

Cambridge Public Schools Science Curriculum

Grade 6

Curriculum	Science Unit Description	Major Science Concepts and Related Massachusetts Science & Technology/Engineering Standards	Examples of Evidence of Student Learning
<i>Eco-systems</i> FALL	Life Science Students build terrestrial and aquatic ecosystems and learn about their interdependence by connecting and observing the integration of the two systems. They explore the results of pollution on ecosystems and use their knowledge to discuss & present issues on the ecosystem of the local watershed or Boston Harbor.	<ul style="list-style-type: none"> • Ecosystems are defined by interactions between living things and their physical environment, and the flow of energy and matter through the system. • All components of an ecosystem must be in balance for it to be sustainable. Disturbances in that balance both human and natural will result in a change in the ecosystem. State Standards: Life: 2, 3, 13-17	<ul style="list-style-type: none"> • Observational notes and drawings of ecocolumns (a terrarium connected to an aquarium). • Class chart comparing the ecocolumns with salt and vinegar-pollutants to the ecocolumns that are not polluted • Field trip to Maynard Ecology Center to investigate Black’s Nook ecosystem. • Students using compound and stereomicroscopes to observe specimens • Student presentations about the effects of pollution on local watershed areas and ecosystems
<i>Human Body Systems</i> WINTER	Life Science Students are able to clarify what they already know about their bodies by performing a series of hands-on-activities, which explore four of the human body systems; digestion, respiration, circulation and musculoskeletal.	<ul style="list-style-type: none"> • The human digestive system processes nutrients that pass into the blood, and are transported to body cells. • The breathing mechanism (respiratory system) controls how oxygen enters the body, passes into the blood, and is transported to body cells, where it combines with digested food to release energy. • The circulatory system is explored, including what is blood and heart function • The energy released by respiration is used by the musculoskeletal system. State Standards: Life: 2-6	<ul style="list-style-type: none"> • Pre-assessment posters display student’s knowledge of human body systems. Later these posters are revised to display students’ new knowledge of organ locations, names and functions. • Students research diseases and the immune system and display their information on posters and give a brief presentation of their findings. • Students use a compound and stereoscope to examine and compare plant and animal cells • Student notebooks contain charts, graphs, notes and diagrams on the digestive, respiratory, circulatory and musculoskeletal systems. • Students take field trip to Biogen Idec Community Lab for a hands-on experience analyzing a “new” medicine.
<i>Designing Cars</i> SPRING	Technology/Engineering (Spring) Students design and build balloon cars, mousetrap cars, cars with motors, or solar-powered vehicles to explore concepts of design engineering. Students also develop an understanding of solar energy as an alternate energy source.	<ul style="list-style-type: none"> • A model car can be designed to run using either batteries or a solar panel. • The Universal Design Process can be used to solve engineering issues. • Controlling variables is critical for successful testing of designs. • Gear ratios affect performance. • Solar energy is an alternative energy source. State Standards: Technology/Engineering: 1.1, 2.1-2.6, 6.4	<ul style="list-style-type: none"> • Students build prototype cars • Students hold design review sessions to help troubleshoot each other’s design. • Students hold a school-based car rally to test their vehicles • Students participate in the Junior Solar Sprint at MIT.

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Grade 7

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<p><i>Chemical Interactions</i></p> <p>FALL</p>	<p>Physical Science Students conduct experiments to observe the macroscopic transformations of matter—phase change, dissolution, reaction—and apply kinetic particle theory to explain those transformations at the microscopic level. This curriculum provides students with a diverse mix of empirical experiences with materials and theoretical models that converge.</p>	<ul style="list-style-type: none"> • Heat moves in predictable ways and is caused by the motion of particles. • Matter can be described and classified using the observation and accurate measurement of characteristic properties, such as density. • Particles of matter exist as elements, compounds, and mixtures that change into different forms but cannot be destroyed. <p>State Standards: Physical: 2-10, 14-16, Earth 3</p>	<ul style="list-style-type: none"> • Student notebooks contain graphs and data tables, as well as drawings of various particulate models of matter. • Students will do hands-on experiments with chemical reactions and properties of matter, such as expansion and contraction of gases. • Students will be using scientific instruments to measure the mass, volume and density of different substances. • A written CPSD science unit assessment
<p><i>Atmosphere, Hydrosphere and Geosphere</i></p> <p>WINTER</p>	<p>Earth Science Students will conduct investigations in the classroom that model the processes of constant change in the atmosphere, hydrosphere and geosphere of the Earth. Using the Fruitvale curriculum, students will investigate and debate a scenario involving contaminated groundwater.</p>	<ul style="list-style-type: none"> • The Earth's four major systems: biosphere, hydrosphere, geosphere, and atmosphere interact with each in many ways. • Heat transfer processes within each system cause many of the Earth's natural events. • The Earth's physical features have evolved over time through many natural processes including: crustal plate movement, weathering, erosion, and glaciation. • Earth scientists use representations and models, such as contour maps and satellite images, to help understand the Earth. <p>State Standards: Earth: 1-6</p>	<ul style="list-style-type: none"> • Student notebooks contain lab write ups and diagrams of the changes that are constantly taking place within the atmosphere, hydrosphere and geosphere. • Students debating the issue of cleaning up groundwater contamination from the positions of different stakeholders. • Students building models of mountains and using them to develop contour maps. • A written CPSD science unit assessment
<p><i>Diversity of Life</i></p> <p>SPRING</p>	<p>Life Science Students make observations and conduct investigations that will introduce them to the big picture of life on Earth. Using this FOSS curriculum, students will learn about the characteristics of life and observe them through investigations with organisms from each of the five kingdoms.</p>	<ul style="list-style-type: none"> • All living things are unified in that they are made up of one or more cells. Cells share common structures which together function to keep the cells alive. • Life on Earth is classified into five kingdoms containing an incredible diversity of organisms. <p>State Standards: Life: 1-4, 16</p>	<ul style="list-style-type: none"> • Students using compound microscopes to observe cells and microorganisms from student created mini-ponds. • Students conducting plant investigations to observe characteristics of life and plant adaptations. • Students designing and conducting experiments with hissing cockroaches. • Students taking a trip to the Maynard Ecology Center. • A written CPSD science unit assessment.

