

New Hampshire Science Standards Grades 5 - 8

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MIDDLE SCHOOL SCIENCE	Boardworks Middle School Science Presentation
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.	
1. Atmosphere, Climate and Weather	
GRADES 5-6	
<i>S:ESS1:6:1.1 Describe and make predictions about local and regional weather conditions using observation and data collection methods.</i>	–
<i>S:ESS1:6:1.2 Identify weather patterns by tracking weather related events, such as hurricanes.</i>	Hurricanes
<i>S:ESS1:6:1.3 Explain the composition and structure of the Earth’s atmosphere.</i>	The Atmosphere
<i>S:ESS1:6:1.4 Describe weather in terms of temperature, wind speed and direction, precipitation, and cloud cover.</i>	What is Weather? Precipitation
<i>S:ESS1:6:1.5 Describe how clouds affect weather and climate, including precipitation, reflecting light from the sun, and retaining heat energy emitted from the Earth’s surface.</i>	Precipitation
GRADES 7-8	
<i>S:ESS1:8:1.1 Identify and describe the processes of the water cycle and explain their effects on climatic patterns.</i>	The Water Cycle
<i>S:ESS1:8:1.2 Identify and describe the impact certain factors have on the Earth’s climate, including changes in the oceans’ temperature, changes in the composition of the atmosphere, and geological shifts due to events such as volcanic eruptions and glacial movements.</i>	Greenhouse Gases
2. Composition and Features	
GRADES 5-6	
<i>S:ESS1:6:2.1 Differentiate between renewable and nonrenewable resources.</i>	Renewable Energy Resources Nonrenewable Energy Resources
<i>S:ESS1:6:2.2 Describe and define the different landforms on the Earth’s surface, such as coastlines, rivers, mountains, deltas, canyons, etc.</i>	–
<i>S:ESS1:6:2.3 Identify and distinguish between various landforms using a map and/or digital images.</i>	–
GRADES 7-8	
<i>S:ESS1:8:2.1 Describe the layers of the Earth, including the core, mantle, lithosphere, hydrosphere, and atmosphere.</i>	The Structure of the Earth
<i>S:ESS1:8:2.2 Use geological evidence provided to support the idea that Earth’s crust/lithosphere is composed of plates that move.</i>	What is Plate Tectonics? Plate Boundaries

3. Fossils	
GRADES 5-6	
S:ESS1:6:3.1 Recognize that fossils offer important evidence relating to changes in life forms and environmental conditions over geologic time.	Evolution
<i>S:ESS1:6:3.2 Identify connections between fossil evidence and geological events, such as changes in atmospheric composition, movement of tectonic plates, and asteroid/comet impact; and develop a means of sequencing this evidence.</i>	–
GRADES 7-8	
S:ESS1:8:3.1 Explain how fossils found in sedimentary rock can be used to support the theories of Earth's evolution over geologic time; and describe how the folding, breaking, and uplifting of the layers affects the evidence.	Sedimentary Rock Evolution
4. Observation of the Earth from Space	
GRADES 5-6	
<i>S:ESS1:6:4.1 Recognize that images taken of the Earth from space can show its features and any changes in those features that appear over time.</i>	–
S:ESS1:6:4.2 Explain that satellites can be used to view and track storms and Earth events, such as hurricanes and wild fires.	Satellites
GRADES 7-8	
S:ESS1:8:4.1 Describe how catastrophic changes that have taken place on the Earth's surface can be revealed by satellite images.	Tsunami Case Study
5. Processes and Rates of Change	
GRADES 5-6	
S:ESS1:6:5.1 Recognize that things change in steady, repetitive, or irregular ways, or sometimes in more than one way at the same time.	Plate Boundaries Physical Weathering Chemical Weathering Biological Weathering Erosion, Transportation and Deposition
S:ESS1:6:5.2 Explain how some changes to the Earth's surface happen abruptly, as a result of landslides, earthquakes and volcanic eruptions; while other changes happen very slowly as a result of weathering, erosions and deposition of sediment caused by waves, wind, water and ice.	Earthquakes Plate Boundaries Physical Weathering Chemical Weathering Biological Weathering Erosion, Transportation and Deposition

