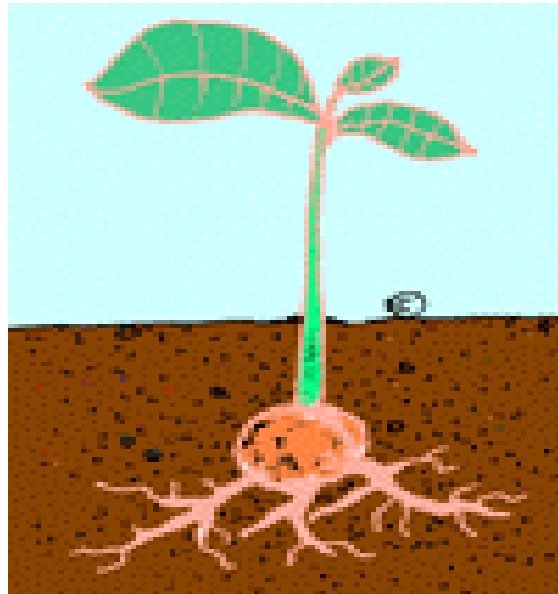


Grade 7 Science and Technology Standards



Based on the Massachusetts Curriculum Frameworks and the
Quincy Public Schools Design for Learning 2000

Grade 7 Science and Technology Standards

STRAND #1: INQUIRY		
	State Standards	Grade 7 Objectives
Inquiry		
1.	Apply Multiple Lines of Inquiry to Address and Analyze Questions	<ul style="list-style-type: none"> • Select the category of scientific inquiry that best fits a given investigation. • Differentiate qualitative from quantitative inquiry methods.
2.	Design an Investigation or Problem Specifying Variables to be Changed, Controlled, and Measured	<ul style="list-style-type: none"> • Conduct scientific inquiries using the correct protocol: Question to be answered, hypotheses, organization, materials/tools, procedures, conclusions, further investigations. • Using a rubric, self-evaluate the scientific inquiry.
3.	Use More Complex Tools to Make Observations, Gather, and Represent Quantitative Data	<ul style="list-style-type: none"> • Select tools that will be used to gather data most efficiently.
4.	Describe Trends in Data Even When Patterns are Not Exact	<ul style="list-style-type: none"> • Determine the number of cycles an investigation needs to be conducted. • Examine data after the investigation has been conducted. • Analyze data of regular and irregular patterns found in the inquiry. • Determine if data is confirmed by multiple cycles. Explain why.
5.	Reformulate Ideas and Technological Solutions Based on Evidence	<ul style="list-style-type: none"> • Critique conclusions/findings of a given scientific investigation. • Compare and contrast findings with secondary sources of information. • Reformulate protocol using scientific tools.
6.	Analyze Alternative Explanations and Procedures	<ul style="list-style-type: none"> • Compare/contrast different investigations conducted on the same scientific question.
7.	Represent Data and Findings Using Graphics	<ul style="list-style-type: none"> • Prepare display of data from a scientific investigation using the most appropriate display format.
8.	<p>Communicate Ideas and Questions Generated and Suggest Improvements or Alternatives to the Experimental Techniques Used.</p> <p>Communicate the Idea That There is More Than One Solution to a Technological Problem.</p>	<ul style="list-style-type: none"> • Review scientific investigations conducted to determine the most efficient means to communicate the procedures and conclusions. • Using a rubric, rework the investigations to improve it.

Grade 7 Science and Technology Standards

STRAND #2: DOMAINS OF SCIENCE		
State Standards		Grade 7 Objectives
Physical Science		
1.	Properties of Matter	<ul style="list-style-type: none"> • Explain the relationships among mass, volume, and density and their applications in properties of matter. • Explain the pH scale. • Compare the properties of acids and bases. • Differentiate between an element and a compound. • Recognize and use the organization of the Periodic Table. • Explain the composition of an atom. • Differentiate physical from chemical change. • Explain the Law of Conservation of Matter and Energy. • Demonstrate how mass is conserved. (Use crushed ice in a sealed container as a demonstration). • Explain how the changes in temperature impact the states of matter.
2.	Particulate Model of Matter	<ul style="list-style-type: none"> • Define: Atoms, nucleus, proton, neutron, electron. • Demonstrate an understanding of the molecular makeup of solids, liquids, and gases. • Demonstrate the three forms of matter using heat and an ice cube to demonstrate solid, liquid, and gas.
3.	Motions and Changes in Motion	<ul style="list-style-type: none"> • Distinguish between different types of force. • Differentiate between speed and velocity, mass and weight. • Demonstrate an understanding that a force in one direction generates an equal force in the opposite direction. • Understand that all matter in the universe exerts force on all other matter in the universe.

