

SCIENCE DEPARTMENT

GENERAL SCIENCE: GRADE 7

Contact Information

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The Department's Educational Philosophy

We believe that students should be exposed to the process of scientific inquiry so they can acquire and interpret scientific knowledge and begin to realize the wider applicability of scientific problem-solving methods. By exposing them to a variety of scientific disciplines, they become aware of the many possible directions in which this inquiry may lead.

Guiding Principles

- Problem-solving skills are central to science education.
- Students must be able to observe, hypothesize, collect and analyze data and formulate hypotheses.
- Students should be able to use or design a strategy for testing scientific concepts.
- A comprehensive science program will emphasize the interplay between the abiotic and biotic factors in the environment.
- Science is integrally related to mathematics.
- An effective science program builds students' ability to communicate accurately and precisely.
- An effective science program stresses both cooperative and independent learning.

GENERAL SCIENCE: GRADE 7

Course Frequency: Full-year course, five times per week

Credits Offered: None

Prerequisites: None

Background to the Curriculum

The program and text used is SciencePlus: Technology and Society (Holt, Rinehart and Winston) – Level Blue: Grade 8 and Level Red: Grade 7. It is designed to teach science by thinking, sharing, and writing about what they do and discover. It is activity and inquiry based. SciencePlus has many activities designed to challenge students' thinking skills while introducing them to realistic methods of science.

The SciencePlus program emphasizes concept and skill development. The seventh-grade program has a language emphasis, while the eighth grade focus is on process. Both of these curriculums are heavily supplemented by outside sources.

SciencePlus meets most of the science strands of the current Massachusetts Science and Technology Frameworks. Units that are chosen from the text are done so to meet these guidelines.

Unit 0 – Scientific Method/Skills of Inquiry

Core Topics/Questions/Concepts/Skills

- How do we solve problems scientifically?
- What are the steps a scientist follows to solve a problem?
- How do you design a controlled experiment?
- How do you measure mass, volume and density?

Unit-End Learning Objectives

Students will learn to solve problems scientifically, design a controlled experiment, and measure mass, volume and density in the metric system. By the end of this unit, students should be able to do the following.

<u>Learning objectives</u>	<u>Corresponding state standards, where applicable</u> (MA Science and Tech/Engineering Curriculum Frameworks)
1] Understand what science is and what scientists do; identify the five steps of the scientific method and utilize them in designing an experiment.	Skills of Inquiry (Gr. 6-8)
2] Recognize an investigative question.	Skills of Inquiry (Gr. 6-8)
3] Make and record precise observations.	Skills of Inquiry
4] Use the five senses in making observations.	Skills of Inquiry (Gr. 6-8)
5] Differentiate between qualitative and quantitative observations.	Skills of Inquiry (Gr. 6-8)
6] Recognize the difference between observations and inferences.	Skills of Inquiry (Gr. 6-8)
7] Recognize that characteristic properties can be used to differentiate between different types of matter.	Physical Science 2 (Gr. 6-8)
8] Recognize that density is a characteristic property, calculated by $D=M/V$.	Physical Science 2 (Gr. 6-8)
9] Recognize the relationship of density to an object's ability to sink or float.	Physical Science 2 (Gr. 6-8)
10] Understand the value of making hypotheses and formulating testable predictions.	Skills of Inquiry (Gr. 6-8)
11] Distinguish between cause and effect.	Skills of Inquiry (Gr. 6-8)
12] Use the "If...then..." form of hypotheses and identify the independent and dependent variable.	Skills of Inquiry (Gr. 6-8)
13] Understand the importance of controlling variables in experiments.	Skills of Inquiry (Gr. 6-8)
14] Draw logical conclusions.	Physical Science 5 (Gr. 6-8)
15] Follow a format for construction of formal lab reports.	Physical Science 6 (Gr. 6-8)
16] Produce repeatable procedures.	Skills of Inquiry (Gr. 6-8)
17] Construct data tables.	Physical Science 4 (Gr. 6-8)
18] Construct graphs of data using independent and dependent variables.	Physical Science 4 (Gr. 6-8)
19] Make measurement of length, mass, volume and density using the metric system.	Physical Science 1,2, 3 (Gr. 6-8)
20] Convert between smaller and larger units of the metric system.	Physical Science 3 (Gr. 6-8)
21] Understand the concept of volume and how to determine volume.	Physical Science 2 (Gr. 6-8)

Unit 1 – Interactions

Core Topics/Questions/Concepts/Skills

- How is energy transferred through a community?
- What are the roles played by plants and animals in a community?
- How and for what purpose do organisms interact?
- How do populations change over time?

Unit-End Learning Objectives

Students will focus on the roles played by plants and animals that make up different biological communities and how they interact. By the end of this unit, students should be able to do the following.