S:ESS1:6:5.3 Recognize that vibrations in materials set up wavelike disturbances that spread away from the source, as with earthquakes.	Earthquakes What is Sound?
GRADES 7-8	
S:ESS1:8:5.1 Explain that the Earth's crust is divided into plates which move at extremely slow rates in response to movements in the mantle.	The Structure of the Earth What is Plate Tectonics?
S:ESS1:8:5.2 Explain how Earth events, abruptly and over time, can bring about changes on Earth's surface (e.g., landforms, ocean floor, rock features, climate).	What is Plate Tectonics? Plate Boundaries The Rock Cycle
S:ESS1:8:5.3 Explain the role of differential heating or convection in ocean currents, winds, weather and weather patterns, atmosphere, or climate.	What is Weather? Wind and Ocean Currents
6. Rock Cycle	
GRADES 5-6	
S:ESS1:6:6.1 Explain how soil is formed from combinations of weathered rock and decomposed plant and animal remains, and that it contains living organisms.	Soil
S:ESS1:6:6.2 Identify the components of soil and other factors, such as bacteria, fungi and worms, which influence its texture, fertility, and resistance to erosion.	Soil
S:ESS1:6:6.3 Describe the properties of soil, such as color, texture, capacity to retain water, and its ability to support plant life.	Soil
GRADES 7-8	
S:ESS1:8:6.1 Describe the processes of the rock cycle.	The Rock Cycle
S:ESS1:8:6.2 Explain that sedimentary, igneous, and metamorphic rocks contain evidence of the minerals, temperatures, and forces that created them.	Sedimentary Rocks Igneous Rocks Metamorphic Rocks
S:ESS1:8:6.3 Explain how sediments of sand and smaller particles, which may contain the remains of organisms, are gradually buried and cemented together by dissolved minerals to form solid rock.	Sedimentary Rocks
S:ESS1:8:6.4 Using data about a rock's physical characteristics, make and support an inference about the rock's history and connection to the rock cycle.	Sedimentary Rocks Igneous Rocks Metamorphic Rocks The Rock Cycle Different Types of Rocks
7. Water	
GRADES 5-6	
S:ESS1:6:7.1 Explain the properties that make water an essential component of the Earth's system, including solvency and its ability to maintain a liquid state at most temperatures.	-
S:ESS1:6:7.2 Explain that water quality has a direct effect on Earth's life forms.	Acid Rain
GRADES 7-8	

S:ESS1:8:7.1 Describe how water flows into and through a watershed, falling on the land, collecting in rivers and lakes, soil, and porous layers of rock, until much of it flows back into the ocean.	–
S:ESS1:8:7.2 Identify the physical and chemical properties that make water an essential component of the Earth's system.	–
S:ESS1:8:7.3 Explain the processes that cause cycling of water into and out of the atmosphere and their connections to our planet's weather patterns.	The Water Cycle Precipitation
ESS2– The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.	
1. Earth, Sun and Moon	
GRADES 5-6	
S:ESS2:6:1.1 Recognize and describe how the regular and predictable motions of the Earth and Moon explain certain Earth phenomena, such as day and night, the seasons, the year, shadows and the tides.	Days, Years and Seasons The Earth, Moon and Sun
S:ESS2:6:1.2 Recognize that of all the known planets, Earth appears to be somewhat unique; and describe the conditions that exist on Earth that allow it to support life.	The Solar System The Water Cycle The Atmosphere
GRADES 7-8	
S:ESS2:8:1.1 Identify the characteristics of the Sun and its position in the universe.	The Solar System
S:ESS2:8:1.2 Recognize and describe how the regular and predictable motions of the Earth and Moon account for phenomena, such as the phases of the Moon and eclipses.	The Earth, Moon and Sun
S:ESS2:8:1.3 Recognize the relationships between the tides and the phases of the moon; and use tide charts and NOAA information to describe them.	–
S:ESS2:8:1.4 Explain the temporal or positional relationships between or among the Earth, Sun and Moon (e.g., night/day, seasons, year, tide).	Days, Years and Seasons
2. Energy	
GRADES 5-6	
S:ESS2:6:2.1 Recognize how the tilt of the Earth's axis and the Earth's revolution around the Sun affect seasons and weather patterns.	Days, Years and Seasons What is Weather?
S:ESS2:6:2.2 Identify and describe seasonal, daylight and weather patterns as they relate to energy.	Days, Years and Seasons What is Weather?
GRADES 7-8	
S:ESS2:8:2.1 Describe the Sun as the principle energy source for phenomena on the Earth's surface.	Feeding Types What is Photosynthesis?
3. Solar System	
GRADES 7-8	

S:ESS2:8:3.1 Identify the characteristics and movement patterns of the planets in our Solar System and differentiate between them.	The Solar System
S:ESS2:8:3.2 Explain the effects of gravitational force on the planets and their moons.	Gravity
<i>S:ESS2:8:3.3 Explain why Earth and our Solar System appear to be somewhat unique, while acknowledging recent evidence that suggests similar systems exist in the universe.</i>	–
S:ESS2:8:3.4 Compare and contrast planets based on data provided about size, composition, location, orbital movement, atmosphere, or surface features (includes moons).	The Solar System
S:ESS2:8:3.5 Explain how gravitational force affects objects in the Solar System (e.g., moons, tides, orbits, satellites).	The Solar System Satellites Gravity
4. View from Earth	
GRADES 5-6	
<i>S:ESS2:6:4.1 Explain the historical perspective of planetary exploration and man's achievements in space, beginning with Russia's Sputnik mission in 1957.</i>	–
<i>S:ESS2:6:4.2 Describe man's perception of the constellations throughout history; and explain how he has used them to his advantage, including navigational purposes and to explain historical events.</i>	–
GRADES 7-8	
S:ESS2:8:4.1 Explain how technological advances have allowed scientists to re-evaluate or extend existing ideas about the Solar System.	Exploring Space
ESS3– The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.	
1. Size and Scale	
GRADES 7-8	
<i>S:ESS3:8:1.1 Define an astronomical unit as the distance from the Earth to the Sun.</i>	–
<i>S:ESS3:8:1.2 Explain that special units of measure, such as light years and astronomical units, are used to calculate distances in space.</i>	–
2. Stars and Galaxies	
GRADES 7-8	
<i>S:ESS3:8:2.1 Describe objects such as asteroids, comets and meteors in terms of their characteristics and movement patterns.</i>	–
3. Universe	
GRADES 7-8	
S:ESS3:8:3.1 Describe the universe as being comprised of billions of galaxies, each containing many billions of stars; and explain that there are vast distances separating these galaxies and stars from one another and from the Earth.	The Solar System

