compare shadows, watch the moon rise). • Chart the change in the moon’s shape across a month to explore moon phases. • Describe the pattern of movement of the sun, moon, and stars as regular and predictable compared to that of birds and airplanes. 	<p>Art: Cut out pictures that show activities that people do when the sky is light and dark. Draw a sun on a piece of construction paper and a moon on another piece. Paste the pictures that were cut out on the appropriate paper.</p> <p>Language Arts: Read stories and myths from other cultures about the constellations.</p>
<p>Significant to Develop at Grade 1: 1.12.11 Describe the light and heat from the sun that warms the Earth. (12E)</p>	<ul style="list-style-type: none"> • Investigate the effect of the sun on the surface temperature of dark and light paper left in the sun or under a bright lamp. • Show or predict that air temperature will be higher in direct sun than in the shade. 	<p>Religion: Discuss the story of creation and the making of the sun. Answer the following questions: Why did God create the sun? What do we use the sun for? What other life forms need the sun and why?</p> <p>Social Studies: Locate the equator and the north and south poles on a globe. Find out what the weather is like in each of these places.</p>
<p>1.12.12 Describe how the rotation and orbit of Earth are related to patterns that humans experience (day or night, seasons). (12F)</p>	<ul style="list-style-type: none"> • Model how the rotation of Earth creates night and day. • Model how revolution of Earth around the Sun changes how directly the sun shines on your state, creating warmer and colder times in the year. 	<p>Art/Social Studies: With a group, choose a country and draw what is happening in that country when it is noon in your town; contribute your drawing to a mural that illustrates the activities that are taking place at the same time around the world.</p>

LEARNING STANDARD/OUTCOME	SAMPLE ASSESSMENT	CONNECTIONS
<p>1.12.13 Describe the position of an object by locating it relative to another object, a background, or a numbered position (distance). (12D)</p>	<ul style="list-style-type: none"> • Describe your position relative to an object (e.g., next to, in front of, behind). • Describe the position of an object relative to what is behind it (e.g., to the right of, lined up with). • Measure the distance between 2 objects. 	<p>Physical Education: Play “Science Says”; follow directions such as “Science says to stand in front of your desk”; continue following various commands (e.g., stand next to, behind, to the left of your desk).</p>
<p>Useful to Work on at Grade 1: 1.12.14 Discuss that the night sky contains more stars than can be counted. (12F)</p>	<ul style="list-style-type: none"> • Recall times when, and places where, you have seen the most stars. • Imagine that there are more stars that you cannot see under even the best conditions on Earth. 	<p>Art: Imagine that you are on a camping trip and use a white crayon and black construction paper to draw what you see in the night sky. Discuss the difference between what you see in the night sky in rural and urban areas.</p> <p>Math: Using a number line, point out that numbers are infinite, and that there is always another number after the one we count to.</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 1: <i>Safety in science</i> 1.13.01 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 of an adult. 	<p>Language Arts: Write a list of safety rules used in the classroom. Art: Create illustrations to go along with each safety rule and display the illustrated list in the classroom for future use during experiments.</p>
<p><i>Science as a human endeavor</i> 1.13.02 Give examples of scientists and engineers working in teams to do different tasks that contribute to the overall results (e.g., Mars missions).</p>	<ul style="list-style-type: none"> • Work in teams on a science investigation, describe how your teams are like teams of scientists who work together, and give examples of other professional science teams you are aware of. • Contribute to a list of the different roles scientists can take to help send a manned rocket into space, to the moon, or to Mars (e.g., engineers to design the rocket, nutritionists to develop foods, chemists to develop materials that can withstand high heat, biologists to study the effect of zero gravity on humans, geologists to collect and analyze rocks). • Describe recent science in the news that uses teams of scientists. 	<p>Technology: Discuss the scientists and engineers who have participated in Mars missions and the type of tools and instruments they use or have developed (e.g., robots, rockets, cameras, rock-grinding devices). Religion: Contribute to teamwork by doing your part and listening to your teammates.</p>

LEARNING STANDARD/OUTCOME	SAMPLE ASSESSMENT	CONNECTIONS
<p><i>Nature of science</i> 1.13.03 Describe that scientists include women and men of all ages and from all cultures.</p>	<ul style="list-style-type: none"> • Find pictures of scientists at work showing that they include both women and men, can be young or old, and live in many different parts of the world. • Draw a picture of a scientist in his or her work environment or laboratory setting (e.g., draw a geologist outside on a mountain, draw a chemist inside with a lot of bubbling flasks, draw both men and women in many different places). 	<p>Religion: Discuss that all humans are equal as created by God. Art: Draw pictures of what you want to be when you grow up. Language Arts: Write about your family physician, and how they help your family.</p>
<p><i>History of science</i> 1.13.04 Describe the diversity of women and men of all ages and cultures that have contributed to new scientific ideas and to new scientific and technological work.</p>	<ul style="list-style-type: none"> • Report on an inventor and post your report on the bulletin board. Find out how many of the inventors are women, how many are from different countries, and how many created their inventions at a significantly different time period from the present. • Draw a picture of something that you would like to invent and tell a story about how the invention works. • Describe a new computer technology that you use at your school or home and learn what state or country developed the technology. • Discuss as a class whether you think that your family physician is a scientist. Talk about the types of technology that physicians use. 	<p>Language Arts: Gather books from the library and read about a few men and women who have contributed to science. Geography: Locate on a map places where scientists have made recent discoveries (e.g., <i>T. rex</i> bones and soft tissues in Montana). Art: Draw a picture of a first-grade student in Australia or China doing a science experiment in school.</p>

LEARNING STANDARD/OUTCOME	SAMPLE ASSESSMENT	CONNECTIONS
<p>Significant to Develop at Grade 1: 1.13.05 Demonstrate the use of creativity, curiosity, imagination, and new approaches in a scientific investigation. (13A)</p>	<ul style="list-style-type: none"> • Develop a diagram showing land, sky, and clouds and devise a technology that might make rain turn on or off from the clouds. • Use your imagination and Popsicle sticks to design, draw, and build a bridge that crosses a river that is drawn 10 inches wide on cardboard. Make use of supports on a small island in the center of the river that is 2 inches wide. • Contribute to a list of ideas about how to explore a science topic. • Participate in a scientific investigation in which you get to ask and then answer your own question. • Describe to peers or parents and show with a picture something that is really neat or amazing in science (e.g., favorite animal, erupting volcano). 	<p>Art: Create a picture of what you imagine happens when a caterpillar turns into a butterfly.</p> <p>Language Arts: Write about how the butterfly gets its color, what happens to the caterpillar's legs, and so on.</p>