<u>Learning objective</u>	<u>Corresponding state standards, where applicable</u>
	MA Curriculum Frameworks Gr. 6-8 & 9-10
1] Identify interactions between biotic and abiotic factors in the environment.	Life Science 13 (Gr. 6-8)), Biology 6.1 (Gr. 9/10)
2] Describe the differences between a habitat and a niche.	Life Science 13
3] Define and compare commensalism, mutualism, and parasitism. Be able to identify relationships of each.	Life Science 13
4] Identify and describe differences between producers, consumers, scavengers, and decomposers.	Life Science 14 & 15 (Gr. 6-8), Biology 6.2 (Gr. 9/10)
5] Identify and describe differences between herbivores, carnivores, and omnivores.	Life Science 14 (Gr. 6-8)
6] Be able to trace the energy flow from producers to top consumers through food chains and food webs.	Life Science 14 (Gr. 6-8)
7] Describe how a change in one part of the food web/chain affects other parts of the web.	Biology 6.2 (Gr. 9/10)
8] Understand what is meant by the “range of tolerance” for a given abiotic factor in the environment.	Life Science 17 (Gr. 6-8))
9] Understand the effect of limiting factors on the organisms in an environment.	Life Science 17 (Gr. 6-8)
10] Explain what is meant by biological succession. Describe the changes that occur in these communities.	Life Science 17 (Gr. 6-8))

11] Understand the natural cycle of re-growth and diversification that occurs after a natural or man-made disaster.	Life Science 17 (Gr. 6-8)
12] Explain how populations of one organism affect the population of other organisms (either as predator/prey or two populations that share the same niche).	Biology 6.3 (Gr. 9/10)
13] Discuss both short-term and long-term changes in an environment and their effects on living things.	Life Science 17 (Gr. 6-8)
14] Compare and contrast different biomes found on Earth.	Life Science 1 (Gr. 6-8)
15] Understand the impact of the loss of environmental diversity and the impact of introduced species on an ecosystem.	

Unit 2-Diversity of Living Things

Core Topics/Questions/Concepts/Skills

- Why does diversity exist?
- How do physical conditions that take place dictate the interactions that take place?
- How does natural selection provide the mechanism for evolution?
- How are organisms classified?

Unit-End Learning Objectives

This unit focuses on the diversity of living things, the reasons for diversity, and how scientists make sense of this diversity.

<u>Learning objectives</u>	<u>Corresponding state standards, where applicable</u> Massachusetts Curriculum Frameworks Gr. 6-8
1] Know that living things exhibit diversity in size, shape, and physical structure.	Life Science 18 (Gr. 6-8)
2] Recognize the value of diversity of living things within all environments.	Life Science 18 (Gr. 6-8)
3] Understand that natural selection explains how the different features of a species change over generations as a result of changing environmental conditions (evolution).	Life Science 11 (Gr. 6-8)
4] Explain the effects of environment on natural selection using Kettlewell's hypothesis about the peppered moth.	Life Science 10 (Gr. 6-8)

5] Recognize the effect of natural selection on the differences among the finches of the Galapagos Islands as studied by Darwin.	Life Science 10 (Gr. 6-8)
6] Know that adaptations (including but not limited to camouflage and mimicry) are inherited features that enable organisms to survive and produce young.	Life Science 10 &12 (Gr. 6-8)
7] Recognize that camouflage is an adaptation that enables an organism to blend in with its environment.	Life Science 10 & 12 (Gr. 6-8)
8] Recognize mimicry as an adaptation.	Life Science 10 & 12 (Gr. 6-8)
9] Identify adaptations which plants have made to survive in their respective environments.	Life Science 10 (Gr. 6-8)
10] Understand the concept of classification and that all life on Earth is grouped into six kingdoms: Archaeobacteria, Eubacteria., Protists (Protista), Fungi, Plants (Plantae), and Animals (Animalia).	Life Science 1 (Gr. 6-8)
11] Describe the role Linnaeus played in devising the classification system.	Life Science 1 (Gr. 6-8)

Unit 6 – The Restless Earth

Core Topics/Questions/Concepts/Skills

- How does the Earth’s surface change over time through the mechanism of plate tectonics?
- How are rocks formed, changed, and reformed?
- How are fossils formed?
- How are fossils used as indicators of geologic history?

Unit-End Learning Objectives

Students are introduced to the earth’s geological process of change. They explore the mechanism of plate tectonics as it relates to mountain-building, earthquakes and volcanism. Students also study rock characteristics, the rock cycle, fossils and geologic time. On completion of this unit, students should be able to do the following.

