Performance Expectation *and Louisiana Connectors*
4-PS3-1 Use evidence to construct an explanation relating the speed of an object to the energy of that object. ***LC-4-PS3-1a Identify that moving objects contain energy.*** ***LC-4-PS3-1b Demonstrate that objects moving faster possess more energy than objects moving slower.***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Constructing explanations and designing solutions: Constructing explanations (science) and designing solutions (engineering) in 3-5 builds on K-2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. • Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem. ***Support an explanation using evidence (e.g., measurements, observations, patterns).*** ***Construct an explanation using evidence (e.g., measurements, observations, patterns).***	**DEFINITIONS OF ENERGY** The faster a given object is moving, the more energy it possesses. (UE.PS3A.a) ***The speed of an object is related to the energy it possesses.*** ***The energy of a moving object depends on its speed.*** ***Objects moving faster possess more energy than objects moving slower.***	**ENERGY AND MATTER** Energy can be transferred in various ways and between objects. ***Energy can be transferred in a system.*** ***Energy can be transferred between objects.***

Clarification Statement
Relating the speed of an object to the energy of the object does not require calculation of the object's speed.

Performance Expectation *and Louisiana Connectors*
4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. ***LC-4-PS3-2a Identify examples of how energy can be moved from place to place (i.e., through sound or light traveling; by electrical currents; heat passing from one object to another).***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Planning and carrying out investigations: Planning and carrying out investigations to answer questions (science) or test solutions (engineering) to problems in 3-5 builds on K-2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. • Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. ***Make observations to collect data.*** ***Make measurements to collect data.*** ***Use data as evidence for an explanation of a phenomenon.***	**DEFINITIONS OF ENERGY** Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (UE.PS3A.b) ***Energy can be transferred by moving objects.*** ***Energy can be transferred through sound.*** ***Energy can be transferred through light.*** ***Energy can be transferred through electric currents.*** **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. (UE.PS3B.a) ***Energy can be observed in a variety of situations (e.g., moving objects, sound, light, or heat).*** ***Pushing and pulling forces can be used to transfer energy from one object to another.*** ***Energy is transferred when objects collide.*** ***In a collision, some energy is also transferred to the surrounding air. As a result, sound is produced.*** ***An object's motion may change after a collision (i.e., increase or decrease speed, stop, or move an object farther than when the same object is moving more slowly),*** ***An object moving faster will have more energy due to motion; therefore, it will have a larger impact on another object. This impact results in an energy transfer.*** Light also transfers energy from place to place. (UE.PS3B.b)	**ENERGY AND MATTER** Energy can be transferred in various ways and between objects**.** ***Energy can be transferred in a system.*** ***Energy can be transferred between objects.***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
	Light is a form of energy. ***Light can transfer energy.*** ***When light is absorbed by a material, most of its energy is changed (transformed) into heat energy.*** 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. (UE.PS3B.c) ***Electric currents can transfer energy.*** ***Electric currents can transform energy into motion, sound, heat, or light.*** ***Transforming motion into electrical energy produces electric currents.*** ***Electrical systems can be designed to perform a variety of tasks.***	

Clarification Statement
When energy is transferred it may change forms such as when light from the sun warms a window pane.

Performance Expectation *and Louisiana Connectors*
4-PS3-3 Ask questions and predict outcomes about the changes in energy that occur when objects collide. ***LC-4-PS3-3a Identify the change in energy or the change in objects' motions when objects collide (e.g., speeds as objects interact, direction).***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Asking questions and defining problems: Asking questions (science) and defining problems (engineering) in 3-5 builds on K-2 experiences and progresses to specifying qualitative relationships. • Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. ***Scientific questions arise in a variety of ways.*** ***Ask scientific questions to which the answers can be supported through investigation.*** ***Questions can be about the prediction of outcomes based on cause and effect relationships.***	**DEFINITIONS OF ENERGY** Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (UE.PS3A.b) ***Energy can be transferred by moving objects.*** ***Energy can be transferred through sound.*** ***Energy can be transferred through light.*** ***Energy can be transferred through electric currents.*** **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. (UE.PS3B.a) ***Energy can be observed in a variety of situations (e.g., moving objects, sound, light, or heat).*** ***Pushing and pulling forces can be used to transfer energy from one object to another.*** ***Energy is transferred when objects collide.*** ***In a collision, some energy is also transferred to the surrounding air. As a result, sound is produced.*** ***An object's motion may change after a collision (i.e., increase or decrease speed, stop, or move an object farther than when the same object is moving more slowly).*** ***An object moving faster will have more energy due to motion; therefore, it will have a larger impact on another object. This impact results in an energy transfer.*** **RELATIONSHIP BETWEEN ENERGY AND FORCES**	**ENERGY AND MATTER** Energy can be transferred in various ways and between objects. ***Energy can be transferred in a system.*** ***Energy can be transferred between objects.***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
	When objects collide, the contact forces transfer energy so as to change the objects' motions. (UE.PS3C.a) ***When two objects collide they exert forces on each other.*** ***Objects with greater energy transfer some of the energy to the object with lesser energy within the system.*** ***The motion of an object is dependent on the amount of force applied to it.***	

