

# SCIENCE CURRICULUM

## Standards to Units

### Skills of Inquiry

#### Grades PreK-2

Asking and pursuing questions are keys to learning in all academic disciplines.

Classroom investigation and experimentation can build essential scientific skills such as observing, measuring, replicating experiments, manipulating equipment, and collecting and reporting data. Students can also examine the questions pursued by scientists in their investigations of natural phenomena and processes as reported or shown in books, papers, videos, the internet, and other media.

**Scientific inquiry and experimentation should not be taught or tested as separate, stand-alone skills. Rather, opportunities for inquiry and experimentation should arise within the science curriculum.**

In the earliest grades, scientific investigations can center on student questions, observations, and communication about what they observe. Such study can then be supported in the classroom by demonstrations, experiments, or simulations.

- Ask questions about objects, organisms, and events in the environment.
- Tell about why and what would happen if?
- Make predictions based on observed patterns.
- Name and use simple equipment and tools (e.g., rulers, meter sticks, thermometers, hand lenses, and balances) to gather data and extend the senses.
- Record observations and data with pictures, numbers, or written statements.
- Record observations and data with pictures, numbers, or written statements.
- Discuss observations with others.

# SCIENCE CURRICULUM

## Standards to Units

### Skills of Inquiry Grades 3-5

Asking and pursuing questions are keys to learning in all academic disciplines.

Classroom investigation and experimentation can build essential scientific skills such as observing, measuring, replicating experiments, manipulating equipment, and collecting and reporting data. Students can also examine the questions pursued by scientists in their investigations of natural phenomena and processes as reported or shown in books, papers, videos, the internet, and other media.

**Scientific inquiry and experimentation should not be taught or tested as separate, stand-alone skills. Rather, opportunities for inquiry and experimentation should arise within the science curriculum.**

Grades 3-5 students can plan and carry out investigations as a class, in small groups, or independently. The students can formulate a hypothesis, plan the steps of an experiment, and determine a way to test the hypothesis. Students should begin to incorporate the mathematical skills of measuring and graphing to communicate their findings.

- Ask questions and make predictions that can be tested.
- Select and use appropriate tools and technology (e.g., calculators, computers, balances, scales, meter sticks, graduated cylinders) in order to extend observations.
- Keep accurate records while conducting simple investigations or experiments.
- Conduct multiple trials to test a prediction. Compare the result of an investigation or experiment with the prediction.
- Recognize simple patterns in data and use data to create a reasonable explanation for the results of an investigation or experiment.
- Record data and communicate findings to others using graphs, charts, maps, models, and oral and written reports.

# SCIENCE CURRICULUM

## Standards to Units

### Strand One – Earth and Space Science Grades PreK-2

In earth and space science, students study the origin, structure, and physical phenomena of the earth and the universe. Earth and space science studies include concepts in geology, meteorology, oceanography, and astronomy.

In grades PreK–2, students are naturally interested in everything around them. This curiosity leads them to observe, collect, and record information about the earth and about objects visible in the sky. They learn to work with tools like magnifiers and simple measuring devices.

Topic	Learning Standard	Grade Level/Unit	Suggested Extensions to Learning in Technology/Engineering (Refer to Strand 4)
<b>Earth's Materials</b>	1. Recognize that water, rocks, soil, and living organisms are found on the earth's surface.	K – Living Things Grade 1 – Rocks Grade 2 – Habitats	<ul style="list-style-type: none"> <li>Identify characteristics shared by naturally occurring rocks and manmade concrete. (T/E 1.1)</li> </ul>
	2. Understand that air is a mixture of gases that is all around us and that wind is moving air.	Grade 2 – Weather	<ul style="list-style-type: none"> <li>Design a kite and identify which materials would be used for its construction. Classify them as natural or manmade materials. Build the kite and fly it outside. (T/E 1.1, T/E 1.2)</li> </ul>
<b>Weather</b>	3. Describe the weather changes from day to day and over the seasons.	K – Seasons Grade 2 – Weather	<ul style="list-style-type: none"> <li>Design and build a tool that could be used to show wind direction (wind sock). (T/E 1.3)</li> </ul>
<b>The Sun as a Source of Light and Heat</b>	4. Recognize that the sun supplies heat and light to the earth and is necessary for life.	K – Living Things Grade 1 – Mammals Grade 1 – Insects & Spiders Grade 1 – Plants Grade 1 – Day & Night Grade 2 – Weather Grade 2 – Habitats Grade 2 - Trees	<ul style="list-style-type: none"> <li>Design a shade for the window to keep the room cool in the summer or to keep the sun out for television viewing. (T/E 1.1, T/E 1.3)</li> </ul>
<b>Periodic Phenomena</b>	5. Identify some events around us that have repeating patterns, including the seasons of the year, day and night.	K – Seasons Grade 1 – Day & Night Grade 2 - Weather	<ul style="list-style-type: none"> <li>Use a thermometer to record the temperature from morning to noon over several weeks and discuss any patterns that emerge. (T/E 2.1)</li> </ul>

