Science

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|  | **GBCS Current Curriculum / GLCEs** | **NGSS Units** |
| **K** | **Pushes & Pulls** | **Forces & Interactions: Pushes & Pulls** |
|  | **P.FM.00.11** Describe the position of an object (above, below, in front of, behind, on) in relation to other objects.  **P.FM.00.12** Describe the direction of a moving object (for example: away from or closer to) from different observers’ view.  **P.FM.00.31** Demonstrate pushes and pulls on objects that can move.  **P.FM.00.32** Observe that objects initially at rest will move in the direction of a push or a pull.  **P.FM.00.33** Observe how pushes and pulls can change the speed or direction of moving objects.  **P.FM.00.34** Observe how the shape and mass of an object can affect motion. | **K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.** [Clarification Statement: Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other.] [Assessment Boundary: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.]  **K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.\*** [Clarification Statement: Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, and knock down other objects. Examples of solutions could include tools such as a ramp to increase the speed of the object and a structure  ------------------------------------------------------------------------------------  **PS2.A: Forces and Motion**  Pushes and pulls can have different strengths and directions (K-PS2-1 K-PS2-2)  Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (K-PS2-1), (K-PS2-2)  **PS2.B: Types of Interactions**  When objects touch or collide, they push on one another and can change motion. (K-PS2-1)  **PS3.C: Relationship Between Energy and Forces**  A bigger push or pull makes things go faster. (secondary to K-PS2-1)  **ETS 1.A: Defining Engineering Problems**  A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. |
| **K** | **Basic Needs of Living Things** | **Interdependent Relationships in Ecosystems: Animal, Plants and Their Environment** |
|  | **L.OL.00.11** Recognize that living things have basic needs.  **L.OL.00.12** Identify and compare living and nonliving things.  **E.SE.00.12** Describe how earth materials contribute to plant and animal life. | **K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.** [Clarification Statement: Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and, that all living things need water.]  **K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.** [Clarification Statement: Examples of plants and animals changing their environment coud include a squirrel digs in the ground to hide its food and tree roots can break concrete.]  **K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.** [Clarification Statement: Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas; and, grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.]  **K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.\*** [Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.]  **LS1.C: Organization for Matter and Energy Flow in Organisms**  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. (K-LS1-1)  **ESS2.E: Biogeology**  Plants and animals can change their environment. (K-ESS2-2)  **ESS3.A: Natural Resources**  Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (K-ESS3-1)  **ESS3.C: Human Impacts on Earth Systems**  Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. secondary to K-ESS2-2),(K-ESS3-3)  **ETS1.B: Developing Possible Solutions**  Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem’s solutions to other people. |
| **K** | **My Earth** | **Weather & Climate** |
|  | **E.SE.00.11** Identify earth materials that occur in nature (rocks, sand,  soil, and water). | **K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time.** [Clarification Statement: Examples of qualitative observations could include descriptions of the weather (such as sunny, cloudy, rainy, and warm); examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. Examples of patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months.] [Assessment Boundary: Assessment of quantitative observations limited to whole numbers and relative measures such as warmer/cooler.]  **K-ESS3-2. Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.\*** [Clarification Statement: Emphasis is on local forms of severe weather.]  **K-PS3-1. Make observations to determine the effect of sunlight on Earth’s surface.** [Clarification Statement: Examples of Earth’s surface could include sand, soil, rocks, and water] [Assessment Boundary: Assessment of temperature is limited to relative measures such as warmer/cooler.]  **K-PS3-2. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.\*** [Clarification Statement: Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun.]  **PS3.B: Conservation of Energy and Energy Transfer**  Sunlight warms Earth’s surface. (K-PS3-1), (K-PS3-2)  **ESS2.D: Weather and Climate**  Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time. (K-ESS2-1)  **ESS3.B: Natural Hazards**  Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events. (K-ESS3-2)  **ETS1.A: Defining and Delimiting an Engineering Problem**  Asking questions, making observations, and gathering information are helpful in thinking about problems |
| **K** | **Observations with My Senses** |  |
|  | **S.IP.00.11** Make purposeful observation of the natural world using the appropriate senses. |  |

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| **1** | **Sorting by Properties** | **1 - Waves: Light & Sound** |