ESS4–The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.	
1. Design Technology	
GRADES 5-6	
S:ESS4:6:1.1 Understand that technology is used to design tools that improve our ability to measure and observe the world.	Satellites
GRADES 7-8	
S:ESS4:8:1.1 Describe ways in which technology has increased our understanding of the world in which we live.	Exploring Space
S:ESS4:8:1.2 Recognize the importance of technology as it relates to science, for purposes such as: access to space and other remote locations, sample collection and treatment, measurement, data collection, and storage, computation, and communication of information.	Exploring Space
2. Tools	
GRADES 5-6	
S:ESS4:6:2.1 Recognize that satellites and Doppler radar can be used to observe or predict the weather.	Satellites
S:ESS4:6:2.2 Employ knowledge of basic weather symbols to read and interpret weather and topographic maps.	What is Weather?
<i>S:ESS4:6:2.3 Read and interpret data from barometers, sling psychrometers and anemometers.</i>	–
GRADES 7-8	
<i>S:ESS4:8:2.1 Calculate temperature in degrees Celsius.</i>	–
<i>S:ESS4:8:2.2 Perform calculations using metric measurements.</i>	–
S:ESS4:8:2.3 Describe how man uses land-based light telescopes, radio telescopes, satellites, manned exploration, probes and robots to collect data.	Exploring Space
3. Local and Global Environmental Issues	
GRADES 5-6	
S:ESS4:6:3.1 Provide examples of products that man has developed which allow humans to do things that they could not do otherwise; and identify the natural materials used to produce these products.	Fossil Fuels
<i>S:ESS4:6:3.2 Identify the most appropriate materials for a given design task with requirements for specific properties, such as weight, strength, hardness, and flexibility.</i>	–
S:ESS4:6:3.3 Provide examples of how to reduce waste through conservation, recycling, and reuse.	Greenhouse Gases
GRADES 7-8	
S:ESS4:8:3.1 Provide examples of how creative thinking and economic need has shaped the way people use natural materials, such as the use of metal ores, petroleum, and fresh water.	Fossil Fuels Using Rocks

S:ESS4:8:3.2 Explain how to test natural materials to measure and compare their properties.	Different Types of Rocks
S:ESS4:8:3.3 Explain how technologies can reduce the environmental impact of natural disasters.	–
S:ESS4:8:3.4 Identify the potential impact of converting forested land to uses such as farms, homes, factories, or tourist attractions.	Environmental Change Growing Plants
4. Career Technical Education Connections	
GRADES 5-6	
S:ESS4:6:4.1 Understand that some form of science is used in most jobs/careers and that some jobs/careers specifically require knowledge of Earth science.	–
GRADES 7-8	
S:ESS4:8:4.1 Understand that some scientific jobs/careers involve the application of Earth Space science content knowledge and experience in specific ways that meet the goals of the job.	–
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).	
1. Classification	
GRADES 5-6	
S:LS1:6:1.1 Identify ways in which living things can be grouped and organized, such as taxonomic groups of plants, animals and fungi.	Classifying Organisms
S:LS1:6:1.2 Categorize organisms into kingdoms that are currently recognized, according to shared characteristics.	Classifying Organisms
GRADES 7-8	
S:LS1:8:1.1 Recognize that similarities among organisms are found in anatomical features and patterns of development; and explain how these can be used to infer the degree of relatedness among organisms.	Classifying Organisms Evolution
S:LS1:8:1.2 Describe or compare how different organisms have mechanisms that work in a coordinated way to obtain energy, grow, move, respond, provide defense, enable reproduction, or maintain internal balance (e.g., cells, tissues, organs and systems).	Cells to Organisms Releasing Energy Types of Reproduction Where Do Cells Come From? The Nervous System The Endocrine System Human Sex Cells and Systems Animal Behavior Types of Animal Behavior
2. Living Things and Organization	
GRADES 5-6	
S:LS1:6:2.1 Recognize that all living things are composed of cells, and explain that while many organisms are single celled, such as yeast, others, including humans, are multicellular.	Animal and Plant Cells What Are Microbes?

S:LS1:6:2.2 Explain that the way in which cells function is similar in all organisms.	Animal and Plant Cells
S:LS1:6:2.3 Recognize that cells use energy obtain from food, to conduct the functions necessary to sustain life, such as cell growth.	Releasing Energy
S:LS1:6:2.4 Recognize and describe the hierarchical organization of living systems, including cells, tissues, organs, organ systems, whole organisms, and ecosystems.	Cells to Organisms
S:LS1:6:2.5 Explain that multicellular organisms have specialized cells, tissues, organs and organ systems that perform certain necessary functions, including digestion, respiration, reproduction, circulation, excretion, movement, control and coordination and protection from disease.	Animal and Plant Cells Cells to Organisms Releasing Energy Types of Reproduction Where Do Cells Come From? The Nervous System The Endocrine System The Musculoskeletal System Human Sex Cells and Systems Fighting Disease Digestion Chemical Digestion The Respiratory System Respiration and the Circulatory System
S:LS1:6:2.6 Recognize that the human cells found in tissues and organs are similar to those of other animals, but somewhat different from cells found in plants.	Animal and Plant Cells
GRADES 7-8	