# SCIENCE CURRICULUM

## Standards to Units

### Strand One – Earth and Space Science Grades 3-5

In earth and space science, students study the origin, structure, and physical phenomena of the earth and the universe. Earth and space science studies include concepts in geology, meteorology, oceanography, and astronomy.

In grades 3–5, students explore properties of earth materials and how they change. They conduct tests to classify materials by observed properties, make and record sequential observations, note patterns and variations, and look for factors that cause change. Students observe weather phenomena and describe them quantitatively using simple tools. They study the water cycle, including the forms and locations of water. The focus is on having students generate questions, investigate possible solutions, make predictions, and evaluate their conclusions.

Topic	Learning Standard	Grade Level/Unit	Suggested Extensions to Learning in Technology/Engineering (Refer to Strand 4)
<b>Rocks and Their Properties</b>	1. Give a simple explanation of what a mineral is and some examples, e.g., quartz, mica.	Grade 4 - Geology	<ul style="list-style-type: none"> <li>• <i>Design a flowchart to demonstrate how silica from sand is used to make glass. (T/E 2.2)</i></li> </ul>
	2. Identify the physical properties of minerals (hardness, color, luster, cleavage, and streak), and explain how minerals can be tested for these different physical properties.	Grade 4 - Geology	<ul style="list-style-type: none"> <li>• <i>Use simple tools to test for hardness, e.g., Moh's Scale of Hardness. (T/E 1.1)</i></li> </ul>
	3. Identify the three categories of rocks (metamorphic, igneous, and sedimentary) based on how they are formed, and explain the natural and physical processes that create these rocks.	Grade 4 - Geology	<ul style="list-style-type: none"> <li>• <i>Discuss the use of rocks in construction based on their physical properties. Test the hardness of various types of rocks used in construction. (T/E 1.1)</i></li> </ul>
<b>Soil</b>	4. Explain and give examples of the ways in which soil is formed (the weathering of rock by water and wind and from the decomposition of plant and animal remains).	Grade 4 - Geology	<ul style="list-style-type: none"> <li>• <i>Design and construct a composting bin being sure to keep design considerations in mind, e.g., aeration, resistance to rot, etc. (T/E 1.2, T/E 2.1, T/E 2.2, T/E 2.3)</i></li> </ul>
	5. Recognize and discuss the different properties of soil, including color, texture (size of particles), the ability to retain water, and the ability to support the growth of plants.	Grade 4 - Geology	<ul style="list-style-type: none"> <li>• <i>Use sieves of different mesh sizes to separate coarse and fine materials in a soil sample. Approximate the ratio of fine to coarse material in the sample. (T/E 1.1, T/E 1.2)</i></li> </ul>
<b>Weather</b>	6. Explain how air temperature, moisture, wind speed and direction, and precipitation make up the weather in a particular place and time.	Grade 5 – Weather	<ul style="list-style-type: none"> <li>• <i>Using measuring tools or graph paper, sketch a scale drawing of the front view of an object used to measure weather. (T/E 2.3)</i></li> <li>• <i>Design and construct a variety of simple instruments that could be used to measure weather. Discuss how their design suits their purpose. (T/E 2.1-2.4)</i></li> <li>• <i>Explain how tools of technology such as a hammer, screwdriver, pliers, tape measure, screws, nails, and other mechanical fasteners can be used to make or build weather instruments. (T/E 1.1)</i></li> </ul>

