Cambridge Public Schools
Science Curriculum

Grade 3

Curriculum	Science Unit Description	Major Science Concepts	Related Massachusetts Science & Technology/Engineering Standards	Examples of Evidence of Student Learning
Habitats	**Life Science** Students investigate the needs of living things and how a habitat meets these needs. Students examine differences in physical features of habitats and consider how organisms adapt to survive.	• Living things have survival needs that they meet in their habitats. • Local habitats have similarities, differences and variations. • Plants and animals have adaptive structures and behaviors that help them survive in their particular habitats.	• Classify plants and animals according to the physical characteristics they share. L.1 • 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).L.8 • Give examples of how changes in environment (drought, cold) have caused some plants to die or move to new locations. L.7 • 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.L.11	• Field trip to Maynard Ecology Center to explore Fresh Pond Reservation habitat • Class charts comparing the number and kinds of living organisms found in different habitats. • Class terraria/aquarium • Students collect and report data for the "Square of Life" on-line collaborative project.
Plant Growth and Develop-ment	**Life Science** Students plant and observe the growth of Wisconsin Fast Plants from seed to flower to seed. They also learn about bees and pollination.	• Plants have predictable stages of germination and growth. • Parts of plants have specialized structures which relate to their function. • Pollination plays a crucial role in seed making (the reproduction of flowering plants).	• Recognize plant behaviors, such as the way seedlings' stems grow toward light and their roots grow downward in response to gravity. L..9 • 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). L. 5 • Identify the structures in plants (leaves, roots, flowers, stem, bark, wood) that are responsible for food production, support, water transport, reproduction, growth, and protection. L. 2 • Recognize that plants and animals go through predictable life cycles that include birth, growth, development, reproduction, and death. L.3 • 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. L. 1	• Bar graphs showing the number of days since planting and several measurements of plant height. • Observational drawings and descriptions of plants from sprouting to leafing to flowering and developing seed pods. • Journal entry about bees and their role in pollination.
Rocks & Minerals	**Earth Science** Students explore simulated and real rocks and investigate the properties of and test minerals as a geologist would. They create their own guidebooks and use information to identify mystery minerals.	• Rocks are made from minerals. • Minerals have characteristic properties such as color, hardness, luminosity, light transmissivity, shape, and streak • The properties of rocks determine how people use rocks.	• Give a simple explanation of what a mineral is and some examples, e.g., quartz, mica. E. 1 • Identify the physical properties of minerals (hardness, color, luster, cleavage, and streak), and explain how minerals can be tested for these different physical properties. E.2 • 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. E.3	• Mineral identification guides made by students. • Demonstration of tests used to identify mystery minerals. • Field trip to the Rocks and Minerals Discovery Class at the Harvard Museum of Natural History

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Grade 4

Curriculum	Science Unit Description	Major Science Concepts	Related Massachusetts Science & Technology/Engineering Standards	Examples of Evidence of Student Learning
Solar System	**Earth Science** Students become familiar with objects in our solar system. They gain a perspective on the physical relationship between objects in the solar system. Students model planets, combine astronomy and geometry to study ellipses and planetary orbits. Study stars and their celestial patterns. Also observe moon phases.	• Using models scientists can predict and show evidence for the elliptical orbit of the earth around the sun, day and night and seasons • Outdoor shadows change predictably in length and direction during the day. • The earth spins on its axis in 24 hours causing day and night • The moon orbits the earth on average every 27 days. • The earth orbits the sun in one year. • The earth is tilted on it's axis and in New England we have seasons • The sun is a star • All planets orbit the sun	• 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. E.14 • Describe the changes that occur in the observable shape of the moon over the course of a month. E.15 • 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. E.13 • Appropriate materials, tools, and machines extend our ability to solve problems and invent. T/E 1	• Outdoor shadow measurements of the same object at different times on the same day. • Research project/poster of a planet or object in the solar system • Demonstration of model representing earth in space—day/night and seasons • StarLab event arranged for class or parents/ school community • Students track and compare sunrise/sunset data for their school and a location in a different latitude • Students keep a moon journal and read moon stories • Students construct a scale model of the solar system
Circuits & Pathways	**Physical Science** Students explore the properties of electricity in simple circuits. They use motors, batteries, wire, bulbs and switches to explore the concepts of a circuit, contact points and multiple pathways.	• Some materials conduct electricity (conductors) and some do not (insulators). • Electricity needs a complete circular pathway (circuit) to flow. • Some circuits have only one pathway (series), and some circuits have multiple pathways (parallel). • Series and parallel circuits have different behaviors.	• 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.P.6 • Identify and classify objects and materials that conduct electricity and objects and materials that are insulators of electricity.P.7 • Give examples of how energy can be transferred from one form to another. P.5	• Field trip to Edgerton Center at MIT where students build flashlights and/or quiz boards • Observational drawings of various circuits with arrows showing the path of the electricity. • Students take an in-school field trip to track the flow of electricity into their school to their classroom.
Investi-gating the Changing Earth	**Earth Science** Students explore changes in the Earth's surface caused by weathering and erosion. Using stream tables they develop explanations for delta deposition, canyon formation, floods, and other stream-related phenomena.	• The surface of the Earth is constantly changing. In ways that can occur very quickly, or slowly and are hard to observe. • Weathering causes the breakdown of earth materials in both physical and chemical ways. • Weathering primarily results from the effects of wind and water. • Erosion refers to the transport or carrying away of weathered particles.	• 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. E.12 • Describe how water on earth cycles in different forms and in different locations, including underground and in the atmosphere. E.10	• Field trip to Maynard Ecology Center to observe earth features/changes over time at Fresh Pond Reservation • Using model streams, students collect data about stream erosion • Students visit the locks at the Charles River Basin as an example of changes human make. • Students use a model volcano as an introduction to plate tectonics.