|  | **P.PM.01.11** Demonstrate the ability to sort objects according to observable properties such as color, shape, size, sinking and floating.  **P.PM.01.21** Demonstrate that water as a solid keeps its own shape (ice).  **P.PM.01.22** Demonstrate that water as a liquid takes on the shape of various containers.  **P.PM.01.31** Identify materials that are attracted by magnets. 5  **P.PM.01.32** Observe that like poles of a magnet repel and unlike poles  of a magnet attract. | **1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.** [Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.]  **1-PS4-2. Make observations to construct an evidence-based account that objects can be seen only when illuminated.** [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]  **1-PS4-3. Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.** [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [Assessment Boundary: Assessment does not include the speed of light.]  **1-PS4-4. Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.\*** [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string  **PS4.A: Wave Properties**  Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1)  **PS4.B: Electromagnetic Radiation**  Objects can be seen only when light is available to illuminate them. Some objects give off their own light. (1-PS4-2)  Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light can not reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1-PS4-3)  **PS4.C: Information Technologies and Instrumentation**  People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4) |

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| 1 | Animal Life | Structure Function and Informational Processing | |
|  | **L.OL.01.13** Identify the needs of animals.  **L.OL.01.21** Describe the life cycle of animals including the following stages: egg, young, adult; egg, larva, pupa, adult  **L.HE.01.11** Identify characteristics (for example: body coverings, beak shape, number of legs, body parts) that are passed from parents to young.  **L.HE.01.12** Classify young animals based on characteristics that are passed on from parents (dogs/puppies, cats/kittens, cows/calves, chickens/chicks). | **1-LS1-1. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.\*** [Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]  **1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.** [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]  **1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.** [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.] [Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.]  **LS1.A: Structure and Function**  All organisms have external parts. Different 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. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)  **LS1.B: Growth and Development of Organisms**  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. (1-LS1-2)  **LS1.D: Information Processing**  Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1)  **LS3.A: Inheritance of Traits**  Young animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents. (1-LS3-1)  **LS3.B: Variation of Traits**  Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1) | |
| **1** | **Weather & The Sun Warms the Earth** | **1 - Space Systems: Patterns and Cycles** | |
|  | **L.ES.01.21** Compare daily changes in the weather related to temperature (cold, hot, warm, cool); cloud cover (clear, cloudy, partly cloudy, foggy); precipitation (rain, snow, hail, freezing rain); wind (breezy, windy, calm).  **E.ES.01.31** Identify the tools that might be used to measure temperature, precipitation, cloud cover and wind.  **E.ES.01.32** Observe and collect data of weather conditions over a period of time.  **E.ES.01.11** Identify the sun as the most important source of heat, which warms the land, air, and water on the Earth.  **E.ES.01.12** Demonstrate the importance of sunlight and warmth in plant growth.  **E.ES.01.22** Describe and compare weather related to the four seasons in terms of temperature, cloud cover, precipitation, and wind.  **E.ES.01.23** Identify severe weather characteristics. 4  **E.ES.01.24** Describe precautions that should be taken for human safety during severe weather conditions (thunder and lightning, strong winds, and heavy precipitation). | **1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted.** [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.] [Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]  **1-ESS1-2. Make observations at different times of year to relate the amount of daylight to the time of year.** [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]  **ESS1.A: The Universe and its Stars**  Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)  **ESS1.B: Earth and the Solar System**  Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2) | |
| **2** | **Measurement of Properties** | **Structure and Properties of Matter** |
|  | **P.PM.02.12** Describe objects and substances according to their properties (color, size, shape, texture, hardness, liquid or solid, sinking or floating).  **P.PM.02.13** Measure the length of objects using rulers (centimeters) and meter sticks (meters).  **P.PM.02.14** Measure the volume of liquids using common measuring tools (measuring cups, measuring spoons, graduated cylinders and beakers).  **P.PM.02.15** Compare objects using a balance.  **P.PM.02.41** Recognize that some objects are composed of single substances (water, sugar, salt) and others are composed of more than one substance (salt and pepper, mixed dry beans). | **2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.** [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]  **2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.\*** [Clarification Statement: Examples of properties could include, strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.]  **2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.** [Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]  **2-PS1-4. Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.** [Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.]  **PS1.A: Structure and Properties of Matter**  Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1)  Different properties are suited to different purposes. (2-PS1-2),(2-PS1-3)  A great variety of objects can be built up from a small set of pieces. (2-PS1-3)  **PS1.B: Chemical Reactions**  Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4) |