## SCIENCE CURRICULUM Standards to Units

### Strand One – Earth and Space Science (continued) Grades 3-5

Topic	Learning Standard	Grade/Topic	Suggested Extensions to Learning in Technology/Engineering (Refer to Strand 4)
<b>Weather(cont.)</b>	7. Distinguish among the various forms of precipitation (rain, snow, sleet, and hail), making connections to the weather in a particular place and time.	Grade 5 – Weather	<ul style="list-style-type: none"> <li>• <i>Construct various weather station instruments (e.g., wind gauge, barometer, anemometer), record data from them, and make conclusions. (T/E 1.1 T/E 1.2 T/E 2.1/T/E 2.2 T/E 2.3)</i></li> </ul>
	8. Describe how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation.	Grade 5 – Weather	<ul style="list-style-type: none"> <li>• <i>To make a model of the jet stream, fill a jar halfway with warm water. Sprinkle some pepper into the water to represent nutrients on the ocean floor. Put a colored ice cube into the jar. Students should draw and describe their observations. (T/E 2.2)</i></li> </ul>
	9. Differentiate between weather and climate.	Grade 5 – Weather	<ul style="list-style-type: none"> <li>• <i>Discuss tools used to measure everyday weather compared with tools used in determining climate. (T/E 1.2)</i></li> <li>• <i>Use a thermometer and barometer to compare conditions indoors and outdoors. (T/E 2.4)</i></li> </ul>
<b>The Water Cycle</b>	10. Describe how water on earth cycles in different forms and in different locations, including underground and in the atmosphere.	Grade 5 – Weather	<ul style="list-style-type: none"> <li>• <i>Design and build a terrarium to demonstrate the water cycle. (T/E 1.2 T/E 2.1 T/E 2.2 T/E 2.3)</i></li> </ul>
	11. Give examples of how the cycling of water, both in and out of the atmosphere, has an effect on climate.	Grade 5 – Weather	
<b>Earth’s History</b>	12. Give examples of how the surface of the earth changes due to slow processes such as erosion and weathering, and rapid processes such as landslides, volcanic eruptions, and earthquakes.	Grade 4 - Geology	<ul style="list-style-type: none"> <li>• <i>Identify one manmade attribute that slows the erosion process (e.g., hay bales at a construction site, silt fence protecting sand dunes) and one attribute that accelerates it (e.g., paving a parking lot, cutting trees). Relate these to natural systems. (T/E 2.1, 2.4)</i></li> </ul>
<b>The Earth in the Solar System</b>	13. Recognize that the earth is part of a system called the “solar system” that includes the sun (a star), planets, and many moons. The earth is the third planet from the sun in our solar system.	Grade 3 – Space Grade 5 – Space	
	14. Recognize that the earth revolves around (orbits) the sun in a year’s time and that the earth rotates on its axis once approximately every 24 hours. Make connections between the rotation of the earth and day/night, and the apparent movement of the sun, moon, and stars across the sky.	Grade 3 – Space Grade 5 – Space	<ul style="list-style-type: none"> <li>• <i>Design and build a sundial and use it to determine the time of day. Explore how accurate it is over time. Determine the conditions under which the sundial does and does not work. (T/E 1.1, 1.2, 2.3)</i></li> </ul>
	15. Describe the changes that occur in the observable shape of the moon over the course of a month.	Grade 3 – Space Grade 5 – Space	<ul style="list-style-type: none"> <li>• <i>Design and create a calendar that illustrates the phases of the moon. (T/E 2.2, 2.3)</i></li> </ul>

