

**Milford Public Schools
Science and
Technology/Engineering
Curriculum Map
Grades 3-5**

Vision Statement

This document contains the Massachusetts Science and Technology/Engineering Learning Standards. Students must be proficient in each of these standards for the MCAS exam at the end of 5th grade. Teachers are responsible for ensuring that students meet each standard at their grade level as per the definitions outlined in the Appendix.

Ideas for developing investigations and learning experiences and extensions for learning in technology/engineering can be found on the Department of Elementary and Secondary Education website at the following address:
<http://www.doe.mass.edu/frameworks/scitech/1006.pdf>.

Milford Public Schools

**Middle School Science
Curriculum Map**

KEY: I = Introduction, M = Mastery, R = Review
(For expectations of each, see Appendix on page 10).

STRAND: Earth and Space Science, Grades 3-5			
Learning Standard	Grade 3	Grade 4	Grade 5
SUBSTRAND: Rocks and Their Properties			
1. Give a simple explanation of what a mineral is and some examples, e.g., quartz, mica.	I, M		R
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.	I, M		R
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.	I, M		R
SUBSTRAND: Soil			
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).			I, M
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.			I, M
SUBSTRAND: Weather			
6. Explain how air temperature, moisture, wind speed and direction, and precipitation make up the weather in a particular place and time.		I	M
7. Distinguish among the various forms of precipitation (rain, snow, sleet, and hail), making connections to the weather in a particular place and time.		I	M
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.			I, M
9. Differentiate between weather and climate.		I, M	R

SUBSTRAND: The Water Cycle			
10. Describe how water on earth cycles in different forms and in different locations, including underground and in the atmosphere.		I, M	R
11. Give examples of how the cycling of water, both in and out of the atmosphere, has an effect on climate.			I, M
SUBSTRAND: Earth's History			
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.			I, M
SUBSTRAND: The Earth in the Solar System			
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.		I, M	R
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.		I, M	R
15. Describe the changes that occur in the observable shape of the moon over the course of a month.		I, M	R

STRAND: Life Science, Grades 3-5			
Learning Standard	Grade 3	Grade 4	Grade 5
SUBSTRAND: Characteristics of Plants and Animals			
1. Classify plants and animals according to the physical characteristics that they share.	I, M		R
SUBSTRAND: Structures and Functions			
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.	I, M		R
3. Recognize that plants and animals go through predictable life cycles that include birth, growth, development, reproduction, and death.	I, M		R
4. Describe the major stages that characterize the life cycle of the frog and butterfly as they go through metamorphosis.			I, M
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).			I, M
SUBSTRAND: Adaptations of Living Things			
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.			I, M
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).			I, M
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).			I, M

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.	I, M		R
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.	I, M		R
SUBSTRAND: Energy and Living Things			
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.	I		M

STRAND:			
Physical Sciences (Chemistry and Physics), Grades 3-5			
Learning Standard	Grade 3	Grade 4	Grade 5
SUBSTRAND: Properties of Objects and Materials			
1. Differentiate between properties of objects (e.g., size, shape, weight) and properties of materials (e.g., color, texture, hardness).	I, M		R
SUBSTRAND: States of Matter			
2. Compare and contrast solids, liquids, and gases based on the basic properties of each of these states of matter.		I, M	R
3. Describe how water can be changed from one state to another by adding or taking away heat.		I, M	R
SUBSTRAND: Forms of Energy			
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.	I	I	M
5. Give examples of how energy can be transferred from one form to another.	I	I	M
SUBSTRAND: Electrical Energy			
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.		I, M	R
7. Identify and classify objects and materials that conduct electricity and objects and materials that are insulators of electricity.		I, M	R
8. Explain how electromagnets can be made, and give examples of how they can be used.		I, M	R
SUBSTRAND: Magnetic Energy			
9. Recognize that magnets have poles that repel and attract each other.		I, M	R
10. Identify and classify objects and materials that a magnet will attract and objects and materials that a magnet will not attract.		I, M	R
SUBSTRAND: Sound Energy			
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.	I, M		R

SUBSTRAND: Light Energy

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.			I, M
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STRAND:			
Technology/Engineering, Grades 3-5			
Learning Standard	Grade 3	Grade 4	Grade 5
1. Materials and Tools			
<i>Central Concept:</i> Appropriate materials, tools, and machines extend our ability to solve problems and invent.			
1.1 Identify materials used to accomplish a design task based on a specific property, e.g., strength, hardness, and flexibility.			
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.			
2. Engineering Design			
<i>Central Concept:</i> Engineering design requires creative thinking and strategies to solve practical problems generated by needs and wants.			
2.1 Identify a problem that reflects the need for shelter, storage, or convenience.			
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.			
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.			

Appendix

The expectations for Introduction, Mastery, and Review are outlined below.

Introduction: Students will be exposed to and gain familiarity with basic facts, skills, and concepts that are necessary for students to attempt future mastery of the standard. Students will be appropriately tested at this level to insure that they have the prerequisite knowledge necessary to master the concept at a later date.

Mastery: Students are expected to reach a predetermined level of learning on one concept before progressing to the next concept. Learning is accomplished when the student is able to demonstrate retention through application of concepts. Teachers will help students reach this level of learning through:

- Assessment of prior knowledge (what was learned at the Introduction level) usually through homework and class discussion
- Modeling and scaffolding of new skills
- Practice, reinforcement, and re-teaching (where necessary)
- Summative evaluation in the form of an appropriate test.

Review: Teachers will go over concepts previously mastered and re-teach where necessary to aide in retention of material.