Grade 7 Science and Technology Standards

STRAND #2: DOMAINS OF SCIENCE		
State Standards		Grade 7 Objectives
Physical Science		
4.	Transformations of Energy	<ul style="list-style-type: none"> • Demonstrate an understanding of the difference between stored (potential) and moving (kinetic) energy and their interaction. • Demonstrate an understanding that energy can be changed from one form to another. • Demonstrate an understanding that work is not done unless an object moves over a distance caused by a force. • Demonstrate an understanding of the formula $W=F \cdot D$ • Demonstrate knowledge of the 6 simple machines and their functions. • Demonstrate understanding that heat is the total amount of energy contained within a certain mass and temperature is the measurement of the motion of molecules in the matter. • Demonstrate understanding that the addition or removal of heat will lead to phase changes in the states of matter. • Recognize that heat travels in different modes, depending on the medium. • Demonstrate understanding that a prism can separate white light into its components. • Demonstrate understanding that stars (luminors) produce their own light and planets and moons (non-luminors) only reflect the light. • Construct, using the correct materials, series and parallel circuits. • Know the symbols that represent each component. • Understand how magnets are able to generate electricity.

Grade 7 Science and Technology Standards

STRAND #2: DOMAINS OF SCIENCE		
State Standards		Grade 7 Objectives
Life Sciences		
1.	Characteristics of Living Things	<ul style="list-style-type: none"> • Describe the needs of living things. • Introduce the ideas of photosynthesis and respiration as primary functions of living things. • Discuss the structure and function of the skeletal, muscular, reproductive, digestive, and integumentary systems. • Discuss the interdependence of an organism's body systems.
2.	Cells	<ul style="list-style-type: none"> • Understand the concepts and implications of cell theory. • Define prokaryotic and eukaryotic cells. • Reinforce cell concepts of unicellular and multicellular life.
3.	Classification of Living Things	<ul style="list-style-type: none"> • Explain the systems of classification for living things. • Describe characteristics of members of each of the six kingdoms of classification. • Discuss problems involved in the classifying of living things into definitive categories. • Further explain the development of the system of binomial nomenclature. • Compare and contrast vascular and nonvascular plants.

Grade 7 Science and Technology Standards

STRAND #2: DOMAINS OF SCIENCE		
	State Standards	Grade 7 Objectives
Life Sciences		
4.	Ecology Ecosystems and Organisms	<ul style="list-style-type: none"> • Define niche. • Show an understanding of the term "survival of the fittest." • List ways that living things are dependent upon their environment for survival. • List the differences between individuals of the same species in their ability to adapt and survive their environment. • Explain how speciation, migration, and isolation contribute to the evolution of new species. • Describe population sizes graphically. • Define the terms "carrying capacity" and "limiting factors" when discussing population sizes. • Give situations that would result in short and long term changes in population sizes. Represent these graphically. • Define and give examples of endangered and extinct species. • Identify the contributions of scientists (Mendel, Darwin, Linnaeus, etc.) • Compare and contrast the various theories relative to the origin of life. • Explain Darwin's theory of evolution. • Explain how an adaptation can impact an organism's chances for survival. • Describe chemical, anatomical, and fossil evidence for evolution. • Define homologous structure. • Define natural selection. • Explain the effects of variation on natural selection. • Explain how natural selection leads to new and varied species. • Explain why an ecosystem is a delicate balance between all living and non-living parts of an environment. • Give examples of how living things depend on non-living things for survival. • Define the terms: environment, ecology, habitat, and niche. • Define the term symbiosis. • Distinguish between mutualism, commensalism, and parasitism. • Give specific examples from nature of each type.