# SCIENCE CURRICULUM

## Standards to Units

<b>Strand Two – Life Sciences</b> <b>Grades PreK-2</b>			
<p>The life sciences investigate the diversity, complexity, and interconnectedness of life on earth. Young children learn to use their senses to observe and then describe the natural world. Noticing differences and similarities and grouping organisms based on some common features is fundamental to the life science curriculum at this grade span.</p>			
<b>Topic</b>	<b>Learning Standard</b>	<b>Grade Level/Topic</b>	<b>Suggested Extensions to Learning in Technology/Engineering (Refer to Strand 4)</b>
<b>Characteristics of Living Things</b>	1. Recognize that animals (including humans) and plants are living things that grow, reproduce, and need food, air, and water.	K – Living Things, Sheep, Birds Grade 1 – Insects Grade 1 - Spiders Grade 1 – Mammals Grade 1 – Plants Grade 2 – Herps Grade 2 - Trees	<ul style="list-style-type: none"> <li>• <i>Design and construct a habitat for a living organism that meets its needs for food, air and water. (T/E 1.2, 1.2, 2.3)</i></li> </ul>
	2. Differentiate between living and nonliving things. Group both living and nonliving things according to the characteristics that they share.	K – Living Things, Sheep, Birds, Sink or Float? Grade 1 - Mammals Grade 1 – Insects Grade 1 – Spiders Grade 1 - Rocks Grade 2 – Herps Grade 2 - Trees	
<b>Life Cycles</b>	3. Recognize that plants and animals have life cycles, and that life cycles vary for different living things.	K – Living Things Grade 1 – Insects Grade 1 - Spiders Grade 1 – Mammals Grade 1 – Plants Grade 2 – Habitats Grade 2 – Herps Grade 2 - Trees	<ul style="list-style-type: none"> <li>• <i>Design and build a habitat for a living organism that can be modified to meet the changing needs of the organism during its life cycle. (T/E 1.1, 1.2)</i></li> </ul>
<b>Heredity</b>	4. Describe ways in which many plants and animals closely resemble their parents in observed appearance.	K – Sheep, Birds Grade 1 – Spiders Grade 1 – Mammals	
<b>Evolution and Biodiversity</b>	5. Recognize that fossils provide us with information about living things that inhabited the earth years ago.	Grade 2 – Fossils & Dinosaurs	<ul style="list-style-type: none"> <li>• <i>Make a fossil print of plant leaves using clay or putty. (T/E 1.1, 1.2)</i></li> </ul>

## SCIENCE CURRICULUM Standards to Units

<b>Strand Two – Life Sciences Grades PreK-2</b>			
<b>Topic</b>	<b>Learning Standard</b>	<b>Grade Level/Topic</b>	<b>Suggested Extensions to Learning in Technology/Engineering (Refer to Strand 4)</b>
<b>Living Things and Their Environment</b>	6. Recognize that people and other animals interact with the environment through their senses of sight, hearing, touch, smell, and taste.	K – Senses Grade 1 – Insects Grade 2 – Fossils & Dinosaurs Grade 2 – Habitats	<ul style="list-style-type: none"> <li>• <i>Design and build an ant farm. Observe how ants use their senses and how they communicate to each other the location of a food source. (T/E 1.1, 1.2, 1.3)</i></li> </ul>
	7. Recognize changes in appearance that animals and plants go through as the seasons change.	K – Living Things, Seasons Grade 1 - Mammals Grade 1 – Plants Grade 2 - Trees	<ul style="list-style-type: none"> <li>• <i>Visit a maple syrup manufacturing facility. Discuss the sap-to-maple syrup process and the seasonal life cycle of a tree. (T/E 1.1, 1.2)</i></li> </ul>
	8. Identify the ways in which an organism’s habitat provides for its basic needs (plants require air, water, nutrients, and light; animals require food, water, air, and shelter).	K –Living Things Grade 1 – Mammals Grade 1 - Plants Grade 2 – Fossils & Dinosaurs Grade 2 – Habitats Grade 2 - Trees	<ul style="list-style-type: none"> <li>• <i>Using simple tools and materials, have students draw pictures of their houses and an animal’s habitat. Discuss differences and similarities. (T/E 1.3)</i></li> </ul>

# SCIENCE CURRICULUM

## Standards to Units

### Strand Two – Life Sciences Grades 3-5

The life sciences investigate the diversity, complexity, and interconnectedness of life on earth.

Children expand the range of observations they make of the living world by recording details of the life cycles of plants and animals, and explore how organisms are adapted to their habitat. Children move beyond using their senses to gather information. They begin to use measuring devices to gather quantitative data that they record, examine, interpret, and communicate. Children are introduced to the power of empirical evidence as they design ways of exploring questions that arise from their observations.

