

Life Science

LS 1 - All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).

	5-6	7-8
1. CLASSIFICATION	<p>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.</p> <p>S(LS1)-6-1.2 Categorize organisms into kingdoms that are currently recognized, according to shared characteristics.</p>	<p>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.</p> <div style="border: 2px solid black; padding: 5px;"> <p>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). [LS1 (5-8) SAE+FAF –2]</p> </div>
2. LIVING THINGS & ORGANIZATION	<p>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.</p>	<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>

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	<p>S(LS1)-6-2.2 Explain that the way in which cells function is similar in all organisms.</p> <p>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.</p> <p>S(LS1)-6-2.4 Recognize and describe the hierarchical organization of living systems, including cells, tissues, organs, organ systems, whole organisms, and ecosystems.</p> <p>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.</p>	<p>S(LS1)-8-2.2 Define a population and describe the factors that can affect it.</p> <p>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.</p> <div style="border: 1px solid black; padding: 5px;"> <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. [LS1 (5-8) FAF -4]</p> </div> <div style="border: 1px solid black; padding: 5px;"> <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. [LS1 (5-8) INQ+ SAE- 1]</p> </div>

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	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.	
3. REPRODUCTION	<p>S(LS1)-6-3.1 Explain that cells repeatedly divide to make more cells for growth and repair.</p> <p>S(LS1)-6-3.2 Explain that the same genetic information is copied in each cell of a new organism.</p> <p>S(LS1)-6-3.3 Explain that all living things reproduce in order to continue their species.</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>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.</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.</p> <p>S(LS1)-8-3.4 Explain that the fertilized egg cell, carrying genetic information from each parent,</p>

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		<p>multiplies to form the complete organism.</p> <p>S(LS1)-8-3.5 Explain how the basic tissues of an embryo form.</p> <div style="border: 1px solid black; padding: 5px;"> <p>S(LS1)-8-3.6 Compare and contrast sexual reproduction with asexual reproduction. [LS1 (5-8) POC -3]</p> </div> <div style="border: 1px solid black; padding: 5px;"> <p>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. [LS4 (5-8) INQ+POC-11]</p> </div>

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LS 2 - Energy flows and matter recycles through an ecosystem.

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1. ENVIRONMENT	<p>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.</p> <p>S(LS2)-6-1.2 Explain that most microorganisms do not cause disease and that many are beneficial to the environment.</p>	<p>S(LS2)-8-1.1 Explain how changes in environmental conditions can affect the survival of individual organisms and an entire species.</p> <p>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.</p> <div style="border: 1px solid black; padding: 5px;"> <p>S(LS2)-8-1.3 Using data and observations, predict outcomes when abiotic/biotic factors are changed in an ecosystem. [LS2 (5-8) INQ+SAE -5]</p> </div>
2. FLOW OF ENERGY	<p>S(LS2)-6-2.1 Describe how energy is transferred in an ecosystem through food webs, and explain the roles and relationships between producers,</p>	<p>S(LS2)-8-2.1 Explain how food provides energy and materials for growth and repair of body parts.</p>

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	<p>consumers and decomposers.</p> <p>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.</p> <p>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.</p> <p>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.</p>	<div style="border: 2px solid black; padding: 10px;"> <p>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). [LS2 (5-8) SAE -6]</p> </div>
3. RECYCLING OF MATERIALS	<p>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</p>	<p>S(LS2)-8-3.1 Identify autotrophs as producers who may use photosynthesis, and describe this as the basis of the food web.</p> <p>S(LS2)-8-3.2 Explain the process of respiration and</p>

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	<p>factors with which they interact, compose an ecosystem.</p> <p>S(LS2)-6-3.2 Identify and describe the ways in which organisms interact and depend on one another in an ecosystem, using food webs.</p> <p>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.</p>	<p>differentiate between it and photosynthesis.</p> <p>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.</p> <p>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.</p> <p>S(LS2)-8-3.5 Identify carbon, hydrogen, oxygen, nitrogen and phosphorus as common elements of living matter.</p> <div style="border: 2px solid black; padding: 5px;"> <p>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, recycling but not carbon cycle or nitrogen cycle). [LS2 (5-8) SAE-7]</p> </div>

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LS 3 - Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).