<p>S:LS1:8:2.1 Identify the functions of the human body's systems, including digestion, respiration, reproduction, circulation, excretion, movement, control and coordination and protection from disease; and describe how they interact with one another.</p>	<p>Animal and Plant Cells Cells to Organisms Releasing Energy Types of Reproduction Where Do Cells Come From? The Nervous System The Endocrine System Human Sex Cells and Systems The Musculoskeletal Systems Human Behavior Fighting Disease Digestion Chemical Digestion The Respiratory System Respiration and the Circulatory System</p>
<p>S:LS1:8:2.2 Define a population and describe the factors that can affect it.</p>	<p>Competition Habitats</p>
<p><i>S:LS1:8:2.3 Explain why it is beneficial for an organism to be able to regulate its internal environment while living in a constantly changing external environment.</i></p>	<p>–</p>
<p>S:LS1:8:2.4 Explain relationships between or among the structure and function of the cells, tissues, organs, and organ systems in an organism.</p>	<p>Cells to Organisms</p>
<p>S:LS1:8:2.5 Using data and observations about the biodiversity of an ecosystem, make predictions or draw conclusions about how the diversity contributes to the stability of the ecosystem.</p>	<p>Food Webs</p>
<p>3. Reproduction</p>	
<p>GRADES 5-6</p>	
<p>S:LS1:6:3.1 Explain that cells repeatedly divide to make more cells for growth and repair.</p>	<p>Where Do Cells Come From?</p>
<p>S:LS1:6:3.2 Explain that the same genetic information is copied in each cell of a new organism.</p>	<p>Where Do Cells Come From?</p>
<p><i>S:LS1:6:3.3 Explain that all living things reproduce in order to continue their species.</i></p>	<p>–</p>
<p>GRADES 7-8</p>	
<p>S:LS1:8:3.1 Differentiate between asexual and sexual reproduction, and explain that in some kinds of organisms, all the genes come from one parent, while in organisms requiring two sexes to reproduce, typically half the genes come from each parent.</p>	<p>Types of Reproduction</p>
<p><i>S:LS1:8:3.2 Explain that a species of sexually reproducing organisms is comprised of all the organisms that can mate to produce fertile offspring.</i></p>	<p>–</p>

S:LS1:8:3.3 Explain that in sexual reproduction, a single specialized cell from a female merges with a specialized cell from a male in a process called fertilization.	Causes of Variation Human Sex Cells and Systems
S:LS1:8:3.4 Explain that the fertilized egg cell, carrying genetic information from each parent, multiplies to form the complete organism.	Causes of Variation Embryo Development and Birth
S:LS1:8:3.5 Explain how the basic tissues of an embryo form.	Embryo Development and Birth
S:LS1:8:3.6 Compare and contrast sexual reproduction with asexual reproduction.	Type of Reproduction
S:LS1:8:3.7 Using data provided, select evidence that supports the concept that genetic information is passed on from both parents to offspring.	Types of Variation
LS2– Energy flows and matter recycles through an ecosystem.	
1. Environment	
GRADES 5-6	
S:LS2:6:1.1 Identify and describe the factors that influence the number and kinds of organisms an ecosystem can support, including the resources that are available, the differences in temperature, the composition of the soil, any disease, the threat of predators, and competition from other organisms.	Competition Habitats Soil Growing Plants Feeding Types
S:LS2:6:1.2 Explain that most microorganisms do not cause disease and that many are beneficial to the environment.	Uses of Microbes
GRADES 7-8	
S:LS2:8:1.1 Explain how changes in environmental conditions can affect the survival of individual organisms and an entire species.	Environmental Change
S:LS2:8:1.2 Explain that in all environments, organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter, and that in any particular environment the growth and survival of organisms depend on the physical conditions.	Competition
S:LS2:8:1.3 Using data and observations, predict outcomes when abiotic/biotic factors are changed in an ecosystem.	Habitats
2. Flow of Energy	
GRADES 5-6	
S:LS2:6:2.1 Describe how energy is transferred in an ecosystem through food webs; and explain the roles and relationships between producers, consumers and decomposers.	Feeding Types Food Chains Food Webs Pyramids of Number and Biomass
S:LS2:6:2.2 Recognize that one of the most general distinctions among organisms is between plants, which use sunlight to make their own food, and animals, which consume energy-rich foods.	Feeding Types

