

**Hawaii Alternate Assessment for NGSS Science Key Ideas / Essence Statements / Meets PLD / LIFE SCIENCES / Grades 5, 8, and Grade 11 (Bio EOC equivalent)**

**Revised October 4, 2022**

**The NGSS Vision:** Proficient learners demonstrate scientific literacy through the application of the practices, crosscutting concepts, and core ideas of science and engineering to engage in discussions on science-related issues; to be critical consumers of scientific information related to their everyday lives; and to continue to learn about science throughout their lives. (Adapted from Framework for K-12 Science Education, p. 9)

Life Science											
Domain	Sub-Domain	Grade 5 Key Idea	Essence	Meets	Grade 8 Key Idea	Essence	Meets	Grade 11 Key Idea	Essence	Meets	
LS1: From Molecules to Organisms: Structures and Processes	LS1.A: Structure and Function	Organisms have both internal and external structures that allow for growth, survival, behavior, and reproduction.	4-LS1-1 Distinguish between internal and external structures of plants and animals and identify the function of the structure and how the structure can be beneficial in a given situation.	Identify the function of various plant and animal structures.	All living things are made up of cells. In organisms, cells work together to form tissues and organs that are specialized for particular body functions.	MS-LS1-1 Recognize that the cell is the smallest living unit, that all living things have one or more cells, and that there are many different types of cells.	Recognize that all living things are made up of one or more cells.	Systems of specialized cells within organisms help perform essential functions of life. Each system is made up of numerous parts. Feedback mechanisms maintain an organism's internal conditions within certain limits and mediate behaviors.	HS-LS1-1 Recognize that the nucleus of a cell contains DNA which is the genetic code that creates the proteins that determine a cell's function, including the specialized cells that make up body tissues.	Identify that the DNA (nucleic acids) in a cell's nucleus is the genetic code that creates proteins that determine a cell's function.	
						MS-LS1-2 Identify that plant and animal cells are different and consist of several parts which have different functions and use a model to describe the functions of the cell parts and how they contribute to the cell as a whole.	Identify the function of one or more of the following cell parts: nucleus, chloroplast, mitochondria, cell membrane, and cell wall.		HS-LS1-2 Identify a major organ, its function in a body system, and explain how body systems work together to maintain life.		
						MS-LS1-3 Identify that groups of cells form tissues that in turn form organs and body systems and use models to demonstrate how organs are connected in major body systems.	Identify that groups of cells create tissues. Tissues come together to create organs, and multiple organs create organ systems.		HS-LS1-3 Identify the body's reactions to stimuli, use data to identify changes in body systems during physical activity, and sequence steps to show an organism's reactions to stimuli.	Identify the function of a body system, its major organ(s), and another system with which it interacts to maintain life.	
	LS1.B: Growth and Development of Organisms	Reproduction is essential to every kind of organism. Organisms have unique and diverse life cycles.	3-LS1-1 Identify and sequence the stages of an organism's life cycle and predict the impact on a species if it does not reproduce.	Given the stages of the life cycle of an organism, put them in order (e.g., develop a model).	An organism's growth is affected by both genetic and environmental factors.	MS-LS1-4 Use observations to match structural adaptations or behaviors to survival and identify animal behaviors that further plant survival.	Use observations to match structural adaptations and/or behaviors to survival needs of plants and animals in an environment.	Growth and division of cells in organisms occurs by mitosis and differentiation for specific cell types.	HS-LS1-4 Identify and use a model to illustrate the cellular division process and explain how cellular division contributes to an organism's development.		
						MS-LS1-5 Identify the factors that can influence an individual organism's growth and use data to identify factors that lead to increases or decreases in potential growth.	Use data to identify environmental factors that lead to optimum organism growth.		Use a model to explain what happens during cell division.		