	5-6	7 - 8
1. CHANGE	<p>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.</p> <p>S(LS3)-6-1.2 Explain how changes in environmental conditions can affect the survival of individual organisms and the entire species.</p>	<p>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.</p>
2. EVIDENCE OF EVOLUTION	<p>S(LS3)-6-2.1 Describe the fundamental concepts related to biological evolution, such as biological adaptations and the diversity of species.</p>	<p>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.</p> <p>S(LS3)-8-2.2 Explain the concept of extinction and describes its importance in biological evolution.</p>

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		<div style="border: 2px solid black; padding: 5px;"> <p>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]</p> </div>
3. NATURAL SELECTION	<p>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.</p> <p>S(LS3)-6-3.2 Recognize that only organisms that are able to reproduce can pass on their genetic information to the next generation.</p>	<p>S(LS3)-8-3.1 Recognize that hereditary information is contained in genes, which are located in the chromosomes of each cell, 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.</p> <p>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.</p> <p>S(LS3)-8-3.3 Explain how individual organisms with</p>

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		<p>certain traits are more likely than others to survive and have offspring.</p> <p>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.</p> <div style="border: 2px solid black; padding: 5px;"> <p>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. [LS3 (5-8) POC-9]</p> </div>

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LS 4 - Humans are similar to other species in many ways, and yet are unique among Earth's life forms.

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1. BEHAVIOR	<p>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.</p> <p>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.</p> <p>S(LS4)-6-1.3 Provide examples of how humans make judgments about new situations based on memories of past experiences.</p>	<p>S(LS4)-8-1.1 Recognize that unlike human beings, behavior in insects and many other species is determined almost entirely by biological inheritance.</p> <p>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.</p> <p>S(LS4)-8-1.3 Explain how all behavior is affected by both inheritance and experience.</p>
2. DISEASE	<p>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.</p>	<p>S(LS4)-8-2.1 Recognize that disease in organisms can be caused by intrinsic failures of the system or infection from other organisms.</p> <p>S(LS4)-8-2.2 Describe how viruses, bacteria, fungi, and parasites may affect the human body and provide</p>

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	<p>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.</p> <p>S(LS4)-6-2.3 Explain how vaccines induce the body to build immunity to a disease without actually causing the disease itself.</p> <p>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.</p>	<p>examples of how they can interfere with normal body function.</p> <p>S(LS4)-8-2.3 Describe the function of white blood cells and explain how they support the bodies defense system. .</p> <div style="border: 1px solid black; padding: 5px;"> <p>S(LS4)-8-2.4 Use data and observations to support the concept that environmental or biological factors affect human body systems (biotic & abiotic). [LS4 (5-8) INQ-10]</p> </div>
3. HUMAN IDENTITY	<p>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</p>	<p>S(LS4)-8-3.1 Compare patterns of human development with those of other vertebrates.</p> <p>S(LS4)-8-3.2 Recognize that an organism can be described in terms of a combination of traits, and</p>

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	5-6	7 – 8
	health behaviors.	<p>differentiate between inherited traits and those that result from interactions with the environment.</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>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., trimesters: 1st – group of cells, 2nd - organs form, 3rd - organs mature). [LS4 (5-8) POC-12]</p> </div> <div style="border: 1px solid black; padding: 5px;"> <p>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. [LS4 (5-8) INQ+POC-11]</p> </div>

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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.		
	5-6	7-8
1. DESIGN TECHNOLOGY	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.	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. 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	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.	S(LS5)-8-2.1 Recognizes 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 (LOCAL AND GLOBAL) MEDICAL TECHNOLOGIES BIOTECHNOLOGIES	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, sterilization of surgical instruments. S(LS5)-6-3.2 Differentiate between	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,

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	<p>vaccines, which help prevent diseases from developing and spreading, and medicines, which relieve symptoms or cure diseases.</p> <p>S(LS5)-6-3.3 Recognize that the quality of personal health can be influenced by society and technology.</p> <p>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.</p>	<p>such as scientific methods for increasing the yield or the pest-resistance of important food crops.</p> <p>S(LS5)-8-3.3 Describes ways biotechnology helps humans, including improved health and medicine.</p>
4. CAREER TECHNICAL EDUCATION CONNECTIONS	<p>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.</p>	<p>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.</p>

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