

## Science Curriculum Parent Guide

School: Middle School

Grade: 6

### Course Description:

The sixth grade marks the start of a three-year middle school modular science curriculum. Here, students begin addressing the four strands found in the *Massachusetts Science and Technology/Engineering Curriculum Frameworks*. The units listed below cover the four strands and are based on sound learning experiences and investigations developed to promote inquiry and subject matter knowledge. Sixth graders will be taught the skills necessary to pose questions, develop procedures, and analyze results of their investigations in science. The transition to middle school requires that students meet higher ordered thinking skills.

<b>Unit</b>	<b>Concepts</b>
Nature's Classroom	When students first enter school in the fall, they will begin the seed plant unit in preparation for the weeklong trip to Nature's Classroom (a thirty-year tradition). Topics covered in Nature's Classroom are: leaf identification, photosynthesis, environmental studies, group dynamics, the "fungus among us," and other topics pertinent to the study of plants. The students will be expected to do a leaf project where different species of leaves are identified and collected.
Parade of Life: Monerans, Protists, Fungi, and Plants	The student will be able to: Explain the use of classification systems, and list the seven major classification groups; Identify parts of a virus and describe viral reproduction; Identify parts of a moneran and explain how it obtains energy; List and describe three kinds of protists; Describe the characteristics of several types of fungi; Analyze the adaptations necessary for plants to live on land; Compare ferns to mosses and algae; Describe the process of photosynthesis; Discuss the patterns of growth in seed plants and the factors that affect growth.
Ecology: Earth's Living Resources	The student will be able to: Describe the basic interactions and relationships among living things; Describe the effects of rhythms on organisms; Explain the role of chemical cycles in nature; Describe the process of ecological succession; Identify the characteristics of the six land biomes and the two water biomes; Discuss the reasons for the extinction of organisms and explain why people should try to save endangered species.
Heat Energy	The student will be able to: Describe the three types of heat transfer; Define temperature and contrast it with heat; Measure changes in temperature; Explain thermal expansion and describe some of its practical applications; Compare and contrast the various types of central heating systems; Explain the function of insulation; Explain the operation of cooling systems and heat engines; Define thermal pollution and discuss its effects on the environment.
Embryology	The student will be able to: Identify and describe the different parts of an avian egg and how each part contributes to the development of the chicken embryo;

	Acquire skills in making observations, identifying relationships, and making comparisons as a result of the embryology unit.
Technology and Engineering	The student will be able to: Use the "Waste Away" program to identify and examine an environmental problem; they will formulate steps to reduce local pollution by recycling. Students engage in a recycling programs in the school; Affirm the need for recycling; Promote recycling as a way of life; Relate consumer choices to the amount of solid waste produced by our society; Evaluate lifestyle habits relative to waste reduction and decide if they are adaptable to the lives of their family and themselves; Learn how solid waste can be reduced through composting and reused as soil for the garden.
Voyage of the Mimi	By showing thirteen straightforward episodes, students will observe, catalog information, and search for correlations on the following topics: cytology (whale study), paleontology (fossil study), and oceanography.

### Suggestions for Parental Involvement

<p><u>Environmental trip</u>: Prep child concerning expectations away from home. Nature's Classroom is a school setting, and proper behavior and overall attitude conducive to learning should be emphasized.</p> <p><u>Leaf Project</u>: Help child collect leaves by escorting him or her throughout Medway to identify the different species of trees. Parents may also help the child make a leaf collection based on teacher directions.</p> <p><u>Biome Unit</u>: Parents can help child make posters, charts, or a diorama of the different biomes.</p> <p><u>Embryology unit</u>: chickens and ducks can be taken home temporarily over the weekend.</p> <p><u>Heat unit and "Voyage of the Mimi"</u>: Teacher will be assigning activities and projects. Parental help would be appreciated.</p> <p><u>Note</u>: Any Parent who works in a field that might be helpful to the overall curriculum is welcome to come to the classroom to speak to the children.</p>
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School:

Middle School

Grade:   7  

### Course Description:

<p>This course includes topics from the Life Science and Earth and Space Science portions of the Massachusetts Science, Technology/Engineering Curriculum Framework. Students will investigate the structure and function of cells, systems in living things, and reproduction and heredity. Earth and Space Science topics studied will include Earth's structure and history, heat transfer in the Earth's system and mapping the Earth. Problem solving and investigative skills are developed through a variety of hands on activities. Connections are made between the science topics studied and basic concepts in technology/engineering.</p>
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### Units