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LS1: From Molecules to Organisms: Structures and Processes (cont.)	LS1.C: Organization for Matter and Energy Flow in Organisms	Food provides animals with the materials and energy they need. Plants acquire material for growth chiefly from air, water, and obtain energy from sunlight.	5-LS1-1 Identify that plants need air and water to survive and use data to explain the effect of varying amounts of water and light on growth.	Identify air and water as the chief sources of growth materials for plants. Soil is much less important.	Plants use the energy from light to make sugars through photosynthesis. Within individual organisms, food is broken down through a series of chemical reactions that rearrange molecules and release energy.	MS-LS1-6 Identify that light energy, water, and carbon dioxide are necessary for plants to make food through a process called photosynthesis and explain the process of photosynthesis using models.	Explain that in photosynthesis, light energy is used to combine carbon dioxide and water to produce oxygen, which is released, and food molecules (sugars), which can be used or stored by the plant.	The hydrocarbon backbones of sugars produced through photosynthesis are used to make amino acids and other molecules that can be assembled into proteins or DNA. Through cellular respiration, matter and energy flow through different organizational levels of an organism as elements are recombined to form different products and transfer energy.	HS-LS1-5 Identify the purpose, inputs, and outputs of photosynthesis and use a model to explain photosynthesis.	Identify what a plant uses and what a plant produces during photosynthesis.
						MS-LS1-7 Identify that food molecules must be broken down during digestion to release energy and form new molecules which are useful to the organism and that diet data can be used to explain differences in size between two organisms of the same species. (Photosynthesis is covered in MS-LS1-6.)	Identify that food molecules are broken down and put back together during digestion to be useful to the organism.		HS-LS1-6 Identify sugar molecules as carbohydrates and describe the process of converting the molecules in sugar into other new molecules.	Confirm or revise a description of the process of creating other molecules from sugar molecules.
	LS1.D: Information Processing	Different senses are specialized for particular kinds of information. Animals use their perceptions and memories to guide their actions.	4-LS1-2 Identify that animals receive information through their senses, process the information, and respond.	Identify animal structures that enable them to detect, process, and respond to information from their surroundings.	Each sense receptor responds to different inputs, transmitting them as signals that travel along nerve cells to the brain; The signals are then processed in the brain, resulting in immediate behavior or memories.	MS-LS1-8 Identify the type of input received by the various senses and describe the process of that information being transmitted to the brain resulting in a response.	Describe that information received by the senses is transmitted to the brain and leads to a memory and/or an immediate response.			

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LS2: Ecosystems: Interactions, Energy, and Dynamics	LS2.A: Interdependent Relationships in Ecosystems	The food of almost any animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants, while decomposers restore materials back to the soil.	5-LS2-1 Identify the components of a food web and use models to identify the role of producers, consumers, and decomposers, and to show the movement of matter in a food web.	Identify the roles of producers, consumers, and decomposers.	Organisms and populations are dependent on their interactions both with other living things and with nonliving factors, any of which can limit their growth.  Interactions vary across ecosystems but the patterns are shared.	MS-LS2-1 Identify factors in an ecosystem that impact organisms, including factors that lead to population changes and how those population changes impact available resources.  MS-LS2-2 Recognize one or more organisms interacting with its environment, identify interactions within and across ecosystems, and/or use data showing cause-and-effect interactions to predict the impact of a change in the population of a species.	Identify whether a population increases or decreases as a result of a change in the ecosystem.  Describe interactions among organisms across multiple ecosystems.	Ecosystems have carrying capacities resulting from biotic and abiotic factors. The fundamental tension between resource availability and organism populations affects the abundance of species in any given ecosystem.	HS-LS2-1 Identify factors that could affect equilibrium within an ecosystem, use data to determine whether available food can sustain a population, and describe changes in a population or a resource in an ecosystem.	Use data to determine whether the food supply present in an ecosystem can sustain a specified increase in the populations eating that particular food.
		<b>Matter cycles between the air and soil and among organisms as they live and die. See LS2.A</b>		The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. Food webs model how matter and energy are transferred among producers, consumers, and decomposers as the three groups interact within an ecosystem.	MS-LS2-3 Complete a food web that includes common organisms to demonstrate the transfer of matter and energy in an ecosystem and use models to describe the interactions between living and nonliving parts of an ecosystem.	Complete a food web showing the transfer of matter and/or energy between living organisms and nonliving parts of an ecosystem.	Photosynthesis and cellular respiration provide most of the energy for life processes. Only a fraction of matter consumed at the lower level of a food web is transferred up, resulting in fewer organisms at higher levels. At each link matter and energy are conserved.  Photosynthesis and cellular respiration are components of the global carbon cycle.	HS-LS2-4 Identify the types of matter and energy that move through a food web using diagrams and explain why producers outnumber consumers in an ecosystem.	HS-LS2-5 Identify the relationship between the inputs and outputs of photosynthesis and cellular respiration in plants, and use a model to link them to the carbon cycle.	Use data to explain the patterns and/or trends between population size and the availability of resources.
										Diagram the movement of matter and energy through a food web (ecosystem).  Identify that the outputs of photosynthesis are the inputs of cellular respiration, and the outputs of respiration are the inputs of photosynthesis.