<u>Learning objectives</u>	<u>Corresponding state standards, where applicable</u>
<ol style="list-style-type: none"> 1] Recognize the layers of the Earth as core, mantle and crust. 2] Understand the theory of plate tectonics. 3] Understand the formation of folds and faults. 4] Understand and explain elastic rebound theory. 5] Understand the use of seismographs and the Richter scale in earthquake detection and measurement. 6] Identify the three types of volcanoes and their differing eruptions. 7] Describe the origin of and locations of volcanoes based on the theory of plate tectonics. 8] Devise a classification scheme for rocks based on observed physical properties. 9] Recognize, understand, and be able to explain what the rock cycle is and how one type of rock can be changed into another type of rock over long periods of time. 10] Describe where and how extrusive and intrusive igneous rocks form. 11] Explain the deposition and lithification of sedimentary rocks. 12] Explain that metamorphic rocks form when the structure and texture of other rocks are changed by exposure to extreme heat and pressure. 13] Understand/identify where metamorphic rocks are likely to form. 14] Explain what intrusions are, where they form, why (including the difference between sills and dikes), and their role in forming metamorphic rock. 15] Describe how fossils are formed in sedimentary rocks. 16] Identify and describe how different fossil types are formed. 17] Understand that the geologic time scale is a relative time scale consisting of four major eras that commence with a major biological change. 	<p style="text-align: center;">Massachusetts Curriculum Frameworks Gr. 6-8</p> <p>Earth and Space Science 2 (Gr. 6-8) Earth and Space Science 5 (Gr. 6-8) Earth and Space Science 5 (Gr. 6-8) Earth and Space Science 5 (Gr. 6-8) Earth and Space Science 5 (Gr. 6-8)</p> <p>Earth and Space Science 4 (Gr. 6-8) Earth and Space Science 4 (Gr. 6-8)</p> <p>Earth and Space Science 7 (Gr. 6-8)</p> <p>Earth and Space Science 6 (Gr. 6-8)</p> <p>Earth and Space Science 6 (Gr. 6-8) Earth and Space Science 6 (Gr. 6-8) Earth and Space Science 6 (Gr. 6-8)</p> <p>Earth and Space Science 6 (Gr. 6-8) Earth and Space Science 6 (Gr. 6-8)</p> <p>Earth and Space Science 7 (Gr. 6-8) Earth and Space Science 7 (Gr. 6-8) Earth and Space Science 7 (Gr. 6-8)</p>

Unit 7 – Toward The Stars

Core Topics/Questions/Concepts/Skills

- How do the Earth, moon and sun’s position cause eclipses, tides, and phases of the moon?
- How can objects in space be differentiated based on their physical characteristics?
- How does the Earth compare to other objects in space?
- What causes the seasons?

Unit-End Learning Objectives

In this unit, students examine the structure of the solar system. They will seek the explanation for astronomical events and investigate the dynamics of the sun-earth-moon system. Upon completion of this unit students should be able to:

<u>Learning objectives</u>	<u>Corresponding state standards, where applicable</u>
	Massachusetts Curriculum Frameworks: Gr. 6-8 and 9-10
1] Identify the names and order of the nine planets in our solar system.	Earth and Space Science 10 (Gr. 6-8)
2] Identify the asteroid belt.	Earth and Space Science 10 (Gr. 6-8)
3] Differentiate between inner and outer planets.	Earth and Space Science 10 (Gr. 6-8)
4] Consider the Pluto dilemma—planet or not?	Earth and Space Science 10 (Gr. 6-8)
5] Differentiate between comets, meteoroids, and asteroids.	Earth and Space Science 10 (Gr. 6-8)
6] Using a table of statistics, make comparisons of real or imaginary planets and make inferences about how they compare.	
7] Identify the common types of galaxies and identify the spiral shape of the Milky Way.	Earth and Space Science 12 (Gr. 6-8) & 4.8 (Gr. 9/10)
8] Locate the Sun and solar system in an outer arm of the Milky Way spiral galaxy.	Earth and Space Science 12 (Gr. 6-8) & 4.8 (Gr. 9/10)
9] Understand the theory of the origin of the universe as the Big Bang theory.	Earth and Space Science 4.1 (Gr. 9/10)
10] Recognize the series of steps a main sequence star goes through in its life cycle.	Earth and Space Science 4.4 (Gr. 9/10)

11] Understand the difference between rotation and revolution and the period of time each is equal to.	Earth and Space Science 9 (Gr. 6-8)
12] Identify the eight major moon phases and the Sun-Moon-Earth arrangements that cause them.	Earth and Space Science 9 (Gr. 6-8)
13] Recognize the Sun-Moon-Earth arrangements that yield solar and lunar eclipses and spring and neap tides.	Earth and Space Science 9 (Gr. 6-8)
14] Understand that there are four tides per 24-hour period as well as four special monthly tides.	Earth and Space Science 9 (Gr. 6-8)
15] Understand that the causes of the changing seasons are the tilt of the earth's axis and the revolution of the Earth around the Sun.	Earth and Space Science 11 (Gr. 6-8)
16] Recognize the dates and positions of the Earth and Sun at the equinoxes and solstices.	Earth and Space Science 11 (Gr. 6-8)
17] Identify the major theories as to the moon's formation.	

Assessment

Quizzes, Tests, Projects

Materials and Resources

Text: SciencePlus Technology and Society (Level Red), Holt, Rinehart and Winston, 2002