Hawaii Alternate Assessment for NGSS Science Key Ideas / Essence Statements / Meets PLD / LIFE SCIENCES / Grades 5, 8, and Grade 11 (Bio EOC equivalent)
Revised June 18, 2021

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 Recognize structures of plants and animals, distinguish between internal and external structures, identify the function of the structure, and/or identify beneficial structures 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 things as living or nonliving, recognize that the cell is the smallest living unit and that all living things have one or more cells, and/or recognize that many organisms have 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 the presence of cells in living things, identify the parts and functions of the cell's nucleus, identify the function of DNA, and/or identify body tissues as specialized cells with specific DNA structures and functions.	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 Recognize that all living things consist of cells; identify that plant and animal cells are different and consist of several parts, each of which has a different function; and/or 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 Recognize a body system, identify a major organ and its function in a body system, and/or explain how body systems work together to maintain life.	Identify the function of a body system, its major organ(s), and another system with which it interacts to maintain life.
						MS-LS1-3 Recognize major organs in the body and that they have specialized functions, identify that groups of cells form tissues that in turn form organs and organ systems, and/or use models to demonstrate how organs are connected in major organ systems.	Recognize that groups of cells create tissues. Tissues come together to create organs, and multiple organs create organ systems.		HS-LS1-3 Recognize stimuli that lead to reactions in a living system, identify the body's reactions to stimuli, identify changes in body systems during physical activity, and/or sequence steps to show an organism's reactions to stimuli.	Use data to identify changes in body systems during exercise or other activities.
	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 Recognize the life cycle of an organism, identify and sequence components of the life cycle, and/or 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.	An organism's growth is affected by both genetic and environmental factors.	MS-LS1-4 Recognize animal behaviors that contribute to survival, match structural adaptations to survival needs, use observations to match structural adaptations or behaviors to survival, and/or identify animal behaviors that further plant survival after reading a short passage. (Human reproduction is not an appropriate topic)	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 Recognize cellular division, use a model to identify and illustrate the cellular division process, and/or explain how cellular division contributes to an organism's development.	Use a model to explain what happens during cell division.

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						MS-LS1-5 Recognize the characteristics of an organism's environment, identify the factors that can influence an organism's growth, use data to identify factors that lead to optimal organism growth and/or that lead to increases or decreases in that growth.	Use data to identify environmental factors that lead to optimum organism growth.			
	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 Recognize that plants are living organisms, identify that they need air and water to survive, and/or use data to explain the effect 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 Recognize that plants need light and water; identify that light energy, water, and carbon dioxide are necessary for plants to make food through a process called photosynthesis; and/or use a model to explain the processes of photosynthesis and respiration.	Recognize that in photosynthesis, light energy is used to combine carbon dioxide and water to produce oxygen, that is released, and food molecules 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 Recognize that plants make their own food; identify the purpose, inputs, and outputs of photosynthesis; and/or use a model to explain photosynthesis.	Identify what a plant uses and what a plant produces during photosynthesis.
						MS-LS1-7 Recognize that organisms need food to survive, identify that food must be chewed and digested to be useful to the organism, and/or use diet data 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 Recognize that plants and animals rely on sugar molecules, identify sugar molecules as carbohydrates, describe the process of converting sugar molecules to other molecules, and/or explain how elements of sugar molecules are used to form other molecules.	Confirm or revise a description of the process of creating other molecules from sugar molecules.
									HS-LS1-7 Recognize that organisms need food and air; identify molecules involved in cellular respiration; use a model to illustrate inputs and outputs of cellular respiration; and/or use a model to describe the respiration process.	Use a model of cellular respiration to illustrate the inputs and outputs, including energy, of the process.