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LS2: Ecosystems: Interactions, Energy, and Dynamics (cont.)	LS2.C: Ecosystem Dynamics, Functioning, and Resilience	<p>When the environment changes some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die. See LS4</p>			Ecosystem characteristics vary over time. Disruptions to any part of an ecosystem can lead to shifts in all of its populations. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health.	MS-LS2-4 Use data to determine the effect of limited resources on a population, recognize that changes to a physical or biological component of an ecosystem can lead to population shifts, and predict the impact of a change in the population or physical environment of an ecosystem.	Use data to determine the effect on a population when a resource is limited due to environmental conditions.	If a biological or physical disturbance to an ecosystem occurs, including one induced by human activity, the ecosystem may return to its more or less original state or become a very different ecosystem, depending on the complex set of interactions within the ecosystem.	HS-LS2-6 Identify and classify natural and human-initiated changes in the physical environment and how those changes could affect the environment and the populations in an ecosystem.	Identify and/or classify natural and human-initiated changes in the physical environment that could affect a population.
	LS2.D: Social Interactions and Group Behavior	Being part of a group helps animals obtain food, defend themselves, and cope with changes.	3-LS2-1 Identify animals as predator or prey and determine how group behaviors help animals survive.	Determine how the group behavior helps the animals survive.	DCIs are addressed in MS-LS2-4			Group behavior has evolved because membership can increase the chances of survival for individuals and their genetic relatives.	HS-LS2-8 Identify and describe group behaviors that increase an animal's chances of survival, and use data to show the positive impact of group behavior.	Given a group behavior, describe how that behavior helps individuals and species to survive and reproduce.
LS3: Heredity: Inheritance and Variation of Traits	LS3.A: Inheritance of Traits	Different organisms vary in how they look and function because they have different inherited information; the environment also affects the traits that an organism develops.	3-LS3-1 Identify one or more similarities or differences between parents and their offspring and use data to identify similarities and differences among offspring.	Identify similarities or differences between parents and one offspring.	Genes chiefly regulate a specific protein, which affect an individual's traits.	MS-LS3-1 Identify that genes guide the creation of needed proteins and that changes in the genes cause changes to proteins, which may result in a genetic mutation leading to the development of new traits.	Identify that changes to gene structures cause changes to the proteins that they create and may lead to the development of new traits that may be helpful or harmful.	DNA carries instructions for forming species' characteristics. Each cell in an organism has the same genetic content, but genes expressed by cells can differ	HS-LS3-1 Identify the function of chromosomes, describe how DNA passes traits from one generation to the next, and describe how changes in DNA can impact offspring.	Describe how traits (characteristics) are passed from one generation to the next through DNA containing genes.
			3-LS3-2 Identify traits of a plant or animal that can be altered by its interaction with the environment or determine environmental factors that affect traits of organisms of the same type.	Identify traits of a plant or animal that can be altered by its environment.		MS-LS3-2 Differentiate between sexual and asexual reproduction and use data or a model to explain trait variation among offspring.	Use a model to describe how asexual reproduction differs from sexual reproduction.			

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LS3: Heredity: Inheritance and Variation of Traits (cont.)	LS3.B: Variation of Traits		See LS3.A		In sexual reproduction, each parent contributes half of the genes acquired by the offspring resulting in variation between parent and offspring. Genetic information can be altered because of mutations, which may result in beneficial, negative, or no change to proteins in or traits of an organism.	See LS3.A		The variation and distribution of traits in a population depend on genetic and environmental factors. Genetic variation can result from mutations caused by environmental factors or errors in DNA replication.	HS-LS3-2 Identify factors that cause genetic variation and explain why reproduction may or may not result in offspring with different traits.	Identify the causes of genetic variation.
LS4: Biological Evolution: Unity and Diversity	LS4.A: Evidence of Common Ancestry and Diversity	Some living organisms resemble organisms that once lived on Earth. Fossils provide evidence about the types of organisms and environments that existed long ago.	3-LS4-1 Identify whether a fossil was a plant or an animal and use data to identify information about the environment the plant or animal may have lived in.	Based on data, identify the environment in which a fossilized plant or animal lived.	The fossil record documents the existence, diversity, extinction, and change of many life forms and their environments through Earth's history. The fossil record and comparisons of anatomical similarities between organisms enables the inference of lines of evolutionary descent.	MS-LS4-1 Identify the relative age of a fossil based on its placement in a rock layer and use fossil data to match present-day organisms to fossils or to explain how an organism changed over time.	Match a fossil to a similar organism found on Earth today or identify that organism as extinct.	The ongoing branching that produces multiple lines of descent can be inferred by comparing DNA sequences, amino acid sequences, and anatomical and embryological evidence of different organisms.	HS-LS4-1 Recognize a fossil and a present-day organism with similar structures and use multiple ways to determine ancestry and the development pattern from the fossil to the present-day organism.	Identify multiple ways to determine the ancestry of an organism.
	LS4.B: Natural Selection	Differences in characteristics between individuals of the same species provide advantages in surviving and reproducing.	3-LS4-2 Identify differences in the characteristics of individuals within a species and determine advantages or disadvantages of a characteristic in a given situation.	Determine which variation of a characteristic is most helpful to a plant or animal in a given situation.	Both natural and artificial selection result from certain traits giving some individuals an advantage in surviving and reproducing, leading to predominance of certain traits in a population.	MS-LS4-4 Understand that certain traits help individuals survive and reproduce in a specific environment and use data showing trait variations to explain population changes in a specific environment	Explain that some traits help individuals in a population to survive and reproduce in a specific environment.	Natural selection occurs only if there is variation in the genes and traits between organisms in a population. Traits that positively affect survival can become more common in a population.	HS-LS4-2 Identify that evolution results in new characteristics, determine why an adaptation occurred within a species, and describe an adaptation that a species may develop and pass on.	Determine which factor resulted in a specific adaptation within a species.
									HS-LS4-5 Identify that environmental changes may lead to changes in the population of organisms and predict what will happen to a species over time as a result of an environmental change.	Realize that a change in the environment may result in changes in the population of organisms or the emergence of a new species.