| **2** | **Plant Life** | **2- Interdependent Relationships in ecosystems** |
|  | **L.OL.02.14** Identify the needs of plants.  **L.OL.02.22** Describe the life cycle of familiar flowering plants including the following stages: seed, plant, flower, and fruit.  **L.HE.02.13** Identify characteristics of plants (for example: leaf shape, flower type, color, size) that are passed on from parent to young. | **2-LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow.** [Assessment Boundary: Assessment is limited to testing one variable at a time.]  **2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.\***  **2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.** [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]  **LS2.A: Interdependent Relationships in Ecosystems**  Plants depend on water and light to grow. (2-LS2-1)  Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)  **LS4.D: Biodiversity and Humans**  There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1)  **ETS1.B: Developing Possible Solutions**  Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem’s solutions to other people. (secondary to 2-LS2-2) |

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| **2** | **Earth’s Surface & Uses and Properties of Water** | **2- Earth’s Systems: Processes that Shape the Earth** |
|  | **E.SE.02.21** Describe the major landforms of the surface of the Earth (mountains, plains, plateaus, valleys, hills).  **E.FE.02.21** Describe how rain collects on the surface of the Earth and flows downhill into bodies of water (streams, rivers, lakes, oceans) or into the ground.  **E.FE.02.22** Describe the major bodies of water on the Earth’s surface (lakes, ponds, oceans, rivers, streams).  **E.FE.02.11** Identify water sources (wells, springs, lakes, rivers, oceans).  **E.FE.02.12** Identify household uses of water (drinking, cleaning, food preparation).  **E.FE.02.13** Describe properties of water as a liquid (visible, flowing, shape of container) and recognize rain, dew, and fog as water in its liquid state.  **E.FE.02.14** Describe the properties of water as a solid (hard, visible, frozen, icy) and recognize ice snow and hail as water in its solid state. | **2-ESS1-1. Make observations from media to construct an evidence-based account that Earth events can occur quickly or slowly.** [Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.] [Assessment Boundary: Assessment does not include quantitative measurements of timescales.]  **2-ESS2-1. Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.\*** [Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.]  **2-ESS2-2. Develop a model to represent the shapes and kinds of land and bodies of water in an area.** [Assessment Boundary: Assessment does not include quantitative scaling in models.]  **2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid.**  **ESS1.C: The History of Planet Earth**  Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1)  **ESS2.A: Earth Materials and Systems**  **Wind and water can change the shape of the land. (2-ESS2-1)**  **ESS2.B: Plate Tectonics and Large -Scale System Interactions**  Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2)  **ESS2.C: The Roles of Water in Earth’s Surface Processes**  Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3)  **ETS1.C: Optimizing the Design Solution**  Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (secondary to 2-ESS2-1) |
| **K-2** |  | **K-2 Engineering & Design** |
|  |  | **K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.**  **K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.**  **K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.**  **ETS1.A: Defining and Delimiting Engineering Problems**  A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)  Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)  Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)  **ETS1.B: Developing Possible Solutions**  Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem’s solutions to other people. (K-2-ETS1-2)  **ETS1.C: Optimizing the Design Solution**  Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3) |

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| **3** | **Motion** | **3 - Forces & Interactions** |