Topic	Learning Standard	Grade Level/Topic	Suggested Extensions to Learning in Technology/Engineering (Refer to Strand 4)
<b>Characteristics of Plants and Animals</b>	1. Classify plants and animals according to the physical characteristics that they share.	Grade 3 – Plants Grade 3 – Endangered Species Grade 4 – Invertebrates	<ul style="list-style-type: none"> <li>• <i>Create a simple chart to classify plants and animals that are common to the school's geographical area. (T/E 2.2)</i></li> </ul>
<b>Plant Structures and Functions</b>	2. Identify the structures in plants (leaves, roots, flowers, stem, bark, wood) that are responsible for food production, support, water transport, reproduction, growth, and protection.	Grade 3 - Plants	<ul style="list-style-type: none"> <li>• <i>Collect plants. Make a detailed drawing of a plant. Identify and label its major structures, i.e., leaves, flowers, stems, roots, seeds. Describe the function of each structure. (T/E 2.2, 2.3)</i></li> </ul>
	3. Recognize that plants and animals go through predictable life cycles that include birth, growth, development, reproduction, and death.	Grade 3 - Plants Grade 3 – Endangered Species Grade 4 - Invertebrates	<ul style="list-style-type: none"> <li>• <i>Design and construct a habitat for a small animal (e.g., insect, butterfly, frog) that has adequate space, and contains the necessities for survival. The habitat should allow for observation of the animal as it goes through the stages of its life cycle. (T/E 1.1, 1.2, 2.1-2.3)</i></li> </ul>
	4. Describe the major stages that characterize the life cycle of the frog and butterfly as they go through metamorphosis.	Grade 4 – Invertebrates (butterfly)	
	5. Differentiate between observed characteristics of plants and animals that are fully inherited (e.g., color of flower, shape of leaves, color of eyes, number of appendages) and characteristics that are affected by the climate or environment (e.g., browning of leaves due to too much sun, language spoken).	Grade 4 - Heredity	
<b>Adaptations of Living Things</b>	6. Give examples of how inherited characteristics may change over time as adaptations to changes in the environment that enable organisms to survive, e.g., shape of beak or feet, placement of eyes on head, length of neck, shape of teeth, color.	Grade 4 – Adaptation Grade 4 - Heredity	<ul style="list-style-type: none"> <li>• <i>Discuss how engineers design things by using their knowledge of the way that animals move, e.g., birds and wings influence airplane design, tails and fins of aquatic animals influence boat design. (T/E 2.4)</i></li> </ul>

## SCIENCE CURRICULUM Standards to Units

<b>Strand Two – Life Sciences (continued) Grades 3-5</b>			
<b>Topic</b>	<b>Learning Standard</b>	<b>Grade Level/Topic</b>	<b>Suggested Extensions to Learning in Technology/Engineering (Refer to Strand 4)</b>
<b>Adaptations of Living Things (cont.)</b>	7. Give examples of how changes in the environment (drought, cold) have caused some plants and animals to die or move to new locations (migration).	Grade 3 –Endangered Animals Grade 4 - Adaptations	
	8. Describe how organisms meet some of their needs in an environment by using behaviors (patterns of activities) in response to information (stimuli) received from the environment. Recognize that some animal behaviors are instinctive (e.g., turtles burying their eggs), and others are learned (e.g., humans building fires for warmth, chimpanzees learning how to use tools).	Grade 4 – Adaptations	
	9. Recognize plant behaviors, such as the way seedlings’ stems grow toward light and their roots grow downward in response to gravity. Recognize that many plants and animals can survive harsh environments because of seasonal behaviors, e.g., in winter, some trees shed leaves, some animals hibernate, and other animals migrate.	Grade 4 – Adaptations	
	10. Give examples of how organisms can cause changes in their environment to ensure survival. Explain how some of these changes may affect the ecosystem.	Grade 3 – Endangered species Grade 4 – Adaptations	<ul style="list-style-type: none"> <li>Brainstorm and sketch things in the home that are designed to help humans survive, e.g., heater for warmth, stove to cook. (T/E 2.1, 2.2)</li> </ul>
<b>Energy and Living Things</b>	11. Describe how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within a food chain from producers (plants) to consumers to decomposers.	Grade 3 - Plants Grade 4 – Adaptations	<ul style="list-style-type: none"> <li>Design and build a compost bin. Use a thermometer to measure the temperature rise during composting. Discuss where heat (energy) comes from (decomposers metabolize energy stored by producers and consumers). (T/E 1.2)</li> </ul>

# SCIENCE CURRICULUM

## Standards to Units

### Strand Three – Physical Science PreK-2

The physical sciences (physics and chemistry) examine the physical world around us. Students learn about the composition, structure, properties, and reactions of matter and the relationships between matter and energy. Students build understanding of the physical sciences through hands-on exploration of the physical world. This framework encourages repeated and increasingly sophisticated experiences that help students understand properties of matter, chemical reactions, forces and motion, and energy. Prek-2 students observe physical processes and sort objects by different criteria. Children learn basic concepts about how things are alike or different. As they push, pull, and transform objects by acting upon them, children see the results of their actions and begin to understand how part of their world works.