Clarification Statement
Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact. Quantitative measurements of energy are not included.

Performance Expectation *and Louisiana Connectors*
4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. ***LC-4-PS3-4a Relate an example that demonstrates that energy can be converted from one form to another form (e.g., electric circuits that convert electrical energy into light, motion, sound or heat).***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Constructing explanations and designing solutions: Constructing explanations (science) and designing solutions (engineering) in 3-5 builds on K-2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. • Apply scientific ideas to solve design problems. ***Solve design problems by applying scientific knowledge.***	**CONSERVATION OF ENERGY AND ENERGY TRANSFER** 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. (UE.PS3B.c) ***Electric currents can transfer energy.*** ***Electric currents can transform energy into motion, sound, heat, or light.*** ***Transforming motion into electrical energy produces electric currents.*** ***Electrical systems can be designed to perform a variety of tasks.*** **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. (UE.PS3D.a) ***Energy can be produced (i.e., converted) to many forms.*** ***Energy cannot be created or destroyed.*** ***Energy can only be transferred or converted from one form to another.*** **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. (UE.ETS1C.a) ***Carry out tests in which variables are controlled and failure points are considered to determine which solution best solves the problem.*** ***Different solutions must be tested for defects.*** ***Evaluate the design solution according to how well it met the criteria and constraints.***	**ENERGY AND MATTER** Energy can be transferred in various ways and between objects. ***Energy can be transferred in a system.*** ***Energy can be transferred between objects.***

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. Example of constraints could include the materials, cost, or time to design the device.

Performance Expectation *and Louisiana Connectors*
4-PS4-1 Develop a model of waves to describe patterns in terms of amplitude and wavelength and to show that waves can cause objects to move. ***LC-4-PS4-1a Describe the properties of waves using a model (e.g., drawings, diagrams) to show amplitude (height) and wavelength.*** ***LC-4-PS4-1b Identify relationships involving wave amplitude, wavelength, and the motion of an object (e.g., when the amplitude increases, the object moves more).*** ***LC-4-PS4-1c Identify amplitude as a measure of energy in a wave.*** ***LC-4-PS4-1d Identify wavelength as the distance between a point on one wave and the identical point on the next wave.***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Developing and using models: Modeling in 3-5 builds on K-2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. • Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution. ***An analogy can be the basis of a model.*** ***A model is supported by examples.*** ***Models may use abstract representations.*** ***Models can be used to describe a scientific principle.*** ***Models can be used to describe a design solution.***	**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. (UE.PS4A.a) ***Waves are regular patterns of motion.*** ***A wave can travel in water.*** ***A wave traveling in water causes the water to move up and down in place.*** ***Water does not move in the direction of the wave.*** ***A wave becomes steep as it moves into shallow water near the shore and moves the water on to the beach.*** ***When waves meet the beach, they act differently by moving towards the shore.*** Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (UE.PS4A.b) ***Wave patterns can be observed by wave amplitude and wavelength.*** ***Waves vary in amplitude (height) and wavelength.***	**PATTERNS** Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena and designed products. ***Similarities and differences in patterns can be used to sort simple rates of change (natural phenomena and designed products).*** ***Similarities and differences in patterns can be used to classify simple rates of change (natural phenomena and designed products).*** ***Similarities and differences in patterns***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
		can be used to analyze simple rates of change (natural phenomena and designed products).

