| AFK12SE/NGSS Strand<br>Disciplinary Core Ideas | Conceptual Understandings<br>for K-2 Teachers | Conceptual Understandings<br>for 3-5 Teachers |
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| **LS1: From Molecules to Organisms: Structures and Processes**<br>How do organisms live, grow, respond to their environment, and reproduce? | | |
| **LS1. A: Structure and Function**<br>*How do the structures of organisms enable life's functions?*<br>**K-2**<br>● All organisms have external parts.<br>● Animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air.<br>● Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive, grow, and produce more plants.<br><br>**Grades 3-5**<br>● Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.<br>*(Boundary: Stress at this grade level is on understanding the macroscale systems and their function, not microscopic processes.)* | ● What are the external structures of different animals and plants?<br>● What are the functions of these different external structures? | ● What are the external and internal structures of different organisms?<br>● What are the functions of these different external and internal structures?<br>● What are similarities between organisms' structures and the function of those structures? |
| **LS1.B: Growth and Development of Organisms**<br>*How do organisms grow and develop?*<br>**K-2**<br>● Plants and animals have predictable characteristics at different stages of development.<br>● Plants and animals grow and change.<br>● Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive.<br>**Grades 3-5**<br>● Reproduction is essential to the continued existence | ● What are the stages of development for plants and animals?<br>● How do adult forms of plants and animals help their young survive? | ● What are the stages of development for organisms?<br>● How do adult forms of organisms help their young survive?<br>● Why is it important for organisms to reproduce?<br>● What are the different life cycles that organisms may have? |

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| of every kind of organism.<br>● Plants and animals have unique and diverse life cycles that include being born (sprouting in plants), growing, developing into adults, reproducing, and eventually dying. | | |
| **LS1.C: Organization for Matter and Energy Flow in Organisms**<br>*How do organisms obtain and use the matter and energy they need to live and grow?*<br>**K-2**<br>● All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.<br><br>**Grades 3-5**<br>● Animals and plants alike generally need to take in air and water, animals must take in food, and plants need light and minerals.<br>● Anaerobic life, such as bacteria in the gut, functions without air.<br>● Food provides animals with the materials they need for body repair and growth and is digested to release the energy they need to maintain body warmth and for motion.<br>● Plants acquire their material for growth from air and water and process matter they have formed to maintain their internal conditions (e.g., at night). | ● What do animals and plants need to live and grow?<br>● How do these needs differ between plants and animals? | ● What is needed for organisms to live and grow?<br>● How do these needs differ between organisms?<br>● What are the different needs of aerobic and anaerobic organisms?<br>● How do organisms use the matter and energy to live and grow? |
| **LS1.D: Information Processing**<br>*How do organisms detect, process, and use information about the environment?*<br>**K-2**<br>● Animals have body parts that capture and convey different kinds of information needed for growth and survival—for example, eyes for light, ears for sounds, and skin for temperature or touch. Animals respond to these inputs with behaviors that help them survive (e.g., find food, run from a predator). | ● How do animals and plants use different parts of their body to detect and respond to stimuli? | ● How do organisms use different parts of their body to detect and respond to stimuli?<br>● What are the differences between instinctive and learned behaviors? |

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| • Plants also respond to some external inputs (e.g., turn leaves toward the sun).<br><br>**<u>Grades 3-5</u>**<br>• Different sense receptors are specialized for particular kinds of information, which may then be processed and integrated by an animal's brain, with some information stored as memories.<br>• Animals are able to use their perceptions and memories to guide their actions.<br>• Some responses to information are instinctive—that is, animals' brains are organized so that they do not have to think about how to respond to certain stimuli. | | |
| **LS2: Ecosystems:**<br>**Interactions, Energy, and Dynamics**<br>How and why do organisms interact with their environment and what are the effects of these interactions? | | |
| **LS2. A: Interdependent Relationships in Ecosystems**<br>*How do organisms interact with the living and nonliving environments to obtain matter and energy?*<br>**<u>K-2</u>**<br>• Animals depend on their surroundings to get what they need, including food, water, shelter, and a favourable temperature.<br>• Animals depend on plants or other animals for food.<br>• They use their senses to find food and water, and they use their body parts to gather, catch, eat, and chew the food.<br>• Plants depend on air, water, minerals (in the soil), and light to grow.<br>• Animals can move around, but plants cannot, and they often depend on animals for pollination or to move their seeds around.<br>• Different plants survive better in different settings because they have varied needs for water, minerals, and sunlight. | • What are some ways plants and animals rely on each other for survival?<br>• How do plants and animals interact with the biotic and abiotic factors of their ecosystem? | • What are some ways plants and animals rely on each other for survival?<br>• How do plants and animals interact with the biotic and abiotic factors of their ecosystem?<br>• How can the flow of energy in an ecosystem be modeled?<br>• What may happen to the health of an ecosystem when an unknown plant or animal is introduced? |

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| **Grades 3-5**<br>● The food of almost any kind of animal can be traced back to plants.<br>● Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Either way, they are "consumers." Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers."<br>● Decomposition eventually restores (recycles) some materials back to the soil for plants to use.<br>● Organisms can survive only in environments in which their particular needs are met.<br>● A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life.<br>● Newly introduced species can damage the balance of an ecosystem. | | |
| **LS2.B.: Cycles of Matter and Energy Transfer in Ecosystems**<br>*How do matter and energy move through an ecosystem?*<br>**K-2**<br>● Organisms obtain the materials they need to grow and survive from the environment. Many of these materials come from organisms and are used again by other organisms.<br>**Grades 3-5**<br>● Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die.<br>● Organisms obtain gases, water, and minerals from the environment and release waste matter (gas, liquid, or solid) back into the environment. | ● In what ways are materials used by plants and animals cycled through an ecosystem? | ● In what ways are materials used by plants and animals cycled through an ecosystem? |
| **LS2.C: Ecosystem Dynamics, Functioning, and** | ● What may happen to plants and animals | ● What may happen to plants and animals |

