

SCIENCE

KINDERGARTEN

Life Science

- Group living and non-living things
- Explain how people use the five senses
- Recognize that humans are living things that need food, air, and water

Physical Science

- Sort objects based on size, shape, color, weight, and texture

Earth Science

- Observe and record weather changes day to day and over the seasons

GRADE 1

Life Science

- Draw and label stages of the life cycle of plants
- Recognize plants look like their parents
- Understand that fossils provide us with information about living things that inhabited the Earth years ago
- Describe seasonal changes in plants
- Identify plants' needs

Physical Science

- Identify objects and materials as solid, liquid or gas
- Recognize solids have a definite shape and liquids and gases take the shape of their container

Earth Science

- Identify characteristics of the Earth's surface (water, soil, rocks)
- Understand the sun supplies heat and light to the Earth and is necessary for life

GRADE 2

Life Science

- Draw and label the life cycle of an animal
- Recognize animals look like their parents
- Describe ways in which an organism's habitat provides for its basic needs
- Identify animal habitats

Physical Science

- Understand objects can move in various ways
- Demonstrate how applying force can change the motion of an object
- Describe how objects can be balanced under some conditions

Earth Science

- Understand that air is all around us, wind is moving air and is a mixture of gases.
- Identify the repeated patterns of events around us (seasons, day, night)

GRADE 3

Life Science

- Identify structures in plants that are responsible for food production, support, water transport, reproduction, growth, and protection
- Describe predictable life cycles of plants
- Describe the role of producers, consumers, and the food chain

Physical Science

- Identify the basic forms of energy
- Explain how energy can be transferred from one form to another
- Understand that electricity in circuits requires a complete loop for an electrical current and can produce light, heat and sound.
- Understand objects and materials can be conductors or insulators of electricity
- Create and use an electromagnet
- Demonstrate magnets have poles that repel and attract each other
- Demonstrate a magnet will attract some objects and materials but not others

Earth Science

- Understand Earth is part of the Solar System (planets, Earth's axis, revolution, rotation and four phases of the moon)
- Understand how Earth orbits the sun in a year's time and rotates on its axis in approximately 24 hours. The rotation of the earth, day/night, and apparent movements of the sun, moon and stars are connected.
- Recognize observable changes in the moon

GRADE 4

Life Science

- Describe predictable life cycles of animals
- Explain major life cycle stages of the frog and butterfly
- Explain how characteristics may change over time as adaptations
- Recognize plants have characteristic behaviors, and plants and animals can survive via seasonal behaviors
- Compare natural systems with mechanical systems that are designed to serve similar purposes

Physical Science

- Identify properties of objects and materials

Earth Science

- Describe what a mineral is
- Identify the physical properties of minerals and test for those
- Describe materials used to accomplish a design task
- Compare and contrast the formation of the three types of rock (metamorphic, igneous, and sedimentary)
- Understand how soil is formed
- Understand the properties of soil and how it supports the growth of plants
- Understand that slow (erosion and weathering) and rapid (extreme weather) processes shape the earth

Technology/Engineering

- Compare and contrast the differences between simple and complex machines

GRADE 5

Life Science

- Describe characteristics of plants and animals and how they are classified
- Describe types of reproduction and how traits are inherited
- Explain how living things adapt to their environment causing them to die or move to new locations
- Recognize that organisms meet needs by using behaviors in response to information from the environment, and some behaviors are instinctive and others are learned
- Recognize plants have characteristic behaviors, and plants and animals can survive via seasonal behaviors
- Explain how ecosystems function

Physical Science

- Identify properties of objects and materials
- Explain how matter is classified
- Explain how the state of water can change by adding or taking away heat
- Identify the basic forms of energy
- Explain how energy can be transformed from one form to another
- Understand light travels in a straight line until it is reflected, refracted or absorbed

Earth Science

- Describe how air temperature, moisture, wind speed and direction, and precipitation make up the weather at a particular place
- Explain how various forms of precipitation are connected to the weather in a particular place and time
- Identify how global patterns influence local weather, which can be measured
- Differentiate between climate and weather
- Describe how the water on Earth cycles in different forms and locations
- List and explain factors that affect climate
- Describe processes that shape the earth

Technology/Engineering

- Construct a prototype using materials and tools

GRADE 6

Science as Inquiry

- Describe the Science Process Skills
- Explain and demonstrate the steps of the Scientific Method

Earth Science

- Interpret and create models and maps of earth's common physical features
- Describe the properties of the layers of the earth
- Describe how layers of rocks can tell us about the age of the earth
- Describe how the movement of the earth's crustal plates causes slow changes in the earth's surface
- Describe how glaciers shape the land
- Describe how fossils provide evidence about the past
- Describe and give examples of ways in which the earth's surface is built up and torn down by natural processes
- Describe how gravity creates tides
- Describe the interaction between the earth, moon, and sun system including phases and eclipses
- Compare and contrast properties and conditions of objects in the solar system to those of Earth
- Explain how the tilt of the Earth creates seasons
- Describe a galaxy as a system of billions of stars, gases and dust