Clarification Statement
Examples of models could include diagrams, analogies, or physical models using wire to illustrate wavelength and amplitude of waves. Examples of wave patterns could include the vibrating patterns associated with sound or the vibrating patterns of seismic waves produced by earthquakes. Does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.

Performance Expectation *and Louisiana Connectors*
4-PS4-2 Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. ***LC-4-PS4-2a Arrange a model to show that light can be seen when light reflected from its surface enters the eye.***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Developing and using models: Modeling in 3-5 builds on K-2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. • Develop and/or use models to describe and/or predict phenomena. ***Models can be used to describe phenomena.*** ***Models can be used to predict phenomena.***	**ELECTROMAGNETIC RADIATION** An object can be seen when light reflected from its surface enters the eyes. (UE.PS4B.a) ***Objects in the dark cannot be seen.*** ***Objects can be seen when they are illuminated.*** ***Sight occurs when light reflects from objects and enters the eye.*** ***Objects cannot be seen if there is no light to illuminate them, but the same object in the same space can be seen if a light source is introduced.***	**CAUSE AND EFFECT** Cause and effect relationships are routinely identified, tested, and used to explain change. ***Cause and effect relationships may be identified.*** ***Cause and effect relationships may be tested.*** ***Cause and effect relationships may be used to explain change.***

Clarification Statement
Develop a model to make sense of a phenomenon involving the relationship between light reflection and visibility of objects. In the model, identify the relevant components including light and its source, objects, the path that light follows, and the eye.

Performance Expectation *and Louisiana Connectors*
4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. ***LC-4-LS1-1a Identify external macroscopic structures (e.g., bird beaks, eyes, feathers, roots, needles on a pine tree) that support growth, survival, behavior, and reproduction of organisms.*** ***LC-4-LS1-1b Identify internal structures (e.g., heart, muscles, bones) that support growth, survival, behavior, and reproduction of organisms.***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Engaging in argument from evidence: Engaging in argument from evidence in 3-5 builds on K-2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). • Construct and/or support an argument with evidence, data, and/or a model. ***Use evidence to construct an argument.*** ***Use evidence to support an argument.*** ***Use data to construct an argument.*** ***Use data to support an argument.*** ***Use a model to construct an argument.*** ***Use a model to support an argument.***	**STRUCTURE AND FUNCTION** Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (UE.LS1A.a) ***Plants have structures like thorns, stems, and roots that support survival, growth, behavior, and reproduction.*** ***Animals have structures like hearts, stomachs, and lungs that support survival, growth, behavior, and reproduction.***	**SYSTEMS AND SYSTEM MODELS** A system can be described in terms of its components and their interactions. ***A system can be described in terms of its parts.*** ***A system can be described in terms of how its parts interact.***

Clarification Statement
Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, shells, fur, or skin.

Performance Expectation *and Louisiana Connectors*
4-LS1-2 Construct an explanation to describe how animals receive different types of information through their senses, process the information in their brains, and respond to the information in different ways. ***LC-4-LS1-2a Identify that sense receptors provide different kinds of information, which is processed by the brain.*** ***LC-4-LS1-2b Identify how animals use their sense receptors to respond to different types of information (e.g., sound, light, odor, temperature) in their surroundings with behaviors that help them survive.*** ***LC-4-LS1-2c Identify how animals use their memories to help them survive.***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Constructing explanations and designing solutions: Constructing explanations (science) and designing solutions (engineering) in 3-5 builds on K-2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. • Construct an explanation of observed relationships (e.g., the distribution of plants in the back yard). ***An explanation relates how a variable(s) relate to another variable or a set of variables.*** ***An explanation can be based on an observed relationship.***	**STRUCTURE AND FUNCTION** Different sense receptors are specialized for particular kinds of information, which then may be processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (UE.LS1D.a) ***Senses help humans and other organisms detect internal and external cues.*** ***Animals have structures that aid them with receiving and processing information through their senses.*** ***Animals use their senses to respond to information they receive.*** ***The brain receives signals from parts of the body via the senses.*** ***In response, the brain sends signals to parts of the body to influence reactions.*** ***Animals also use memory to inform their actions.***	**CAUSE AND EFFECT** Events that occur together with regularity might or might not be a cause and effect relationship. ***Some events that occur together have a cause and effect relationship.*** ***Some events that occur together do not have a cause and effect relationship.***

Clarification Statement
Emphasis is on systems of information transfer. Responses could include animals running from predators, animals returning to breeding grounds, animals scavenging for food, or humans responding to stimuli.