|  | **P.FM.03.22** Identify the force that pulls objects towards the Earth.  **P.FM.03.35** Describe how a push or a pull is a force  **P.FM.03.36** Relate a change in motion of an object to the force that caused the change in motion.  **P.FM.03.37** Demonstrate how the change in motion of an object is related to the strength of the force acting upon the object and to the weight of the object.  **P.FM.03.38** Demonstrate when an object does not move in response to a force, it is because another force is acting on it.  **P.FM.03.41** Describe the motion of objects in terms of the path and direction.  **P.FM.03.42** Identify changes in motion (change direction, speed up, slowing down).  **P.FM.03.43** Relate the speed of an object to the distance it travels in a  standard amount of time. | **3-PS2-1. Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.** [Clarification Statement: Examples could include an unbalanced force on one side of a ball can make it start moving; and, balanced forces pushing on a box from both sides will not produce any motion at all.] [Assessment Boundary: Assessment is limited to one variable at a time: number, size, or direction of forces. Assessment does not include quantitative force size, only qualitative and relative. Assessment is limited to gravity being addressed as a force that pulls objects down.]  **3-PS2-2. Make observations and/or measurements of an object’s motion to provide evidence that a pattern can be used to predict future motion.** [Clarification Statement: Examples of motion with a predictable pattern could include a child swinging in a swing, a ball rolling back and forth in a bowl, and two children on a see-saw.] [Assessment Boundary: Assessment does not include technical terms such as period and frequency.]  **3-PS2-3. Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.** [Clarification Statement: Examples of an electric force could include the force on hair from an electrically charged balloon and the electrical forces between a charged rod and pieces of paper; examples of a magnetic force could include the force between two permanent magnets, the force between an electromagnet and steel paperclips, and the force exerted by one magnet versus the force exerted by two magnets. Examples of cause and effect relationships could include how the distance between objects affects strength of the force and how the orientation of magnets affects the direction of the magnetic force.] [Assessment Boundary: Assessment is limited to forces produced by objects that can be manipulated by students, and electrical interactions are limited to static electricity.]  **3-PS2-4. Define a simple design problem that can be solved by applying scientific ideas about magnets.\*** [Clarification Statement: Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other.]  **PS2.A: Forces and Motion**  >Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object’s speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level.) (3-PS2-1)  >The patterns of an object’s motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.) (3-PS2-2)  **PS2.B: Types of Interactions**  Objects in contact exert forces on each other .(3-PS2-1)  Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. (3-PS2-3), (3-PS2-4) |
| **3** | **Light and Sound** | **Interdependent Relationships in Ecosystems** |
|  | **P.EN.03.11** Identify light and sound as forms of energy.  **P.EN.03.21** Demonstrate that light travels in a straight path and that shadows are made by placing an object in a path of light.  **P.EN.03.22** Describe what happens to light when it travels from air to water (a straw half in water and half in the air looks bent).  **P.EN.03.31** Relate sounds to their sources of vibrations (for example: a musical note produced by plucking a guitar string, the sounds of a drum made by striking a drumhead).  **P.EN.03.32** Distinguish the effect of fast or slow vibrations as pitch.  **P.PM.03.51** Demonstrate how some materials are heated more than others by light that shines on them.  **P.PM.03.52** Explain how we need light to see objects: light from a source reflects off objects and enters our eyes. | **3-LS2-1. Construct an argument that some animals form groups that help members survive.**  **3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.** [Clarification Statement: Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.] [Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.]  **3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.** [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]  **3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.\*** [Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.] [Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.]  **LS2.C: Ecosystem Dynamics, Functioning, and Resilience**  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. (secondary to 3-LS4-4)  **LS2.D: Social Interactions and Group Behavior**  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. (Note: Moved from K–2)(3-LS2-1)  **LS4.A: Evidence of Common Ancestry and Diversity**  Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (Note: Moved from K–2)(3-LS4-1)  Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)  **LS4.C: Adaptation**  For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)  **LS4.D: Biodiversity and Humans**  Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4) |
| **3** | **Structure and Function of Living Things** | **3 - Inheritance and Variation of Traits: Life Cycles and Traits** |
|  | **L.OL.03.31** Describe the function of the following plant parts: flower, stem, root, and leaf.  **L.OL.03.32** Identify and compare structures in animals used for controlling body temperature, support, movement, food getting, and protection (fur, wings, teeth, claws, scales).  **L.OL.03.41** Classify plants on the basis of observable physical characteristics (roots, leaves, stems, and flowers).  **L.OL.03.42** Classify animals on the basis of observable physical characteristics (backbone, body covering, limbs).  **L.EV.03.11** Relate characteristics and functions of observable parts in a variety of plants that allow them to live in their environment (for example: leaf shape, thorns, odor, color).  **L.EV.03.12** Relate characteristics and functions of observable body parts to the ability of animals to live in their environment | **3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.** [Clarification Statement: Changes organisms go through during their life form a pattern.] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.]  **3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.** [Clarification Statement: Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans.] [Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.]  **3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.** [Clarification Statement: Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.]  **3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.** [Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten  **LS1.B: Growth and Development of Organisms**  Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS11)  **LS3.A: Inheritance of Traits**  Many characteristics of organisms are inherited from their parents. (3-LS3-1)  Other characteristics result from individuals’ interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3-LS3-2)  **LS3.B: Variation of Traits**  Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)  The environment also affects the traits that an organism develops. (3-LS3-2)  **LS4.B: Natural Selection**  Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2) |
| **3** | **Earth Materials, Change and Resources** | **3 - Weather and Climate** |
|  | **E.ES.03.41** Identify natural resources (metals, fuels, fresh water, soil, and forests).  **E.ES.03.42** Classify renewable (fresh water, forests) and non-renewable (fuels, metals) resources.  **E.ES.03.43** Describe ways humans are protecting, extending and restoring resources (recycle, reuse, reduce, renewal).  **E.ES.03.44** Recognize that paper, metal, glass, and some plastics can be recycled.  **E.ES.03.51** Describe ways humans are dependent on the natural environment (forests, water, clean air, earth materials) and constructed environments (homes, neighborhoods, shopping malls, factories, and industry).  **E.ES.03.52** Describe helpful or harmful effects of humans on the environment (garbage, habitat destruction, land management, renewable and non-renewable resources). | **3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.** [Clarification Statement: Examples of data could include average temperature, precipitation, and wind direction.] [Assessment Boundary: Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.]  **3-ESS2-2. Obtain and combine information to describe climates in different regions of the world.**  **3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.\*** [Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lighting rods.]  **ESS2.D: Weather and Climate**  >Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)  >Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2)  **ESS3.B: Natural Hazards**  >A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1) (Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.) |
| **4** | **Heat, Electricity and Magnetism** | **Energy** |
|  | **P.EN.04.12** Identify heat and electricity as forms of energy.  **P.EN.04.41** Demonstrate how temperature can be increased in a substance by adding energy. **P.EN.04.42** Describe heat as the energy produced when substances burn, certain kinds of materials rub against each other, and when electricity flows through wire.  **P.EN.04.43** Describe how heat is produced through electricity, rubbing and burning.  **P.EN.04.51** Demonstrate how electrical energy is transferred and changed through the use of a simple circuit.  **P.EN.04.52** Demonstrate magnetic effects in a simple electric circuit.  **P.PM.04.53** Identify objects that are good conductors or poor conductors of heat and electricity.  **P.PM.04.33** Demonstrate magnetic field by observing the patterns formed with iron filings using a variety of magnets.  **P.PM.04.34** Demonstrate that magnetic objects are affected by the strength of the magnet and the distance from the magnet. | **4-PS3-1. Use evidence to construct an explanation relating the speed of an object to the energy of that object.** [Assessment Boundary: Assessment does not include quantitative measures of changes in the speed of an object or on any precise or quantitative definition of energy.]  **4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.** [Assessment Boundary: Assessment does not include quantitative measurements of energy.]  **4-PS3-3. Ask questions and predict outcomes about the changes in energy that occur when objects collide.** [Clarification Statement: Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.] [Assessment Boundary: Assessment does not include quantitative measurements of energy.]  **4-PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.\*** [Clarification Statement: Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound; and, a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device.] [Assessment Boundary: Devices should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound.]  **4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.** [Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.]  **PS3.A: Definitions of Energy**  The faster a given object is moving, the more energy it possesses. (4-PS3-1)  Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3)  **PS3.B: Conservation of Energy and Energy Transfer**  >Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2),(4-PS3-3)  >Light also transfers energy from place to place. (4-PS3-2)  >Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2),(4-PS3-4)  **PS3.C: Relationship Between Energy and Forces**  >When objects collide, the contact forces transfer energy so as to change the objects’ motions. (4-PS3-3)  PS3.D: Energy in Chemical Processes and Everyday Life  >The expression “produce energy” typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)  **ESS3.A: Natural Resources**  Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1)  **ETS1.A: Defining Engineering Problems**  >Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (secondary to 4-PS3-4) |