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LS4: Biological Evolution: Unity and Diversity (cont.)	LS4.C: Adaptation	Particular organisms can only survive in particular environments.	3-LS4-3 Identify the features of a habitat, including organisms living in it, and use data to show that some organisms can survive better in a habitat than others can.	Determine the characteristics of an organism that enable it to survive in a particular habitat.	Species can change over time in response to changes in environmental conditions through adaptation by natural selection acting over generations. Traits that support successful survival and reproduction in the new environment become more common.	MS-LS4-5 Identify desirable and undesirable traits in organisms and recognize that there are processes that allow humans to influence certain characteristics.	Recognize selective breeding to be a process that allows the desirable traits to be chosen.	Evolution results primarily from genetic variation of individuals in a species, competition for resources, and proliferation of organisms better able to survive and reproduce. Adaptation means that the distribution of traits in a population, as well as species expansion, emergence or extinction, can change when conditions change.	HS-LS4-3 Identify an advantageous trait, describe why some organisms will likely survive better than other organisms in an environment, and use data to explain why organisms exhibiting an advantageous trait increase over time.	Given a scenario of similar organisms with different traits, explain why an organism will likely survive in a given environment.
						MS-LS4-6 Contrast traits among plants or animals of the same species and use a description of an environment to predict whether a trait is likely to increase or decrease based on the survival of organisms with favorable traits.	Given a description of an environment, determine whether a trait is likely to increase or decrease in a specific population over time.	HS-LS4-4 Explain why organisms with beneficial traits are more likely to survive and describe how some organisms within a population become better adapted over time.	Explain why organisms with beneficial traits are more likely to survive and reproduce.	
LS4: Biological Evolution: Unity and Diversity (cont.)	LS4.D: Biodiversity and Humans	Populations of organisms live in a variety of habitats. Change in those habitats affects the organisms living there.	3-LS4-4 Identify organisms that will be affected, either positively or negatively by a given environmental change and use data to determine whether a solution to the change is effective.	Determine whether a change in the environment is likely to have a positive or negative impact on a particular organism.			Biodiversity is increased by formation of new species and reduced by extinction. Humans depend on biodiversity but also have adverse impacts on it. Sustaining biodiversity is essential to supporting life on Earth.	HS-LS4-6 Identify species that have been negatively impacted by human activity, determine strategies to protect species, and use data to show how humans can continue an activity without negatively affecting another species.	Use data to determine the effectiveness of a strategy to protect a species.	

Earth and Space Sciences					
ESS2: Earth's Systems	ESS2.D: Weather and Climate ESS2.E: Biogeology		The biosphere and Earth's other systems have many interconnections that cause a continual co-evolution of Earth's surface and life on it.  Changes in the atmosphere due to human activity have increased carbon dioxide concentrations and thus affect climate.	HS-ESS2-6 Identify and explain the carbon cycle using models and data and describe the changes in the amount of carbon in the atmosphere due to human activities.  HS-ESS2-7 Identify changes on Earth that can lead to changes among living things, identify examples of how living things change the environment, and the impact of those changes.	Describe the cycling of carbon using a model.  Identify examples of how living things change the characteristics of the environment in their specific region.
ESS3: Earth and Human Activity	ESS3.C: Human impacts on Earth systems		Sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources, including the development of technologies and regulations.	HS-ESS3-3 Identify ways in which humans use resources, ways humans sustain their populations and other living resources, and use data to show how managing natural resources promotes sustainability.	Identify steps that can be taken to sustain human society and living resources.