### Concepts

Cells: Building Blocks of Life	The student will be able to: Describe the basic characteristics of living things; Identify the needs and chemistry of living things; Describe the structure and function of various cells and their parts; Compare typical plant cells and typical animal cells; Define osmosis and diffusion;
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	<p>Explain how a cell grows and reproduces; Describe and compare respiration and photosynthesis.</p>
Heredity: The Code of Life	<p>The student will be able to: Explain the principles of dominance, segregation, and independent assortment; Solve genetics problems using a Punnett square; Explain how changes in chromosomes affect heredity; Describe how certain human traits are transmitted from one generation to the next; Describe how breeding techniques affect populations of plants and animals; Discuss major techniques used in applied genetics.</p>
Dynamic Earth	<p>The student will be able to: Describe and explain the motion of the Earth's crust; Describe the formation of mountains, plateaus, and dome mountains; Describe what occurs during earthquakes; Describe the types of volcanoes and state the locations of major zones of volcanic activity; Discuss the theory of continental drift, ocean-floor spreading, and plate tectonics, and list the major lithospheric plates; Define mineral and explain how minerals are identified and used; Define rock, describe the three basic types of rocks, and explain the rock cycle; Describe weathering and soil formation; Identify the factors that cause erosion and deposition.</p>
Technology and Engineering	<p>Students will be able to: Evaluate the effectiveness of various tools in a classroom mining activity; Design a genetically engineered plant. Present the design to class discussing both the pros and cons of the design.</p>
Human Biology and Health	<p>The student will be able to: Classify the four basic types of tissues; Describe the features and functions of the skeletal, muscular, digestive, circulatory, respiratory, excretory, nervous, and endocrine systems; Describe human reproduction and development; Identify the immune system and its function; Explain the effects of the use of drugs, alcohol, and tobacco.</p>

### Suggestions for Parental Involvement:

1. Homework is assigned four or five nights per week. A student planner will help students keep track of assignments. Parents should check periodically to see that assignments are complete.
2. Progress reports are issued at the midpoint of each marking period. Be aware when these reports and report cards will be coming home with your child. Please discuss them with your child and call the school if you have any questions.
3. Acquiring new vocabulary is a big part of a middle school science program. Encourage your child to review vocabulary often. Playing a "Concentration" game with your child is an excellent way to practice vocabulary.
4. Projects are assigned at different times of the year. Most middle school students need parental help with organization, procuring materials, and remaining on task to meet deadlines. Please work with your child in that supporting role.
5. Hiking together can be a vehicle to encourage your child to use what he/she is learning to identify rocks, minerals, and geologic formations you encounter.
6. The heredity unit provides an excellent opportunity to look at family photos and discuss genetic variations within the family.
7. There are many excellent science programs on television, especially on PBS and the Discovery Channel. Additionally, a family trip to local museum can provide interesting discussion about science topics.
8. Do you have any special knowledge or skills you wish to share?

School: \_\_\_\_\_ Middle School

Grade:   8  

### Course Description:

The eighth-grade completes the three-year middle school modular science curriculum. Students continue their study in Strand 1: Earth and Space Science and Strand 2: Physical Science (Physics and Chemistry) along with the integration of Strand 4: Technology/Engineering as it relates to these fields of study. Problem solving skills are reinforced through an inquiry based learning format. Utilizing experimentation students become more comfortable with formulating hypotheses, collecting quantitative data in tables and graphs, drawing conclusions based on collected data, and communicating their findings via formal reports. This process leads to further questioning and higher level thinking skills.