Topic	Learning Standard	Grade/Unit	Suggested Extensions to Learning in Technology/Engineering (Refer to Strand 4)
<b>Observable Properties of Objects</b>	1. Sort objects by observable properties such as size, shape, color, weight, and texture.	Grade 1 - Rocks	<ul style="list-style-type: none"> <li>• <i>Predict from looking at the shape of a simple tool or object what things it might be used for, e.g., pliers, letter opener, paperweight. (T/E 1.2, 2.1)</i></li> </ul>
<b>States of Matter</b>	2. Identify objects and materials as solid, liquid, or gas. Recognize that solids have a definite shape and that liquids and gases take the shape of their container.	Grade 3 - Matter	<ul style="list-style-type: none"> <li>• <i>Ask students to bring in different types of containers from home. Discuss and demonstrate whether the containers are appropriate to hold solids and liquids, e.g., an unwaxed cardboard box will absorb water and eventually disintegrate while a glass bottle will not. (T/E 1.1, 1.2)</i></li> </ul>
<b>Position and Motion of Objects</b>	3. Describe the various ways that objects can move, such as in a straight line, zigzag, back-and-forth, round-and-round, fast, and slow.	Grade 1 – Simple Machines and Motion Grade 3 – Motion	<ul style="list-style-type: none"> <li>• <i>Using construction paper and glue, design a three-dimensional object that will roll in a straight line and a three-dimensional object that will roll around in a circle. (T/E 1.3, 2.1)</i></li> </ul>
	4. Demonstrate that the way to change the motion of an object is to apply a force (give it a push or a pull). The greater the force, the greater the change in the motion of the object.	Grade 1 – Simple Machines and Motion Grade 3 – Motion	
	5. Recognize that under some conditions, objects can be balanced.	Grade 3 – Simple Machines	<ul style="list-style-type: none"> <li>• <i>Design a lever, putting unequal weights on the ends of the balance board. Observe. Now find ways to restore the balance by moving the fulcrum, keeping each weight in the same place. Discuss what happens. (T/E 2.1)</i></li> </ul>

# SCIENCE CURRICULUM

## Standards to Units

### Strand Three – Physical Science Grades 3-5

The physical sciences (physics and chemistry) examine the physical world around us. Students learn about the composition, structure, properties, and reactions of matter and the relationships between matter and energy. Students build understanding of the physical sciences through hands-on exploration of the physical world. This framework encourages repeated and increasingly sophisticated experiences that help students understand properties of matter, chemical reactions, forces and motion, and energy. Students' growth in their understanding of ordinary things allows them to make the intellectual connections necessary for understanding how the physical world works. Students are able to design simple comparative tests, carry out the tests, collect and record data, analyze results, and communicate their findings to others.

Topic	Learning Standard	Grade/Unit	Suggested Extensions to Learning in Technology/Engineering(Refer to Strand 4)
<b>Properties of Objects and Materials</b>	1. Differentiate between properties of objects (e.g., size, shape, weight) and properties of materials (e.g., color, texture, hardness).	Grade 3 – Matter Grade 5 – Matter	<ul style="list-style-type: none"> <li>• <i>Observe several common objects, discuss the different materials that they are made of, and the reasons that those specific materials may have been used. (T/E 1.1)</i></li> <li>• <i>Given a variety of objects made of different materials, ask questions and make predictions about their hardness, flexibility, and strength. Test to see if your predictions were correct. (T/E 1.1)</i></li> </ul>
	2. Compare and contrast solids, liquids, and gases based on the basic properties of each of these states of matter.	Grade 3 – Matter Grade 5 – Matter	<ul style="list-style-type: none"> <li>• <i>Design one container for each of the states of matter, taking into account what material properties are important, e.g., size, shape, flexibility. (T/E 1.1, 2.3)</i></li> </ul>
<b>States of Matter</b>	3. Describe how water can be changed from one state to another by adding or taking away heat.	Grade 3 – Matter Grade 5 – Matter Grade 5 – Heat	<ul style="list-style-type: none"> <li>• <i>Using given insulating materials, try to keep an ice cube from melting. (T/E 1.1)</i></li> </ul>
	4. Identify the basic forms of energy (light, sound, heat, electrical, and magnetic). Recognize that energy is the ability to cause motion or create change.	Grade 3 – Sound Grade 4 – Light Grade 4 - Magnets Grade 5 – Electricity/Magnets Grade 5 – Heat	<ul style="list-style-type: none"> <li>• <i>Design and construct a candle wheel that demonstrates how heat can cause a propeller to spin (a very popular craft toy). (T/E 1.1, 1.2, 2.2, 2.3)</i></li> </ul>
<b>Forms of Energy</b>	5. Give examples of how energy can be transferred from one form to another.	Grade 5 – Electricity Grade 5 - Heat	<ul style="list-style-type: none"> <li>• <i>Design and build a simple roller coaster for a marble or toy car to demonstrate how energy changes from one form to another. (T/E 2.2, 2.3)</i></li> </ul>