Grade 7 Science and Technology Standards

Life Sciences (Continued)

STRAND #2: DOMAINS OF SCIENCE	
State Standards	Grade 7 Objectives
Life Sciences	
	<ul style="list-style-type: none"> Explain the important role competition contributes to the balance of nature. Explain the important role that predator/prey relationships play in an ecosystem. List and discuss ways that human activity is disrupting the balance of nature. Explain the process of photosynthesis and the production of food energy for producers. Demonstrate an understanding that phytoplankton in the oceans are the most productive producers on the Earth. Give possible scenarios for what would happen to an ecosystem without producers. Show an understanding that living things store foods' chemical energy in individual cells. Describe possible effects that air or water pollution may have on an ecosystem's community. Explain the unique role each organism plays in recycling organic matter through an ecosystem.

Grade 7 Science and Technology Standards

STRAND #2: DOMAINS OF SCIENCE		
State Standards		Grade 7 Objectives
Earth Science		
1.	Interactions and Cycles the Earth System	<ul style="list-style-type: none"> • Describe the mechanism of plate movements with respect to convection in the upper mantle and lower crust. • Explain the relationship among volcanism, earthquakes, and mountain building as they relate to the Theory of Plate Tectonics. • Describe changes of the Earth's features created by both continental and oceanic tectonic plate movement. • Explain the physical, chemical, and biological processes in which rock is weathered into soil. • Given a soil sample, explain the interaction of organic and inorganic components of the soil. • Explain the impact of moving water on the surface of the Earth. • Define porosity and permeability. • Explain theories for the salinity of the ocean. • List the physical, chemical, and biological features of the ocean. • Identify the major ocean currents and predict the influence on the Earth's climate. • List the factors influencing climate. • Compare and contrast local and global climatic changes. • Explain current issues influencing climatic changes. • Analyze the evolution of life as impacted by climatic changes. • Describe and demonstrate the movement of water in the local watershed. • Describe and explain the influence of gravity on surface water. • Define porosity and permeability. • Explain the impact of porosity and permeability on ground water. • Identify human activities that have changed the Earth's land, oceans, and atmosphere.
2.	Earth and Space	<ul style="list-style-type: none"> • Describe nuclear fusion as the source of the sun's energy. • Describe how heat from the sun is a driving force for global winds and currents.

Grade 7 Science and Technology Standards

STRAND #3: TECHNOLOGY		
State Standards		Grade 7 Objectives
Design Process		
1.	Explore and Illustrate Possible Solutions and From These Propose One Solution	<ul style="list-style-type: none"> Discuss a product that could solve a selected problem. Develop the design. Evaluate the design.

STRAND #3: TECHNOLOGY		
State Standards		Grade 7 Objectives
Nature of Engineering		
1.	Understanding Technology as a System	<ul style="list-style-type: none"> Discuss how technology influences economic, political and social issues.
2.	Transportation Systems	<ul style="list-style-type: none"> Define the general modes of transportation. Recognize various propulsion, control, guidance, and suspension systems of transportation vehicles.
3.	Manufacturing Processes	<ul style="list-style-type: none"> Define the steps of a manufacturing flow chart. Recognize the components of the manufacturing process. Design a production system that will change a raw material to a finished product.
4.	Thermal Processes and Phenomena in Transportation or Bioengineering	<ul style="list-style-type: none"> Explain the thermal process as the gain or loss of heat energy by matter. Explain how heating and cooling changes the state of materials.

STRAND #3: TECHNOLOGY		
State Standards		Grade 7 Objectives
Understanding and Using Technology in Society		
1.	Nature and Impact of Technology	<ul style="list-style-type: none"> Select an example of an invention that formed the basis for a major change in the way we live. Describe ways that technological advances have positive results but may be accompanied by negative effects.
2.	The Tools and Machines of Technology	<ul style="list-style-type: none"> Document ways that a range of tools and machines are used to implement solutions to design problems.