S:LS2:6:2.3 Describe the process of photosynthesis and explain that plants can use the food they make immediately or store it for later use.	What is Photosynthesis? Leaves and Glucose
S:LS2:6:2.4 Recognize that energy, in the form of heat, is usually a byproduct when one form of energy is converted to another, such as when living organisms transform stored energy to motion.	What is Energy?
GRADES 7-8	
S:LS2:8:2.1 Explain how food provides energy and materials for growth and repair of body parts.	Releasing Energy Where Do Cells Come From?
S:LS2:8:2.2 Given a scenario, trace the flow of energy through an ecosystem, beginning with the sun, through organisms in the food web, and into the environment (includes photosynthesis and respiration).	Food Chains Food Webs Releasing Energy What is Photosynthesis?
3. Recycling of Materials	
GRADES 5-6	
S:LS2:6:3.1 Define a population as all individuals of a species that exist together at a given place and time; and explain that all populations living together in a community, along with the physical factors with which they interact, compose an ecosystem.	Habitats
S:LS2:6:3.2 Using food webs, identify and describe the ways in which organisms interact and depend on one another in an ecosystem.	Food Webs
S:LS2:6:3.3 Explain how insects and various other organisms depend on dead plant and animal matter for food; and describe how this process contributes to the system.	Pyramids of Number and Biomass
GRADES 7-8	
<i>S:LS2:8:3.1 Identify autotrophs as producers who may use photosynthesis, and describe this as the basis of the food web.</i>	–
S:LS2:8:3.2 Explain the process of respiration and differentiate between it and photosynthesis.	Releasing Energy What is Photosynthesis?
<i>S:LS2:8:3.3 Know that all organisms, including humans, are part of, and depend on, two main interconnected global food webs: one which includes microscopic ocean plants, and the other which includes land plants.</i>	–
S:LS2:8:3.4 Describe how matter is recycled within ecosystems and explain that the total amount of matter remains the same, though its form and location change.	Recycling Nutrients
S:LS2:8:3.5 Identify carbon, hydrogen, oxygen, nitrogen and phosphorus as common elements of living matter.	What Are Atoms?
S:LS2:8:3.6 Given an ecosystem, trace how matter cycles among and between organisms and the physical environment (includes water, oxygen, food web, decomposition and recycling, but not carbon cycle nor nitrogen cycle).	The Water Cycle Food Webs Pyramids of Number and Biomass

LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).	
1. Change	
GRADES 5-6	
S:LS3:6:1.1 Provide examples of how all organisms, including humans, impact their environment; and explain how some changes can be detrimental to other organisms.	Environmental Change Greenhouse Gases
S:LS3:6:1.2 Explain how changes in environmental conditions can affect the survival of individual organisms and the entire species.	Environmental Change
GRADES 7-8	
S:LS3:8:1.1 Describe the type of impact certain environmental changes, including deforestation, invasive species, increased erosion, and pollution containing toxic substances, could have on local environments.	Environmental Change Acid Rain
2. Evidence of Evolution	
GRADES 5-6	
S:LS3:6:2.1 Describe the fundamental concepts related to biological evolution, such as biological adaptations and the diversity of species.	Evolution Causes of Variation Adaptations
GRADES 7-8	
S:LS3:8:2.1 Describe how the fossil record provides geologic evidence verifying the existence of now extinct life forms, and explains how this evidence provides documented proof of their appearance, diversification and extinction.	Evolution
S:LS3:8:2.2 Explain the concept of extinction and describes its importance in biological evolution.	Evolution
S:LS3:8:2.3 Use a model, classification system, or dichotomous key to illustrate, compare, or interpret possible relationships among groups of organisms (e.g., internal and external structures, anatomical features). [LS3(5-8)MAS+FAF-8]	Classifying Organisms
3. Natural Selection	
GRADES 5-6	
S:LS3:6:3.1 Recognize that there are genetic variations among individuals in groups of organisms and provide examples of how these variations affect the survival of an organism.	Types of Variation Evolution
S:LS3:6:3.2 Recognize that only organisms that are able to reproduce can pass on their genetic information to the next generation.	Evolution
GRADES 7-8	
S:LS3:8:3.1 Recognize that hereditary information is contained in genes, which are located in the chromosomes of each cell; and explain that inherited traits can be determined by either one or many genes, and that a single gene can influence more than one trait, such as eye and hair color.	Causes of Variation Types of Variation Genes and Alleles

S:LS3:8:3.2 Recognize that in any given environment the growth and survival of organisms depend on the physical conditions that exist; and explain that in all environments, organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter.	Competition
S:LS3:8:3.3 Explain how individual organisms with certain traits are more likely than others to survive and have offspring.	Evolution
S:LS3:8:3.4 Recognize that humans are able to control some characteristics of plants and animals through selective breeding; and explain how this results in small differences between the parents and offspring, which can accumulate in successive generations so that decedents are very different from their ancestors.	Selecting Characteristics Evolution
S:LS3:8:3.5 Cite examples supporting the concept that certain traits of organisms may provide a survival advantage in a specific environment and therefore, an increased likelihood to produce offspring.	Evolution
LS4– Humans are similar to other species in many ways, and yet are unique among Earth’s life forms.	
1. Behavior	
GRADES 5-6	
<i>S:LS4:6:1.1 Recognize that learning requires more than just storage and retrieval of information and that prior knowledge needs to be tapped in order to make sense out of new experiences or information.</i>	–
<i>S:LS4:6:1.2 Explain that people can learn about others from direct experience, from the media, and from listening to others talk about their life and work.</i>	–
<i>S:LS4:6:1.3 Provide examples of how humans make judgments about new situations based on memories of past experiences.</i>	–
GRADES 7-8	
S:LS4:8:1.1 Recognize that unlike human beings, behavior in insects and many other species is determined almost entirely by biological inheritance.	Animal Behavior Types of Animal Behavior Human Behavior
S:LS4:8:1.2 Explain that organism’s behavioral response is a reaction to internal or and environmental stimuli, and that these responses may be determined by heredity or from past experience.	Animal Behavior Types of Animal Behavior Human Behavior
S:LS4:8:1.3 Explain how all behavior is affected by both inheritance and experience.	Types of Animal Behavior Human Behavior
2. Disease	
GRADES 5-6	