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	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 Recognize the senses animals use to detect stimuli, identify the structures that allow animals to process and respond to their environment, and/or identify how an animal responds.	Identify animal structures that enable them to detect, process, and react 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 Recognize the five senses; identify the inputs each sense responds to; describe the process of the senses receiving information, transmitting it to the brain, and the resulting response; and/or explain the process that resulted in a given response.	Describe that information received by the senses is transmitted to the brain and leads to a memory and/or an immediate response.			
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 Recognize producers and consumers; identify the components of a food web; identify the role of producers, consumers, and decomposers; and/or use a model to show the movement of matter in a food web.	Identify the role 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 Recognize organisms or environmental factors; identify factors in an ecosystem that impact organisms, including factors that cause population changes; and/or use data to describe how population changes impact available resources.	Identify whether a population increases or decreases as a result of a change in the ecosystem.	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 Within an ecosystem, recognize organisms that interact, identify factors that could affect equilibrium, use data to determine whether available food can sustain a population, and/or use data to describe changes in a population or resource.	Use data to determine if the food supply present in an ecosystem can sustain a specified increase in the populations of organisms, eating that particular food.
						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.	Describe interactions among organisms across multiple ecosystems.		HS-LS2-2 Recognize the needs of a plant or animal, identify the interdependence of organisms, use data to explain patterns and trends between a population and the availability of resources, and/or describe change(s) in the population size of an organism as another environmental factor changes.	Use data to explain the patterns and/or trends between population size and the availability of resources. (Links to LS2.C)
									HS-LS2-3 DCI and CCC are covered through HS-LS2.4 where SEP is more appropriate. Aerobic and anaerobic are unnecessary complications for this group of students.	
	LS2.B: Cycles of Matter and Energy Transfer in Ecosystems	Matter cycles between the air and soil and among organisms as they live and die. See LS2.A			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	MS-LS2-3 Recognize that food webs include producers, consumers, and decomposers; complete a food web that includes common organisms; demonstrate the flow of energy in a food web; and/or use a model to show	Complete a food web showing the flow of energy between living organisms and non-living 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	HS-LS2-4 Recognize that matter and energy flow through a food chain, identify the types of matter and energy that flow and diagram their movement, and/or explain why producers outnumber consumers in an ecosystem.	Diagram the movement of matter and energy through a food web (ecosystem).

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					how matter and energy are transferred among producers, consumers, and decomposers as the three groups interact within an ecosystem.	energy flow within an ecosystem.		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-LS2-5 Recognize what a plant needs to make its own food, identify the purpose of photosynthesis and respiration, and show the relationship between inputs and outputs of each, and/or link photosynthesis and respiration to the carbon cycle.	Identify that the outputs of photosynthesis are the inputs of respiration, and the outputs of respiration are the inputs of photosynthesis.
	LS2.C: Ecosystem Dynamics, Functioning, and Resilience	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			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 Recognize an ecosystem; identify components of an ecosystem; use data to determine the effect of limited resources on a population; and/or predict the impact of a change in the population or physical environment of an ecosystem and recognize that changes to any physical or biological component of an ecosystem can lead to population shifts.	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 Recognize a nonliving factor in an ecosystem and identify how it affects a population, identify and classify changes in the physical environment that could affect a population, and/or describe how a change[2] could affect the environment and populations in an ecosystem.	Identify and/or classify natural and human-initiated changes in the physical environment that could affect a population.
									HS-LS2-7 Recognize human activities that can be harmful to Earth, match human activities with positive and negative effects, and/or identify and describe solutions that reduce the negative impacts of human activities.	Identify human activities that can have a negative effect on the Earth and then identify a solution that reduces its impact on the environment.
	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 Recognize animals as predators and prey, identify their group behavior, determine how that group behavior is beneficial, and/or use data to show that 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 Recognize threats to an animal species, identify and describe group behaviors that increase its chances of survival, and/or 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 Recognize a plant or animal trait, identify one or more similarities or differences between parents and their offspring, and/or use data to identify similarities and differences.	Identify similarities or differences between parents and one offspring.	Genes chiefly regulate a specific protein, which affect an individual's traits.	MS-LS3-1 Recognize genes, including their location; identify that genes create needed proteins; understand that structural changes to genes may cause the development of new traits; and/or show that variations in structure and function are the result of a genetic mutation.	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 Recognize the traits of an organism, identify the function of chromosomes, describe how DNA passes traits from one generation to the next, and/or describe how changes in DNA can impact offspring.	Describe how traits (characteristics) are passed from one generation to the next through DNA containing genes.