## SCIENCE CURRICULUM Standards to Units

### Strand Three – Physical Science (continued) Grades 3-5

Topic	Learning Standard	Grade/Unit	Suggested Extensions to Learning in Technology/Engineering(Refer to Strand 4)
<b>Electrical Energy</b>	6. Recognize that electricity in circuits requires a complete loop through which an electrical current can pass, and that electricity can produce light, heat, and sound.	Grade 5 - Electricity	<ul style="list-style-type: none"> <li>● <i>Using graphic symbols, draw and label a simple electric circuit. (T/E 2.2)</i></li> <li>● <i>Using batteries, bulbs, and wires, build a series circuit. (T/E 1.2, 2.2)</i></li> <li>● <i>Design and build a simple game using simple circuits. (T/E 1.2, 2.2)</i></li> </ul>
	7. Identify and classify objects and materials that conduct electricity and objects and materials that are insulators of electricity.	Grade 5- Electricity	<ul style="list-style-type: none"> <li>● <i>Select from a variety of materials (e.g., cloth, cardboard, Styrofoam, plastic, etc.) to design and construct a simple device (prototype) that could be used as an insulator. Do a simple test of its effectiveness. (T/E 1.1, 1.2, 2.2, 2.3)</i></li> </ul>
	8. Explain how electromagnets can be made, and give examples of how they can be used.	Grade 4 - Magnets Grade 5 – Electricity/Magnets	<ul style="list-style-type: none"> <li>● <i>Design and construct a simple game or toy (prototype) that works because of electromagnets. (T/E 1.1, 1.2, 2.2, 2.3)</i></li> <li>● <i>Make an electromagnet with a six-volt battery, insulated wire, and a large nail. (T/E 1.2, 2.1, 2.2, 2.3)</i></li> </ul>
<b>Magnetic Energy</b>	9. Recognize that magnets have poles that repel and attract each other.	Grade 4 – Magnets	<ul style="list-style-type: none"> <li>● <i>Design and build a magnetic device to sort steel from aluminum materials for recycling. (T/E 1.1)</i></li> </ul>
	10. Identify and classify objects and materials that a magnet will attract and objects and materials that a magnet will not attract.	Grade 4 – Magnets	<ul style="list-style-type: none"> <li>● <i>Design and construct a device that utilizes magnets to lift a metal weight at least six inches off the ground. (T/E 1.1, 1.3, 2.3)</i></li> </ul>
<b>Sound Energy</b>	11. Recognize that sound is produced by vibrating objects and requires a medium through which to travel. Relate the rate of vibration to the pitch of the sound.	Grade 3 – Sound	<ul style="list-style-type: none"> <li>● <i>Design and construct a telephone (prototype) using a variety of materials, e.g., paper cups, string, tin cans, and wire. Determine which prototype works best. Discuss possible reasons. (T/E 1.1, 1.2, 2.2, 2.3)</i></li> </ul>
<b>Light Energy</b>	12. Recognize that light travels in a straight line until it strikes an object or travels from one medium to another, and that light can be reflected, refracted, and absorbed.	Grade 4 – Light	<ul style="list-style-type: none"> <li>● <i>Design and build a prototype to inhibit solar heating of a car, e.g., windshield reflector, window tinting. (T/E 1.2, 2.1, 2.3)</i></li> <li>● <i>Design and build a pinhole camera. Test the effects of light on light sensitive paper. (T/E 1.2, 2.3)</i></li> <li>● <i>Design and build a periscope from cardboard and mirrors. (T/E 1.1, 1.2, 2.3)</i></li> </ul>

## SCIENCE CURRICULUM Standards to Units

### Strand 4 - Technology/ Engineering Grades PreK-2

Science tries to understand the natural world. Based on the knowledge that scientists develop, the goal of engineering is to solve practical problems through the development or use of technologies. Technology/engineering works in conjunction with science to expand our capacity to understand the world.