S:LS4:6:2.1 Explain that the human body has ways to defend itself against disease-causing organisms and describe how defenders, including tears, saliva, the skin, some blood cells and stomach secretions support the defense process.	Fighting Disease
S:LS4:6:2.2 Recognize that there are some diseases that human beings can only get once; and explain how many diseases can be prevented by vaccination.	Fighting Disease
S:LS4:6:2.3 Explain how vaccines induce the body to build immunity to a disease without actually causing the disease itself.	Fighting Disease
<i>S:LS4:6:2.4 Recognize a healthy body cannot fight all germs that invade it; and explain how some germs interfere with the body's defenses.</i>	–
GRADES 7-8	
S:LS4:8:2.1 Recognize that disease in organisms can be caused by intrinsic failures of the system or infection from other organisms.	Human Behavior How Microbes Cause Disease
S:LS4:8:2.2 Describe how viruses, bacteria, fungi, and parasites may affect the human body and provide examples of how they can interfere with normal body function.	What Are Microbes? How Microbes Cause Disease
S:LS4:8:2.3 Describe the function of white blood cells and explain how they support the body's defense system.	Fighting Disease
<i>S:LS4:8:2.4 Use data and observations to support the concept that environmental or biological factors affect human body systems (biotic and abiotic).</i>	–
3. Human Identity	
GRADES 5-6	
S:LS4:6:3.1 Recognize that the length and quality of human life are influenced by many factors, including sanitation, diet, medical care, gender, genes, environmental conditions, and personal health behaviors.	Types of Variation
GRADES 7-8	
<i>S:LS4:8:3.1 Compare patterns of human development with those of other vertebrates.</i>	–
S:LS4:8:3.2 Recognize that an organism can be described in terms of a combination of traits; and differentiate between inherited traits and those that result from interactions with the environment.	Types of Variation
S:LS4:8:3.3 Describe the major changes that occur over time in human development from single cell through embryonic development to new born (i.e., group of cells during the first trimester, organs form during the second, organs mature during the third).	Embryo Development and Birth
S:LS4:8:3.4 Using data provided, select evidence that supports the concept that genetic information is passed on from both parents to offspring.	Genes and Alleles Inheritance
LS5– The growth of scientific knowledge in Life Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.	
1. Design Technology	

GRADES 5-6	
S:LS5:6:1.1 Recognize that an agricultural system is designed to maximize the use of all the elements in the system, including using plants for food, oxygen, for the filtration of air and water, and for making compost.	Growing Plants
GRADES 7-8	
S:LS5:8:1.1 Explain how technology has influenced the course of history, and provide examples such as those that relate to agriculture, sanitation and medicine.	Fighting Disease Growing Plants
S:LS5:8:1.2 Provide examples of ways technology is used to protect the environment, such as using bacteria to clean water.	–
2. Tools	
GRADES 5-6	
S:LS5:6:2.1 Demonstrate the appropriate use of tools, such as thermometers, probes, microscopes and computers to gather, analyze and interpret data in the life sciences.	Looking at Cells
GRADES 7-8	
S:LS5:8:2.1 Recognize and provide examples of how technology has enhanced the study of life sciences, as in the development of advanced diagnosing equipment improving medicine.	–
3. Social Issues/Medical Technology/Biotechnology	
GRADES 5-6	
S:LS5:6:3.1 Provide examples of early health care technology that helped to extend the life expectancy of humans, such as the discovery of penicillin and sterilization of surgical instruments.	–
S:LS5:6:3.2 Differentiate between vaccines, which help prevent diseases from developing and spreading, and medicines, which relieve symptoms or cure diseases.	Fighting Disease
S:LS5:6:3.3 Recognize that the quality of personal health can be influenced by society and technology.	–
S:LS5:6:3.4 Identify and describe some of the processes and systems used to grow food in New Hampshire, including irrigation, pest control and harvesting.	Growing Plants
GRADES 7-8	
S:LS5:8:3.1 Explain the necessity of and purpose for the proper disposal of medical products.	–
S:LS5:8:3.2 Give examples of how increased understanding of biology has led to improvements in biotechnology, such as scientific methods for increasing the yield or the pestresistance of important food crops.	Selecting Characteristics
S:LS5:8:3.3 Describes ways biotechnology helps humans, including improved health and medicine.	–
4. Career Technical Education Connections	
GRADES 5-6	
S:LS5:6:4.1 Understand that some form of science is used in most jobs/careers and that some jobs/careers specifically require knowledge of life science.	–