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| **4** | **Properties and Changes of Matter** | **Waves: Waves and Information** |
|  | P.PM.04.16 Measure the weight (spring scale) and mass (balances) in grams or kilograms of objects.  P.PM.04.17 Measure the volume of liquids in milliliters and liters.  P.PM.04.23 Compare and contrast the states (solid, liquid, and gas) of matter.  P.CM.04.11 Explain how matter can change from one state (solid, liquid, and gas) to another by heating and cooling. | **4-PS4-1. Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.** [Clarification Statement: Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves.] [Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.]  **4-PS4-3. Generate and compare multiple solutions that use patterns to transfer information.\*** [Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1’s and 0’s representing black and white to send information about a picture, and using Morse code to send text.]  **PS4.A: Wave Properties**  >Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; it does not move in the direction of the wave except when the water meets the beach. (Note: This grade band endpoint was moved from K–2).(4-PS4-1)  >Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)  PS4.C: Information Technologies and Instrumentation  >Digitized information transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3)  **ETS1.C: Optimizing The Design Solution**  >Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (secondary to 4-PS4-3) |
| **4** | **Relationships and Requirements of Living Things** | **Structure, Function and Information Processing** |
|  | **L.OL.04.15** Determine that plants require air, water, light, and a source of energy and building material for growth and repair.  **L.OL.04.16** Determine that animals require air, water and a source of energy and building material for growth and repair.  **L.EV.04.21** Identify individual differences (color, leg length, size, wing size, leaf shape) in organisms of the same kind.  **L.EV.04.22** Identify how variations in physical characteristics of individual organisms give them an advantage for survival and reproduction.  **L.EC.04.11** Identify organisms as part of a food chain or food web.  **L.EC.04.21** Explain how environmental changes can produce a change  in the food web.  **E.ST.04.31** Explain how fossils provide evidence of Earth’s past.  **E.ST.04.32** Compare and contrast life forms found in fossils and organisms that exist today. | **4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.** [Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.]  **4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.** [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]  **4-LS1-2. Use a model to describe that animals’ receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.** [Clarification Statement: Emphasis is on systems of information transfer. ] [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]  **PS4.B: Electromagnetic** **Radiation**  >An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2)  **LS1.A: Structure and Function**  Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)  **LS1.D: Information Processing**  >Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal’s brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2) |

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| **4** | **Sun, Moon and Earth** | **Earth Systems: Processes that Shape the Earth** |
|  | **E.ST.04.11** Identify the sun and moon as common objects in the sky.  **E.ST.04.12** Compare and contrast the characteristics of the sun, moon, and Earth, including relative distances and abilities to support life.  **E.ST.04.21** Describe the orbit of the Earth around the sun as it defines  a year.  **E.ST.04.22** Explain that the spin of the Earth creates day and night.  **E.ST.04.23** Describe the motion of the moon around the Earth.  **E.ST.04.24** Explain how the visible shape of the moon follows a predictable cycle, which takes approximately a month.  **E.ST.04.25** Describe the apparent movement of the sun and moon across the sky through day/night and the seasons. | **4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.** [Clarification Statement: Examples of evidence from patterns could include rock layers with shell fossils above rock layers with plant fossils and no shells, indicating a change from water to land over time; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.] [Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.]  **4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.** [Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.]  **4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth’s features.** [Clarification Statement: Maps can include topographic maps of Earth’s land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]  **4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.\*** [Clarification Statement: Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.] [Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.]  **ESS1.C: The History of Planet Earth**  >Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)  **ESS2.A: Earth Materials and Systems**  >Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)  **ESS2.B: Plate Tectonics and Large-Scale System Interactions**  >The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2)  **ESS2.E: Biogeology**  Living things affect the physical characteristics of their regions. (4-ESS2-1)  **ESS3.B: Natural Hazards**  A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2)(Note: This Disciplinary Core Idea can also be found in 3.WC.)  **ETS1.B: Designing Solutions to Engineering Problems**  >Testing a solution involves investigating how well it performs under a range of likely conditions. (secondary to 4-ESS3-2) |