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Grade 8

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<p><i>Motion, Forces and Energy</i></p> <p>FALL</p>	<p>Physical Science Students investigate motion, forces, and mechanical energy by collecting data from tops spinning, cars traveling down ramps, and marbles on rollercoaster tracks. In Tops and Yo-yos students use their data to determine the affect of different variable on a top. With the cars and ramps, students use more complex tools, such as photogates and timers to collect data.</p>	<ul style="list-style-type: none"> • The motion of an object can be described by its position, direction, and speed. • Forces act on all objects. When forces are balanced, motion does not change; when they are unbalanced, forces transfer energy to or from an object causing change in motion. • Energy cannot be created or destroyed, but exists in different interchangeable forms including mechanical (kinetic and potential), heat, chemical, electromagnetic, and nuclear. <p>State Standards: Physical: 1,11,12,13 Earth: 8 Technology/Engineering: 6.4</p>	<ul style="list-style-type: none"> • Student notebooks contain position vs. time graphs, speed vs. time graphs, and diagrams with vectors drawn to illustrate forces acting on object. • Students working in groups to collect data from tops spinning and cars moving down ramps • Students sharing their data with the class and using graphs to tell a story about the motion of an object. • A written CPSD science unit assessment.
<p><i>Astronomy</i></p> <p>WINTER</p>	<p>Earth Science Students use models to develop a better understanding of the Earth, Moon, and Sun system including the phases of the moon, eclipses and the seasons. Moving outward, students will compare and contrast the various objects in our solar system and create models to represent their relative sizes. Finally, students will focus on the structure of the universe and the apparent motion of the stars and planets in the sky.</p>	<ul style="list-style-type: none"> • Our solar system contains a central sun, nine known planets, their moons and many asteroids, meteors and comets in orbit, each with unique and common properties. Our sun, which is a medium-sized star, is one star of billions of stars in our galaxy, the Milky Way. The Milky Way is one of billions of galaxies in the universe. • Most objects in the solar system are in regular and predictable motion. These motions explain such phenomena as the day, year, phases of the moon, eclipses and seasons. • Gravity is a theory that helps to explain the motion and formation of objects in the universe. <p>State Standards: Earth: 7-12</p>	<ul style="list-style-type: none"> • Student notebooks should include questions and predictions about what causes different astronomical phenomenon, and diagrams of the relationship between objects in our solar system. • Students keeping a moon journal, which includes daily observations and data collection. • Students using lights and spheres to model the phases of the moon and the relationship between the Earth and Sun during the seasons. • Students testing theories and observing the stars using StarLab, an inflatable planetarium. • A written CPSD science unit assessment.
<p><i>Genetics and Evolution</i></p> <p>SPRING</p>	<p>Life Science Students investigate genetics by growing Wisconsin Fast Plants to observe how traits are exhibited over at least two generations. Students will then consider genetics at a cellular level as they learn more about reproduction and cell division. Finally, students will learn about evolution and natural selection as they conduct a series of activities and investigations in the classroom.</p>	<ul style="list-style-type: none"> • Heredity is the passing on of genetic information from parent(s) to offspring. • All living things reproduce, asexually or sexually, which allows them to replace their numbers on Earth. • Evolution is a change of a population of living things over generations driven by natural selection. <p>State Standards: Life: 7-12, 17, 18</p>	<ul style="list-style-type: none"> • Student notebooks will include data tables and frequency distribution graphs of genetic traits. • Students will use Genscope, a computer program, to simulation the inheritance of genetic traits in a large sample of dragons. • Students will take a field trip to Biogen where they will conduct a lab to simulate the diagnosis of a genetic disorder. • A written CPSD science assessment.