While learning the safe use of tools and materials that underlie engineering solutions, prek-2 students are encouraged to manipulate materials that enhance their three-dimensional visualization skills—an essential component of the ability to design. They identify and describe characteristics of natural and manmade materials and their possible uses and identify the use of basic tools and materials, e.g., glue, scissors, tape, ruler, paper, toothpicks, straws, and spools. In addition, students at this level learn to identify tools and simple machines used for a specific purpose (e.g., ramp, wheel, pulley, lever) and describe how human beings use parts of the body as tools.

Topic	Learning Standard	Grade Level/Unit Refer to Suggested Extensions Strands 1-3 and	Broad Concept
<b>Materials and Tools</b>	1.1 Identify and describe characteristics of natural materials (e.g., wood, cotton, fur, wool) and human-made materials (e.g., plastic, Styrofoam).	Grade 1 - Ecology	Materials both natural and human-made have specific characteristics that determine how they will be used.
	1.2 Identify and explain some possible uses for natural materials (e.g., wood, cotton, fur, wool) and human-made materials (e.g., plastic, Styrofoam).	Grade 1 – Ecology	
	1.3 Identify and describe the safe and proper use of tools and materials (e.g., glue, scissors, tape, ruler, paper, toothpicks, straws, spools) to construct simple structures.		
<b>Engineering Design</b>	2.1 Identify tools and simple machines used for a specific purpose, e.g., ramp, wheel, pulley, lever.	Grade 1 – Simple Machines and Motion	Engineering design requires creative thinking and consideration of a variety of ideas to solve practical problems.
	2.2 Describe how human beings use parts of the body as tools (e.g., teeth for cutting, hands for grasping and catching), and compare their use with the ways in which animals use those parts of their bodies.		

# SCIENCE CURRICULUM

## Standards to Units

### Strand 4 - Technology/ Engineering Grades 3-5

Science tries to understand the natural world. Based on the knowledge that scientists develop, the goal of engineering is to solve practical problems through the development or use of technologies. Technology/engineering works in conjunction with science to expand our capacity to understand the world.

Students in grades 3–5 learn how appropriate materials, tools, and machines extend our ability to solve problems and invent. They identify materials used to accomplish a design task based on a specific property and explain which materials and tools are appropriate to construct a given prototype. They achieve a higher level of engineering design skill by recognizing a need or problem, learn different ways that the problem can be represented, and work with a variety of materials and tools to create a product or system to address it.

Topic	Learning Standard	Grade Level/Unit	Broad Concept
<b>Materials and Tools</b>	1.1 Identify materials used to accomplish a design task based on a specific property, i.e., weight, strength, hardness, and flexibility.	Grade 3 – Sound (Hummer bee design)	Appropriate materials, tools, and machines extend our ability to solve problems and invent.
	1.2 Identify and explain the appropriate materials and tools (e.g., hammer, screwdriver, pliers, tape measure, screws, nails, and other mechanical fasteners) to construct a given prototype safely.		
	1.3 Identify and explain the difference between simple and complex machines, e.g., hand can opener that includes multiple gears, wheel, wedge gear, and lever.	Grade 3 – Simple Machines	
<b>Engineering Design</b>	2.1 Identify a problem that reflects the need for shelter, storage, or convenience.		Engineering design requires creative thinking and strategies to solve practical problems generated by needs and wants.
	2.2 Describe different ways in which a problem can be represented, e.g., sketches, diagrams, graphic organizers, and lists.		
	2.3 Identify relevant design features (e.g., size, shape, weight) for building a prototype of a solution to a given problem.	Grade 3 – Sound (Hummer bee design)	
	2.4 Compare natural systems with mechanical systems that are designed to serve similar purposes, e.g., a bird’s wings as compared to an airplane’s wings.	Grade 3 – Simple Machines	