GRADES 7-8	
<i>S:LS5:8:4.1 Understand that some scientific jobs/careers involve the application of life science content knowledge and experience in specific ways that meet the goals of the job.</i>	–
PS1– All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).	
1. Composition	
GRADES 5-6	
S:PS1:6:1.1 Recognize that all matter is composed of minute particles called atoms; and explain that all substances are composed of atoms, each arranged into different groupings.	What Are Atoms?
S:PS1:6:1.2 Identify elements as substances that contain only one kind of atom; and explain that elements do not break down by normal laboratory reactions, such as heating, exposure to electric current, and reaction to acid.	Elements and Compounds
S:PS1:6:1.3 Recognize that over one hundred elements exist, and identify the periodic table as a tool for organizing the information about them.	Elements and Compounds The Periodic Table
GRADES 7-8	
S:PS1:8:1.1 Explain that atoms often combine to form a molecule or formula unit (crystal).	Elements and Compounds
S:PS1:8:1.2 Recognize that elements can combine in a variety of ways to form compounds.	Elements and Compounds Making Compounds
S:PS1:8:1.3 Differentiate between an atom and a molecule.	What Are Atoms? Elements and Compounds
S:PS1:8:1.4 Differentiate between a mixture and a pure substance.	What is a Mixture?
S:PS1:8:1.5 Identify methods used to separate mixtures, such as boiling, filtering, chromatography and screening.	Separating Mixtures Chromatography
S:PS1:8:1.6 Collect data or use data provided to infer or predict that the total amount of mass in a closed system stays the same, regardless of how substances interact (conservation of matter).	Conservation of Mass
S:PS1:8:1.7 Given graphic or written information, classify matter as atom/molecule or element/compound (not the structure of an atom).	Elements and Compounds
2. Properties	
GRADES 5-6	
S:PS1:6:2.1 Identify elements according to their common properties, such as highly reactive metals, less reactive metals, highly reactive non-metals and almost non-reactive gases.	Metals and Nonmetals Metalloids
S:PS1:6:2.2 Identify substances by their physical and chemical properties, such as magnetism, conductivity, density, solubility, boiling and melting points.	Metals and Nonmetals
S:PS1:6:2.3 Differentiate between weight and mass.	Gravity
<i>S:PS1:6:2.4 Identify energy as a property of many substances.</i>	–

GRADES 7-8	
<i>S:PS1:8:2.1 Differentiate between volume and mass and define density.</i>	–
<i>S:PS1:8:2.2 Explain how different substances of equal volume usually have different weights.</i>	–
<i>S:PS1:8:2.3 Identify a molecule as the smallest part of a substance that retains its properties.</i>	–
<i>S:PS1:8:2.4 Investigate the relationships among mass, volume and density.</i>	–
<i>S:PS1:8:2.5 Given data about characteristic properties of matter (e.g., melting and boiling points, density, solubility), identify, compare, or classify different substances.</i>	–
S:PS1:8:2.6 Represent or explain the relationship between or among energy, molecular motion, temperature, and states of matter.	Particles in Action Changing State Changes of Matter
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.	
1. Change	
GRADES 5-6	
S:PS2:6:1.1 Differentiate between a physical change, such as melting, and a chemical change, such as rusting.	Changes of Matter Types of Chemical Reactions Everyday Chemical Reactions
GRADES 7-8	
S:PS2:8:1.1 Explain how substances react chemically with other substances to form new substances, known as compounds, and that in such recombinations, the properties of the new substances may be very different from those of the old.	Making Compounds Types of Chemical Reactions
<i>S:PS2:8:1.2 Identify factors that affect reaction rates, such as temperature, concentration and surface area; and explain that dissolving substances in liquids often accelerates reaction rates.</i>	–
S:PS2:8:1.3 Explain that oxidation involves combining oxygen with another substance, as in burning or rusting.	Energy Changes
S:PS2:8:1.4 Explain that states of matter depend on the arrangement of the molecules and their motion.	Changing State Particles in Action
S:PS2:8:1.5 Given a real-world example, show that within a system, energy transforms from one form to another (i.e., chemical, heat, electrical, gravitational, light, sound, mechanical).	What is Energy?
2. Conservation	
GRADES 5-6	
S:PS2:6:2.1 Describe how mass remains constant in a closed system and provide examples relating to both physical and chemical change.	Conservation of Mass
GRADES 7-8	
<i>S:PS2:8:2.1 Explain the law of conservation of energy.</i>	–