### Units

### Concepts

Astronomy	<p>The Student will be able to:</p> <ul style="list-style-type: none"><li>Explain the origin of the solar system and the role gravity played in its formation;</li><li>Identify two factors that keep the planets in their orbits;</li><li>Describe the main characteristics of the planets, moons, comets, and asteroids in the solar system;</li><li>Compare and contrast the properties of solar system planets (i.e. revolution, rotation, atmospheric conditions, gravity) to that of the Earth;</li><li>Construct a scale model of the solar system;</li><li>Identify and describe the three main types of galaxies in the universe;</li><li>Compare the size and shape of the Milky Way to other galaxies;</li><li>Explain how stars are classified;</li><li>Compare and contrast the properties of stars to that of our Sun;</li><li>Summarize the major features and properties of the Moon;</li><li>Describe the changes in the observable shape of the Moon over the course of a month;</li><li>Demonstrate how the motions of the Earth, the Moon and the Sun are related to the Moon's phases and to eclipses;</li><li>Identify the two types of eclipses: solar eclipses and lunar eclipses;</li><li>Describe the role of the pull of the Moon's gravity (and to a lesser extent the Sun's gravity) on tidal movement;</li><li>Collect and interpret data describing the apparent motion of the Sun, Moon and the stars across the sky;</li><li>Relate the tilt of the Earth's axis and its position in reference to the Sun to the Earth's seasons and length of day and night.</li></ul>
McAuliffe Challenger Learning Center	<p>Each year our eighth grade students visit the McAuliffe Challenger Learning Center at Framingham State College. The center utilizes a space station simulator as an instructional tool. In prior years our students have participated in "Rendezvous with a Comet" and "Return to the Moon" simulations. Presently the students are completing the last year in the cycle of missions with "Voyage to Mars". Prior to their visit to the center, students undergo vigorous classroom training. The training includes acquiring specific background knowledge to support their mission as well as practice working with a team to solve problems, communication and decision-making skills.</p>
Chemistry of Matter	<p>Students will be able to:</p> <ul style="list-style-type: none"><li>Describe and give examples of general and characteristic properties of matter;</li><li>Distinguish between weight and mass;</li><li>Explain how gravity and weight are related;</li><li>Compare volume and mass;</li><li>Define density. Calculate the density of a substance when you know its mass and</li></ul>

	<p>volume;</p> <p>Demonstrate confidence in using a variety of measurement tools (i.e. balance, ruler, spring scale, graduate cylinder);</p> <p>Understand that the measurements of matter (i.e. weight, mass) are limited by the accuracy of the measuring instrument;</p> <p>Demonstrate the appropriate use of significant figures in calculations (i.e. volume, density).</p> <p>Explain and give examples of chemical properties and chemical changes;</p> <p>Explain and demonstrate the principle of the Law of Conservation of Mass;</p> <p>Demonstrate an understanding that elements are made of atoms, which are the building block of matter;</p> <p>Demonstrate an understanding that most compounds are made of molecules and a molecule is made of two or more atoms chemically combined;</p> <p>Classify matter as elements, compounds, or mixtures-giving examples of each;</p> <p>Design an experiment to separate different combinations of matter;</p> <p>Differentiate between physical changes and chemical changes;</p> <p>Use models to demonstrate different combinations of matter (i.e. mixtures, compounds).</p>
Motion/Forces And Energy	<p>Students will be able to:</p> <p>Describe the motion of an object in terms of its position, direction, and speed;</p> <p>Students collect distance and time measurements, then analyze and interpret their data;</p> <p>Calculate an object's speed and velocity using appropriate units;</p> <p>Illustrate the motion of an object on a graph;</p> <p>Identify and state various examples of the two basic kinds of energy (potential and kinetic);</p> <p>Show how different forms of energy are related.</p>
Technology /Engineering	<p>Utilizing "Steps of the Engineering Design Process" in Strand 4:</p> <p>Technology/Engineering students will . . .</p> <p>Design and construct a Rube Goldberg device powered by potential energy;</p> <p>Design and construct a vehicle (Puff Mobile) to study motion in terms of position, direction, and speed;</p> <p>Design and construct a small-scale boat out of aluminum foil so that it can carry cargo (pennies) and float to develop an understanding of buoyancy.</p>

### Suggestions for Parental Involvement:

Parents should assist students in setting both long range and short-term study goals. A weekly/monthly calendar is suggested to help students in the planning of assignments.

Parents should assist students in setting up an appropriate study location away from distractions.

Encourage your child to have a "homework-partner", a student to call to clarify an assignment or to obtain school work due to short-term school absence.

Parents should be aware of the times of the year when progress reports and report cards are sent home with your child. Please discuss these reports with your child and contact the school with any concerns.

Science lends itself to many follow-up home experiments suggested by your child's teacher.

"Experimenting" with your son/daughter is an excellent way to learn about the classroom curriculum.

The astronomy unit requires your son/daughter to make observations of the moon and the stars. This would make a great family project.

There are many science-based specials on television. The Discovery Channel and PBS are two stations with educational orientated programs. Watching these programs with your son/daughter can lead to interesting discussions.