| **5** | **Measuring Changes in Motion** | **5 - Structure and Properties of Matter** |
|  | **Force Interactions - Some forces between objects act when the objects are in direct contact (touching), such as friction and air resistance, or when they are not in direct contact (not touching), such as magnetic force, electrical force, and gravitational force.**  P.FM.05.21 Distinguish between contact forces and non-contact forces.  P.FM.05.22 Demonstrate contact and non-contact forces to change the motion of an object  **P.FM.M.3 Force – Forces have a magnitude and direction. Forces can be added. The net force on an object is the sum of all of the forces acting on the object. The speed and/or direction of motion of an object changes when a non-zero net force is applied to it. A balanced force on an object does not change the motion of the object (the object either remains at rest or continues to move at a constant speed in a straight line).**  P.FM.05.31Describe what happens when two forces act on an object in the same or opposing directions.  P.FM.05.32 Describe how constant motion is the result of balanced (zero net) forces.  P.FM.05.33 Describe how changes in the motion of objects are caused by a non-zero net (unbalanced) force.  P.FM.05.34 Relate the size of change in motion to the strength of unbalanced forces and the mass of the object.  **P.FM.M.4 Speed – Motion can be described by a change in position relative to a point of reference. The motion of an object can be described by its speed and the direction it is moving. The position and speed of an object can be measured and graphed as a function of time.**  P.FM.05.41 Explain the motion of an object relative to a point of reference.  P.FM.05.42 Describe the motion of an object in terms of distance, time and direction, as the object moves, and in relationship to other objects.  P.FM.05.43 Demonstrate how motion can be measured and represented on a graph. | **5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen.** [Clarification Statement: Examples of evidence could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] [Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.]  **5-PS1-2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.** [Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that forms new substances.] [Assessment Boundary: Assessment does not include distinguishing mass and weight.]  **5-PS1-3. Make observations and measurements to identify materials based on their properties.** [Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.] [Assessment Boundary: Assessment does not include density or distinguishing mass and weight.]  **5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances.**  **PS1.A: Structure and Properties of Matter**  >Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model shows that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon; the effects of air on larger particles or objects. (5-PS1-1)  >The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)  >Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic -scale mechanism of evaporation and condensation.) (5-PS1-3)  **PS1.B: Chemical Reactions**  When two or more different substances are mixed, a new substance with different properties may be formed.(5-PS1-4)  >No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) (5-PS1-2)  **PS3.D: Energy in Chemical Processes and Everyday Life**  >The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1) |
| **5** | **Animals Systems** | **Matter and Energy in Organisms and Ecosystems** |
|  | **L.OL.M.4 Animal Systems – Multicellular organisms may have specialized systems that perform functions that serve the needs of the organism.**  L.OL.05.41 Identify the general purpose of selected animal systems (digestive, circulatory, respiratory, skeletal, muscular, nervous, excretory, and reproductive).  L.OL.05.42 Explain how animal systems (digestive, circulatory, respiratory, skeletal, muscular, nervous, excretory, and reproductive) work together to perform selected activities. | **5-PS3-1. Use models to describe that energy in animals’ food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.** [Clarification Statement: Examples of models could include diagrams, and flow charts.]  **5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.** [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]  **5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.** [Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations.]  **LS1.C: Organization for Matter and Energy Flow in Organisms**  >Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1)  >Plants acquire their material for growth chiefly from air and water. (5-LS1-1)  **LS2.A: Interdependent Relationships in Ecosystems**  >The food of almost any kind of 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. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. 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. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)  **LS2.B: Cycles of Matter and Energy Transfer in Ecosystems**  >Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1) |
| **5** | **Evolution and Traits of Organisms** | **Earth’s Systems** |