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| **Resilience**<br>*What happens to ecosystems when the environment changes?*<br>**K-2**<br>● The places where plants and animals live often change, sometimes slowly and sometimes rapidly. When animals and plants get too hot or too cold, they may die. If they cannot find enough food, water, or air, they may die.<br><br>**Grades 3-5**<br>● When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. | when the environment changes?<br>● How can studying patterns in environmental changes help us to predict what might happen to plants or animals in other similar environments? | when the environment changes?<br>● How can studying patterns in environmental changes help us to predict what might happen to plants or animals in other similar environments? |
| **LS2.D: Social Interactions and Group Behavior**<br>*How do organisms interact in groups so as to benefit individuals?*<br>**K-2**<br>● Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size.<br><br>**Grades 3-5**<br>● Groups can be collections of equal individuals, hierarchies with dominant members, small families, groups of single or mixed gender, or groups composed of individuals similar in age.<br>● Some groups are stable over long periods of time; others are fluid, with members moving in and out. Some groups assign specialized tasks to each member; in others, all members perform the same or a similar range of functions. | ● How do animals interact in groups so as to benefit individuals? | ● How do groups of similar plants or animals interact so as to benefit individuals?<br>● What are different ways that individuals can be formed into groups?<br>● How can the role of an individual contribute to the function of the group? |
| **LS3: Heredity:** | | |

| **Inheritance and Variation of Traits**<br>How are characteristics of one generation passed to the next? How can individuals of the same species and even siblings have different characteristics? | | |
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| **LS3.A: Inheritance of Traits**<br>*How are the characteristics of one generation related to the previous generation?*<br>**K-2**<br>● Organisms have characteristics that can be similar or different.<br>● Young animals are very much, but not exactly, like their parents and also resemble other animals of the same kind.<br>● Plants also are very much, but not exactly, like their parents and resemble other plants of the same kind.<br><br>**Grades 3-5**<br>● Many characteristics of organisms are inherited from their parents.<br>● Other characteristics result from individuals' interactions with the environment, which can range from diet to learning.<br>● Many characteristics involve both inheritance and environment. | ● How are the characteristics of one generation related to the previous generation? | ● How are the characteristics of one generation related to the previous generation?<br>● From examining different plants and animals over time, what evidence is there that not all characteristics may be inherited?<br>● In what ways can the environment affect characteristics of a population over time? |
| **LS3.B: Variation of Traits**<br>*Why do individuals of the same species vary in how they look, function, and behave?*<br>**K-2**<br>● Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.<br><br>**Grades 3-5**<br>● Offspring acquire a mix of traits from their biological parents.<br>● Different organisms vary in how they look and function because they have different inherited | ● How can individuals of the same species and even siblings have different characteristics? | ● How can individuals of the same species and even siblings have different characteristics? |

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| information.<br>● In each kind of organism there is variation in the traits themselves, and different kinds of organisms may have different versions of the trait.<br>● The environment also affects the traits that an organism develops—differences in where they grow or in the food they consume may cause organisms that are related to end up looking or behaving differently. | | |
| **LS4: Biological Evolution:**<br>**Unity and Diversity**<br>How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms?<br>How does biodiversity affect humans? | | |
| **LS4.A: Evidence of Common Ancestry and Diversity**<br>*What evidence shows that different species are related?*<br>**K-2**<br>● Some kinds of plants and animals that once lived on Earth (e.g., dinosaurs) are no longer found anywhere, although others now living (e.g., lizards) resemble them in some ways.<br>**Grades 3-5**<br>● Fossils provide evidence about the types of organisms (both visible and microscopic) that lived long ago and also about the nature of their environments.<br>● Fossils can be compared with one another and to living organisms according to their similarities and differences. | ● What evidence is there on Earth today of the types of plants and animals that once existed? | ● What evidence is there on Earth today of the types of plants and animals that once existed?<br>● How do scientists use fossil evidence to explain how organisms and their environments have changed over time? |
| **LS4. B: Natural Selection**<br>*How does genetic variation among organisms affect survival and reproduction?*<br>**K-2**<br>● N/A<br><br>**Grades 3-5** | ● How do physical characteristics among plants and animals affect survival and reproduction?<br>● How does natural selection occur in a population? | ● How do physical characteristics among organisms affect survival and reproduction?<br>● How does natural selection occur in a population? |

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| ● Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. | | |
| **LS4.C: Adaptation**<br>*How does the environment influence populations of organisms over multiple generations?*<br>**K-2**<br>● Living things can survive only where their needs are met. If some places are too hot or too cold or have too little water or food, plants and animals may not be able to live there.<br><br>**Grades 3-5**<br>● Changes in an organism's habitat are sometimes beneficial to it and sometimes harmful. For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. | ● How do populations adapt to environmental influences over multiple generations? | ● How do populations adapt to environmental influences over multiple generations? |
| **LS4.D: Biodiversity and Humans**<br>*What is biodiversity, how do humans affect it, and how does it affect humans?*<br>**K-2**<br>● There are many different kinds of living things in any area, and they exist in different places on land and in water.<br><br>**Grades 3-5**<br>● Scientists have identified and classified many plants and animals.<br>● Populations of organisms live in a variety of habitats, and change in those habitats affects the organisms living there.<br>● Humans, like all other organisms, obtain living and nonliving resources from their environments. | ● What is biodiversity?<br>● How do humans affect biodiversity?<br>● How do scientists classify plants and animals? | ● What is biodiversity?<br>● How do humans affect biodiversity and how does biodiversity affect humans?<br>● How do scientists classify organisms? |