Technology/Engineering

- Identify and explain the steps of the engineering design process
- Demonstrate methods of representing solutions to a design problem
- Describe and explain the purpose of a given prototype

GRADE 7

LIFE SCIENCE

Structure and Function of Cells

- Describe basic units of life (cells)
- Compare and contrast plant and animal systems including transport, support, respiration, and metabolism

Systems of Living Things

- Describe the hierarchical organization of multi-cellular organisms from cells to organs to tissues to systems to organisms
- Identify the general functions of the major systems of the human body (digestion, respiration, reproduction, circulation, excretion, protection from disease, and movement, control, and coordination) and describe ways that these systems interact with each other

Classification of Organisms

- Classify organisms into kingdoms according to shared characteristics
- Describe several organisms from each kingdom

Relationships in the Ecosystem

- Give examples of ways in which organisms interact and have different functions within an ecosystem that enable it to survive
- Explain the roles and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web
- Explain how dead plants and animals are broken down by other living organisms, how this process contributes to the system as a whole
- Recognize that producers (plants contain chlorophyll) use energy from sunlight to make sugars from carbon dioxide and water through a process called photosynthesis

Evolution and Biodiversity

- Relate genetic variation and environmental factors to evolution and diversity
- Recognize that evidence from fossils, geology, and comparative anatomy, provide the basis for the theory of evolution

Changes in Ecosystems Over Time

- Identify ways in which ecosystems have changed throughout geologic time.
- Describe how changes may be catastrophic
- Recognize that biologic evolution accounts for diversity of species over time

Reproduction and Heredity

- Define heredity as the passage of genetic instructions from one generation to another
- Recognize that hereditary information is contained in genes located in chromosomes of each cell
- Compare how traits are passed in sexual and asexual reproduction

Scientific Reasoning

- Use the scientific method to design an experiment
- Illustrate understanding of variables and controls

Technology/Engineering

- Demonstrate an understanding of the design process by designing and building structures within given constraints
- Identify, illustrate, and describe the steps of the design process

GRADE 8

PHYSICAL SCIENCE

Properties of Matter

- Compare and contrast weight and mass
- Demonstrate the ability to calculate the density of matter
- Explain how mass is conserved in a closed system

Elements, Compounds and Mixtures

- Explain the differences between elements, compounds, and mixtures
- Differentiate between an atom and a molecule
- Describe the difference between a chemical and a physical change
- Recognize that there are more than 100 elements

Motion of Objects

- Explain and give examples of how the motion on an object can be describe by its position, direction of motion, and speed
- Graph and interpret distance vs. time graphs for constant speed

Energy

- Differentiate between potential and kinetic energy
- Identify situations where kinetic energy transforms into potential energy and vice versa
- Recognize that heat is a form of energy
- Explain the effect of heat on particle motion related to phase change
- Describe how heat moves in predictable ways

Scientific Reasoning

- Use the scientific method to design an experiment
- Illustrate understanding of variables and controls

Technology/Engineering

- Demonstrate an understanding of the design process by designing and building structures within given constraints
- Identify, illustrate, and describe the steps of the design process

GRADE 9-12

In all science courses

- Solve scientific problems and design and carry out a controlled experiment working individually or in groups
- Make scientific measurements using rulers, balances, thermometers, volumetric, and electronic devices
- Apply mathematics and graphing techniques to describe, analyze, and display data
- Use appropriate technologies in scientific inquiry such as microscopes, graphing calculators, electronic probes, electronic balances, and computers
- Write a laboratory report and/or a scientific research paper including works cited
- Find, present, and display scientific information orally and in written form, and with appropriate audiovisuals, models, and demonstrations
- Apply scientific principles and concepts to everyday life

Environmental Science

- Describe the characteristics of the Earth's geosphere, hydrosphere, atmosphere, and biosphere
- Explain the flow of energy and cycling of nutrients through an ecosystem
- Explain the importance of biodiversity and how species become adapted to their environment
- Describe the different types of pollution and their environmental and health impacts
- Distinguish between renewable and nonrenewable resources and define sustainability
- Compare and contrast the advantages and disadvantages of different energy sources
- Make environmental measurements such as water quality, soil and weather conditions, species diversity and biomass
- Analyze local environmental issues including land use change on Cape Cod
- Describe everyday actions people can make to protect the environment