|  | **L.HE.M.1 Inherited and Acquired Traits – The characteristics of organisms are influenced by heredity and environment. For some characteristics, inheritance is more important; for other characteristics, interactions with the environment are more important.**  L.HE.05.11 Explain that both the environment and the genetics of the individual influence the traits of an individual.  L.HE.05.12 Distinguish between inherited and acquired traits.  **L.EV.M.1 Species Adaptation and Survival – Species with certain traits are more likely than others to survive and have offspring in particular environments. When an environment changes, the advantage or disadvantage of the species’ characteristics can change. Extinction of a species occurs when the environment changes and the characteristics of a species are insufficient to allow survival.**  L.EV.05.11 Explain how behavioral characteristics (adaptation, instinct, learning, habit) of animals help them to survive in their environment.  L.EV.05.12 Describe the physical characteristics (traits) of organisms that help them to survive in their environment.  L.EV.05.13 Describe how fossils provide evidence about how living things and environmental conditions have changed.  L.EV.05.14 Analyze the relationship of environmental change and catastrophic events (for example: volcanic eruption, floods, asteroid impact, tsunami) to species extinctions.  **L.EV.M.2 Relationships Among Organisms – Similarities among organisms are found in anatomical features, which can be used to infer the degree of relatedness among organisms. In classifying organisms, biologists consider details of internal and external structures to be more important that behavior and general appearance.**  L.EV.05.21 Relate the degree of similarity in anatomical features to the classification of contemporary organisms. | **5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.** [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]  **5-ESS2-2. Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.** [Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.]  **5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.**  **ESS2.A: Earth Materials and Systems**  >Earth’s major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth’s surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)  **ESS2.C: The Roles of Water in Earth’s Surface Processes**  >Nearly all of Earth’s available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)  **ESS3.C: Human Impacts on Earth Systems**  >Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth’s resources and environments.(5-ESS3-1) |
| **5** | **Position and Motion of Objects in the Sky** | **Space Systems: Stars and the Solar System** |
|  | **E.ES.M.6 Seasons – Seasons result from annual variations in the intensity of sunlight and length of day due to the tilt of the axis of the Earth relative to the plane of its yearly orbit around the sun.**  E.ES.05.61 Demonstrate and explain seasons using a model.  E.ES.05.62 Explain how the revolution of the Earth around the sun defines a year.  **E.ST.M.1 Solar system – The sun is the central and largest body in our solar system. Earth is the third planet from the sun in a system that includes other planets and their moons, as well as smaller objects, such as asteroids and comets.**  E.ST.05.11 Design a model of the solar system that shows the relative order and scale of the planets, dwarf planets, comets and asteroids to the sun.  **E.ST.M.2 Solar System Motion – Gravity is the force that keeps most objects in the solar system in regular and predictable motion.**  E.ST.05.21 Describe the motion of planets and moons in terms of rotation on axis and orbits due to gravity.  E.ST.05.22 Explain the phases of the moon.  E.ST.05.23 Explain the apparent motion of the stars (constellations) and the sun across the sky.  E.ST.05.24 Explain lunar and solar eclipses.  E.ST.05.25 Explain the tides of the oceans as they relate to the gravitational pull and orbit of the moon. | **5-PS2-1. Support an argument that the gravitational force exerted by Earth on objects is directed down.** [Clarification Statement: “Down” is a local description of the direction that points toward the center of the spherical Earth.] [Assessment Boundary: Assessment does not include mathematical representation of gravitational force.]  **5-ESS1-1. Support an argument that the apparent brightness of the sun and stars is due to their relative distances from Earth.** [Assessment Boundary: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).]  **5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.** [Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.] [Assessment Boundary: Assessment does not include causes of seasons.]  **PS2.B: Types of Interactions**  >The gravitational force of Earth acting on an object near Earth’s surface pulls that object toward the planet’s center. (5-PS2-1)  **ESS1.A: The Universe and its Stars**  >The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1)  **ESS1.B: Earth and the Solar System**  >The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night ; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2) |
| **3-5** |  | **3-5 Engineering and Design** |
|  |  | **3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.**  **3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.**  **3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled**  **ETS1.A: Defining and Delimiting Engineering Problems**  >Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how we ll each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)  **ETS1.B: Developing Possible Solutions**  >Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)  >At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)  >Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)  **ETS1.C: Optimizing the Design Solution**  >Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3) |