Performance Expectation *and Louisiana Connectors*
4-ESS1-1 Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in landforms over time. ***LC-4-ESS1-1a Identify rock formations that show how the Earth's surface has changed over time (e.g., change following earthquakes).*** ***LC-4-ESS1-1b Identify older fossils as being found in deeper, older rock layers.***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Constructing explanations and designing solutions: Constructing explanations (science) and designing solutions (engineering) in 3-5 builds on K-2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. • Identify the evidence that supports particular points in an explanation. ***Support an explanation with evidence.*** ***Specific points can be part of an explanation.*** ***Support each particular point with evidence.***	**THE HISTORY OF PLANET EARTH** Local, regional, and global patterns of rock formations reveal changes over time due to Earth's forces such as earthquakes and volcanoes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (UE.ESS1C.a) ***As rocks and land formations change (e.g., Earth forces such as earthquakes and volcanoes), scientists are able to study the rock formations.*** ***The study of rock formations help explain how the landscape has changed over time.*** ***Rock formations can be examined to identify patterns in rock layers and fossils found in those rock layers.*** ***Patterns of rock formation can show the order in which rock layers were formed.*** ***Fossils in rock layers are evidence that Earth's surfaces have changed over time.***	**PATTERNS** Patterns can be used as evidence to support an explanation. ***Patterns can be used as evidence.*** ***Patterns can be used to support an explanation.***

Clarification Statement
Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water 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. Does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formation and layers.

Performance Expectation *and Louisiana Connectors*
4-ESS2-1 Plan and conduct investigations on the effects of water, ice, wind, and vegetation on the relative rate of weathering and erosion. ***LC-4-ESS2-1a Use data to compare differences in the shape of the land due to the effects of weathering or erosion.*** ***LC-4-ESS2-1b Identify how living things affect the shape of the land.***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Planning and carrying out investigations: Planning and carrying out investigations to answer questions (science) or test solutions (engineering) to problems in 3-5 builds on K-2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. ***Plan investigations collaboratively to produce data to serve as the basis for evidence.*** ***Conduct investigations collaboratively to produce data to serve as the basis for evidence.*** ***Plan investigations collaboratively using fair tests in which variables are controlled and the number of***	**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. (UE.ESS2A.a) ***Rainfall shapes the land.*** ***Rainfall affects living things.*** ***Water, ice, wind, and vegetation can break down rocks into smaller pieces.*** ***Water, ice, wind, and vegetation can break down soils and sediments into smaller pieces.*** ***Erosion is the movement of rocks, soil, and sediment from one place to another.*** ***Water, ice, wind, and vegetation can affect weathering and erosion by moving particles from one place to another.*** ***Ice erosion occurs when a large chunk of ice, usually a glacier, is moved (often due to gravity) and wears away the rocks or soil.*** ***Wind, or the movement of air, also causes erosion.*** ***Water or rainfall can chemically weather rocks.*** **BIOGEOLOGY** Living things affect the physical characteristics of their environment. (UE.ESS2E.a) ***Living organisms affect landforms.*** ***Living things impact the movement of rocks, soil, and sediments in different ways.*** ***Plants affect the environment in many ways; they die and decay and become part of the soil, some have roots that can stabilize or destabilize the soil.***	**CAUSE AND EFFECT** Cause and effect relationships are routinely identified, tested, and used to explain change. ***Cause and effect relationships may be identified.*** ***Cause and effect relationships may be tested.*** ***Cause and effect relationships may be used to explain change.***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
trials considered. ***Conduct investigations collaboratively using fair tests in which variables are controlled and the number of trials considered.***	***Animals affect the environment in many ways: some eat plants, they disturb rocks, soil, and sediment, some build dams or nests, others burrow into the ground.***	

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.