Biology

- Describe the composition and function of the four major categories of organic molecules (carbohydrates, lipids, proteins, and nucleic acids)
- Identify the structures found in cells, relate these with their functions, and compare and contrast prokaryotic and eukaryotic cells
- Describe the conversion and flow of energy through cells and organisms including photosynthesis and cellular respiration
- Compare and contrast asexual and sexual reproduction and their roles in the cell cycle and heredity
- Describe the structure and function of DNA including mutations; explain mechanisms of inheritance; predict outcomes of genetic crosses
- Cite evidence for the role of natural selection in preserving or eliminating genetic variation leading to adaptation and resulting in biodiversity
- Classify organisms into appropriate groups based on their characteristics and phylogeny
- Describe how living and non-living factors interact in an ecosystem and identify the roles and impacts of each
- Describe the structure and function of major organ systems of the human body and how these interact to maintain homeostasis

Chemistry

- Explain the fundamentals of the chemical basis of nature and relate concepts in chemistry to everyday life
- Describe the properties of atoms and apply modern atomic theory to the concepts of chemical bonding, molecular structure, and the properties of compounds
- Explain the organization of the periodic table and use this information to predict properties of elements
- Describe chemical reactions according to conservation of matter and energy, equilibria, kinetics, and thermochemistry
- Perform experiments to verify chemical concepts and use appropriate mathematics and graphing techniques to analyze and present data

Physics

- Explain concepts of linear motion including force, acceleration, energy, and momentum
- Explain concepts of rotational motion including torque, centripetal acceleration, momentum, and orbital motion
- Solve problems involving temperature, heat, and fluid dynamics
- Apply physics principles to practical problem solving and everyday phenomena
- Analyze laboratory data (e.g. curve fitting, error analysis) and manipulate equations and formulae to derive new and useful relationships
- Classify various forms of energy and apply the Law of Conservation to energy transformations

BUSINESS/COMPUTER SCIENCE

GRADES 9-12

Accounting

- Understand how to process a complete set of books
- Develop a knowledge of departmentalized accounting, payroll, depreciation, uncollected accounts, accruals, prepaid expenses, and unearned revenue
- Practice using simulated accounting scenarios
- Produce accounting records for sole proprietorships and partnerships using a computer

Personal Economics

- Develop an understanding of how to manage a checking account and credit cards
- Learn the guidelines for selecting insurance policies
- Gain knowledge of consumer protection laws
- Use consumer periodicals to analyze the different types of banking services, investment options, and housing options

Case Studies in Management

- Utilize real-world situations to learn the principles of management, finance, accounting, marketing, human resources and information systems
- Work in teams on problem-solving, communication, and presentation skills

Business Law I

- Learn the basic legal rights and responsibilities of consumers and businesses
- Study contracts in-depth
- Learn the nature and formation of sales contracts

Computer Literacy

- Become familiar with the keyboard
- Learn how to fully utilize the power of Microsoft Office 2007, Access 2007, PowerPoint 2007, MS One Note, and MS Project

Web Design

- Explore web page creation, web site management, HTML, XHTML, Dreamweaver, CSS Cascading Style Sheets and the integration of Photoshop, Flash, and other web enhancing tools
- Learn about text formatting, page layout, manipulation of graphics, tables, frames and basic design components
- Create a personal portfolio that includes a variety of web pages
- Work on the school website and volunteer for non-profits and/or businesses via internship opportunities

Jobs for Bay State Graduates

- Learn basic skills for career preparation, job attainment, and job success
- Understand the importance of assessment and goal setting
- Learn to develop a resume and cover letter
- Receive job development and placement services for a successful transition from school to the work force

TECH STUDIES

Computer Graphics

- Design magazine covers, movie posters, print advertisements, CD covers, and animations using Photoshop, Illustrator, Image Ready, InDesign and Flash
- Engage in production projects for the school
- Develop a graphic arts portfolio

Animation

- Study the history and future of animation
- Expand upon drawing skills through the use of computer animation
- Develop short films, music videos, stop-motion animation, and claymation

Woodworking

- Learn to draw and read simple plans, develop process sheets, and construction flow charts
- Learn safe and proper use of hand and power tools
- Incorporate a variety of tools and processes to learn manufacturing and mass production techniques

Cottage Industries

- Understand how to select the right tool for the right job
- Develop advanced skills while using jigs and fixtures
- Learn the proper processes, procedures and sequencing of operations necessary to complete advanced projects

Construction Technology

- Learn the basics of residential construction through the drawing and construction of scale model houses
- Develop knowledge of construction procedures, techniques, and building codes

Boatbuilding

- Learn basic woodworking and fiberglassing techniques used to produce wood composite boats
- Learn various measurement techniques and how to read and transcribe complex plans

MEDIA STUDIES

Video

- Develop production techniques utilizing both studio and field equipment to develop skills
- Design and create video packages that effectively use graphics, images, and sound to present a distinctive point of view on a topic
- Produce three to five video projects including personal video essays, broadcast journalism, reports, research projects, or independent portfolio development
- Create coherent presentations that synthesize information from a variety of sources