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				3-LS3-2 Recognize the needs of a plant or animal, distinguish between organisms whose needs are and are not being met, identify traits that are affected by environmental factors, and/or determine environmental factors that impact traits.	Identify traits of a plant or animal that can be altered by its environment.		MS-LS-3-2 Recognize that all organisms reproduce to maintain the species, differentiate between sexual and/or asexual reproduction, and use data or a model to explain trait variation among offspring. (Links to LS1.B, and LS3.B)	Use a model to describe how asexual reproduction differs from sexual reproduction.			
	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 Recognize that genetic information in chromosomes determines traits; identify factors that cause genetic variation; and/or 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 Recognize a fossil, identify whether a fossil was a plant or an animal, and/or use data to identify the environment in which a fossil lived or to identify a trait of the fossil that provides information about its environment.	Based on data, identify the environment[1] 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 Recognize fossils, Identify the relative age of a fossil based on its placement in a rock layer, match present-day organisms to fossils, and/or use fossil data 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 species of organisms that have similar anatomical structures, identify a fossil and a present-day organism with similar structures, identify multiple ways of determining an organism's ancestry, and/or use data to trace development from the fossil to the present-day organism.	Identify multiple ways to determine the ancestry of an organism.
							MS-LS4-2 Recognize fossils, compare present-day organisms with fossils that have similar characteristics, and/or compare and contrast related modern organisms with fossils. (Also see MS-LS4-1)	Compare fossils with present day organisms with similar characteristics.			

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	LS4.B: Natural Selection	Differences in characteristics between individuals of the same species provide advantages in surviving and reproducing.	3-LS4-2 Recognize a characteristic of a plant or animal, identify differences in the characteristics of individuals within a species, and/or 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 Recognize a trait, understand that certain traits help individuals survive and reproduce in a specific environment, and/or use data showing trait variations to explain population changes in a specific environment. (Also see MS-LS3-2 and other PEs)	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 Recognize that evolution results in beneficial characteristics that increase the chances of survival for a species; determine why an adaptation occurred within a species; and/or 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 Recognize the survival needs of organisms, identify a gradual change in an environment, realize that environmental changes may lead to changes in the population of organisms, and/or predict what will happen to a species over time as a result of an environmental change.	Realize that a gradual change in the environment may result in changes in the population of organisms or the emergence of a new species.
	LS4.C: Adaptation	Particular organisms can only survive in particular environments.	3-LS4-3 Recognize an organism in a habitat; identify the features of a habitat, including organisms living in it; determine the characteristics of an organism that enable or prevent it from surviving there; and/or 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 Recognize that traits are passed from parent to offspring, identify desirable and undesirable traits in organisms, recognize processes that allow desirable traits to be chosen, and/or use information in a passage to determine how a desired trait was acquired.	Recognize selective breeding to be a process that allows the best 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 Recognize that some organisms survive better than others in given environments, identify an advantageous inheritable trait, explain why some organisms will likely survive better than others in an environment, and/or 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 based on the given environment.
						MS-LS4.6 Recognize traits, contrast traits among plants or animals of the same species, use a description of an environment to determine whether a trait is likely to increase or decrease, and/or predict changes in population 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 Recognize a trait, identify beneficial traits, explain why organisms with beneficial traits are more likely to survive, and/or describe how populations in an environment become better adapted over time.	Explain why organisms with beneficial traits are more likely to survive and reproduce.

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	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 Recognize the changes to an environment due to a natural event one caused by human activity, identify organisms that will be affected either positively or negatively, and/or use data to determine whether a solution to the environmental 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 Recognize a human activity that negatively impacts another species, identify species that have been negatively impacted[1] by human activity, determine the effectiveness of a strategy to protect a species, and/or use data to determine 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

Domain	**Sub-Domain**							**Grade 11 Key Idea**	**Essence**	**Meets**
ESS2: Earth's Systems	ESS2.D: Weather and Climate / ESS2.E: Biogeology	See ALT NGSS Science VerticalHorizProg_ESS.docx and ALT NGSS Science VerticalHorizProg_MS.docx						The biosphere and Earth's other systems have many interconnections that cause a continual co-evolution of Earth's surface and life on it.	HS-ESS2-6 Recognize a cycle, identify a cycle that involves carbon, describe the cycling of carbon, and/or describe changes in the amount of carbon in the atmosphere due to human activities.	Describe the cycling of carbon using a model.
								Changes in the atmosphere due to human activity have increased carbon dioxide concentrations and thus affect climate.	HS-ESS2-7 Recognize that changes to Earth and organisms have occurred over time, identify changes on Earth that can lead to changes among living things, identify examples of how living things change the environment, and/or identify the impact of those changes.	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	See ALT NGSS Science VerticalHorizProg_ESS.docx and ALT NGSS Science VerticalHorizProg_MS.docx						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 Recognize a natural resource, identify ways in which humans use resources, identify ways to sustain both human populations and living resources, and/or use data to show how managing natural resources promotes sustainability.	Identify steps that can be taken to sustain human populations and living resources.