Cambridge Public Schools
Science Curriculum

Grade 5

Curriculum	Science Unit Description	Major Science Concepts	Related Massachusetts Science & Technology/Engineering Standards	Examples of Evidence of Student Learning
Magnets and Motors FALL	**Physical Science** Students explore properties of magnets, build compasses, make electromagnets and build simple motors using magnets and an electromagnet. They also use a small motor to generate electricity to light a bulb.	• Magnets (and electromagnets) have distinct and measurable properties. • The flow of electricity creates a magnetic field. • Technological invention allows us to use magnets and electricity to turn electric motors and to generate electricity by moving wire through magnetic fields.	• Explain how electromagnets can be made, and give examples of how they can be used. P.8 • Recognize that magnets have poles that repel and attract each other. P.9 • Identify and classify objects and materials that a magnet will attract and objects and materials that a magnet will not attract.P.10 • Give examples of how energy can be transferred from one form to another. P.5	• Graphs that show the effects of one variable in the construction of an electromagnet on its strength. • Construction and explanation of how a model motor works. • Students visit MIT Edgerton center for program on magnets
Design Technol-ogy **Simple Mechanisms Packaging and other Structures** **WINTER**	**Technology/Engineering** • Students explore how bags, boxes, cartons and bottles work to contain protect, dispense and display products. • Students examine a variety of packaging materials as examples of structures, which are technologies designed to support mechanical loads • Students look at everyday objects and sort and classify simple mechanisms. • Students experiment with first and second class levers, examine and take apart machines.	• Develop fundamental themes of systems, material properties and spatial relationships • Illustrate concepts of force, structure, load and failure; compression, tension and shear, repair, redesign and reuse • Demystify common artifacts, and by extension, technology in general • Develop process skills in observation, classification, prediction, control of variables, design, and evaluation • Develop environmental awareness	• Appropriate materials, tools and machines extend our ability to solve problems. T/E 1 • Identify materials used to accomplish a design task based on specific property (weight, strength, hardness and flexibility). T/E 1.1 • Engineering design requires creative thinking and strategies to solve practical problems generated by needs and wants. T/E 2 • Identify a problem that reflects the need for shelter, storage or convenience. T/E 2.1 • Identify relevant design features for building a prototype of a solution to a given problem. T/E 2 3 • Identify appropriate materials, tools, and machines needed to construct a prototype of a given engineering design. T.E 2.4 • Explain how such design features as size, shape, weight, function, and cost limitations would affect the construction of a given prototype. T.E. 2.5 • Identify the five elements of a universal systems model: goal, inputs, processes, outputs, and feedback. T.E. 2.6	• Students test and evaluate different products to formulate criteria for the "best" handle, pump or shelf • Students use weights to test the strength of different types of bags and redesign them to make them stronger • Students participate in a school wide design challenge • Students investigate relative strength of columns of difference shapes and discover the importance of controlling variables in a test
Weather and Water SPRING	**Earth Science** • Students use knowledge and evidence to construct explanations for the movement and change in air and water that result in weather on Earth. • Students explore ideas about changes of state, and heat transfer prior to investigating air masses, fronts, and winds.	• Weather is a condition of the Earth's atmosphere at a given time and place. • Air is matter and can be compressed. • The Sun is the major source of energy that heats the atmosphere. • A variety of instruments are used to measure and predict weather conditions	• Explain how air temperature, moisture, wind speed and direction, and precipitation make up the weather in a particular place and time.E.6 • Distinguish among the various forms of precipitation (rain, snow, sleet, and hail), making connections to the weather in a particular place and time.E.7 • 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. E.8 • Differentiate between weather and climate.E.9 • Describe how water on earth cycles in different forms and in different locations, including underground and in the atmosphere.E.10	• Use weather instruments to measure temperature, atmospheric pressure, humidity, wind direction, and wind speed. •Determine dew point by cooling water in a container until condensation occurs. •Build an anemometer. •Students develop a weather forecast using data from Tobin WeatherNet Station data