S:PS2:8:2.2 Collect data or use data provided to infer or predict that the total amount of mass in a closed system stays the same, regardless of how substances interact (conservation of matter).	Conservation of Mass
3. Energy	
GRADES 5-6	
S:PS2:6:3.1 Explain that the pitch of a sound is dependent on the frequency of the vibration producing it.	What is Sound?
S:PS2:6:3.2 Explain that sound vibrations move at different speeds, have different wavelengths; and establish wave-like disturbances that emanate from the source.	What is Sound? Speed of Sound
S:PS2:6:3.3 Recognize that energy, in the form of heat, is usually a by-product when one form of energy is changed to another, such as when machines convert stored energy to motion.	What is Energy?
S:PS2:6:3.4 Explain that heat energy moves from warmer materials or regions to cooler ones through conduction, convection, and radiation.	Heat and Temperature Conduction and Convection Radiation
S:PS2:6:3.5 Explain how electrical circuits can be used to transfer energy in order to produce heat, light, sound, and chemical changes.	Energy Transfer in Circuits How is Electrical Energy Useful?
GRADES 7-8	
S:PS2:8:3.1 Differentiate between kinetic energy, which is the energy of motion and potential energy, which depends on relative position.	What is Energy?
<i>S:PS2:8:3.2 Recognize the Sun is a major energy source for the Earth, and describes how it affects the planet's surface.</i>	–
S:PS2:8:3.3 Describe ways light can interact with matter, such as transmission (which includes refraction), absorption, and scattering (which includes reflection).	Reflection Refraction
S:PS2:8:3.4 Explain that the human eye can only detect wavelengths of electromagnetic radiation within a narrow range; and explain that the differences of wavelength within that range of visible light are perceived as differences in color.	What is Light? Color Electromagnetic Waves
S:PS2:8:3.5 Recognize that most chemical and nuclear reactions involve a transfer of energy.	Types of Chemical Reactions Energy Changes
<i>S:PS2:8:3.6 Use data to draw conclusions about how heat can be transferred (convection, conduction, radiation).</i>	–
PS3– The motion of an object is affected by force.	
1. Forces	
GRADES 5-6	
S:PS3:6:1.1 Recognize that just as electric currents can produce magnetic forces, magnets can cause electric currents.	Electromagnets Magnetic Materials Magnetic Fields

S:PS3:6:1.2 Explain that when a force is applied to an object, it reacts in one of three ways: the object either speeds up, slows down, or goes in a different direction.	What Are Forces? Calculating Resultant Forces
S:PS3:6:1.3 Describe the relationship between the strength of a force on an object and the resulting effect, such as the greater the force, the greater the change in motion.	Calculating Resultant Forces
GRADES 7-8	
S:PS3:8:1.1 Explain that the force of gravity gets stronger the closer one gets to an object and decreases the further away one gets from it.	Gravity
S:PS3:8:1.2 Recognize the general concepts related to gravitational force.	Gravity
S:PS3:8:1.3 Use data to determine or predict the overall (net) effect of multiple forces (e.g., friction, gravitational, magnetic) on the position, speed, and direction of motion of objects.	Calculating Resultant Forces
2. Motion	
GRADES 5-6	
S:PS3:6:2.1 Explain the how balanced and unbalanced forces are related to an object's motion.	What Are Forces?
S:PS3:6:2.2 Explain that an object's motion can be tracked and measured over time and that the data can be used to describe its position.	Distance, Time and Speed
GRADES 7-8	
S:PS3:8:2.1 Explain that an object in motion that is unaffected by a force will continue to move at a constant speed and in a straight line.	–
S:PS3:8:2.2 Explain how the motion of an object can be described by its position, direction of motion, and speed; and illustrate how that motion can be measured and represented graphically.	Distance, Time and Speed Graphing Speed Average and Instantaneous Speed
PS4– The growth of scientific knowledge in Physical Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.	
1. Design Technology	
GRADES 5-6	
S:PS4:6:1.1 Understand that scientific principles are used in the design of technology.	–
GRADES 7-8	
S:PS4:8:1.1 Understand that design features, such as size shape, weight, and function, must be considered when designing new technology.	–
2. Tools	
GRADES 5-6	
S:PS4:6:2.1 Recognize that manufacturing processes use a variety of tools and machines to separate, form, combine and condition natural and synthetic materials.	–
GRADES 7-8	

S:PS4:8:2.1 Demonstrate appropriate use of tools, such as rulers, calculators, balances, and graduated cylinders to measure and calculate volume and mass.	–
3. Social Issues/Energy, Power and Transportation/Manufacturing	
GRADES 5-6	
S:PS4:6:3.1 Explain how a battery changes chemical energy into electrical energy.	Energy Transfer in Circuits How is Electrical Energy Useful? Energy Changes
S:PS4:6:3.2 Demonstrate how to produce a magnetic force with an electric current, such as an electromagnet, and how to produce an electric current with a magnet, such as a generator.	Uses of Electromagnets Electromagnets
S:PS4:6:3.3 Provide an example to show that manufacturing processes involve changing natural materials into finished products through a series of processes that involve physical and/or chemical changes.	Fossil Fuels
GRADES 7-8	
S:PS4:8:3.1 Explain how humans use natural resources, such as flowing water and burning of coal, oil, or natural gas to generate electrical energy in power plants.	Renewable Energy Nonrenewable Energy Resources Fossil Fuels
S:PS4:8:3.2 Describe how natural resources, such as coal, oil and natural gas are tapped for use in power plants, and how alternative sources, such as solar, wind, water, nuclear are tapped for power; and compare the advantages and disadvantages of each source.	Renewable Energy Nonrenewable Energy Resources Fossil Fuels
S:PS4:8:3.3 Differentiate between durable goods, which are designed to operate for a long period of time, and non-durable goods, which are only intended to operate for a short period of time.	–
4. Career Technical Education Connections	
GRADES 5-6	
S:PS4:6:4.1 Understand that some form of science is used in most jobs/careers and that some jobs/careers specifically require knowledge of physical science.	–
GRADES 7-8	
S:PS4:8:4.1 Understand that some scientific jobs/careers involve the application of physical science content knowledge and experience in specific ways that meet the goals of the job.	–