Performance Expectation *and Louisiana Connectors*
4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features. ***LC-4-ESS2-2a Use maps to locate different land and water features of Earth.*** ***LC-4-ESS2-2b Use maps to determine that earthquakes and volcanoes often occur along the boundaries between continents.***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Analyzing and interpreting data: Analyzing data in 3-5 builds on K-2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. • Analyze and interpret data to make sense of phenomena using logical reasoning. ***Use data to make sense of phenomena.*** ***Use logical reasoning to make sense of phenomena.*** ***Analyze data to make sense of phenomena.***	**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 of Earth. (UE.ESS2B.a) ***The locations of mountain ranges, deep ocean trenches, earthquakes, and volcanoes occur in patterns.*** ***Most earthquakes and volcanoes are located on the boundaries of continents.*** ***Mountains form inside continents or on their boundaries.*** ***Maps can be used to track and illustrate changes of land and water features over time.*** ***Maps can be used to determine where earthquakes, volcanoes, mountain chains, and other land and water features occur on Earth.***	**PATTERNS** Patterns can be used as evidence to support an explanation. ***A scientific explanation is supported by evidence.*** ***Patterns can be used as evidence.***

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.

Performance Expectation *and Louisiana Connectors*
4-ESS2-3 Ask questions that can be investigated and predict reasonable outcomes about how living things affect the physical characteristics of their environment. ***LC-4-ESS2-3a Identify how plants affect the environment (e.g., some have roots that can stabilize or destabilize the soil).*** ***LC-4-ESS2-3b Identify how animals affect the environment (e.g., they disturb rocks, soil, and sediment; some build dams or nests).***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Asking questions and defining problems: Asking questions (science) and defining problems (engineering) in 3-5 builds on K-2 experiences and progresses to specifying qualitative relationships. • Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. ***Scientific questions arise in a variety of ways.*** ***Ask scientific questions to which the answers can be supported through investigation.*** ***Questions can be about the prediction of outcomes based on cause and effect relationships.***	**BIOGEOLOGY** Living things affect the physical characteristics of their environment. (UE.ESS2E.a) ***Living organisms affect landforms.*** ***Living things impact the movement of rocks, soil, and sediments in different ways.*** ***Plants affect the environment in many ways; they die and decay and become part of the soil, some have roots that can stabilize or destabilize the soil.*** ***Animals affect the environment in many ways: some eat plants, they disturb rocks, soil, and sediment, some build dams or nests, others burrow into the ground.***	**CAUSE AND EFFECT** Cause and effect relationships are routinely identified, tested, and used to explain change. ***Cause and effect relationships may be identified.*** ***Cause and effect relationships may be tested.*** ***Cause and effect relationships may be used to explain change.***

Clarification Statement
Investigations include making observations in various habitats in real life or virtual circumstances. Living things could include animals such as beavers, crawfish, armadillos, nutria, gophers, and plants such as kudzu, water hyacinth, and Chinese tallow.

Performance Expectation *and Louisiana Connectors*
4-ESS3-1 Obtain and combine information to describe that energy and fuels are derived from renewable and non-renewable resources and how their uses affect the environment. ***LC-4-ESS3-1a Identify the origins of the natural sources humans use for energy and fuel.*** ***LC-4-ESS3-1b Identify environmental effects associated with the use of a given energy resource.***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Obtaining, evaluating, and communicating information: Obtaining, evaluating, and communicating information in 3-5 builds on K-2 experiences and progresses to evaluating the merit and accuracy of ideas and methods. • Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. ***Obtain and combine information from various books to explain phenomena.*** ***Obtain and combine information from various books to support a solution to a problem.*** ***Obtain and combine information from various forms of media to explain phenomena.*** ***Obtain and combine information from various forms of media to support a solution to a problem.***	**NATURAL RESOURCES** Energy and fuels (fossil fuels, wind energy, solar energy, hydroelectric energy) 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. (UE.ESS3A.a) ***Natural resources are materials found in nature that have not been made by people or animals.*** ***All of the energy and fuels that humans use come from natural resources.*** ***The use of natural resources by humans affects the environment.*** ***Humans can alter the living and non-living factors within an ecosystem, creating changes to the overall system.*** ***Different technologies are used to access resources to meet human wants and needs.*** ***Methods used to access resources for human wants and needs affect the environment.*** ***Some of these resources are renewable and can be used over or can be replaced.*** ***Some resources are non-renewable and are limited and cannot be replaced or reused.***	**CAUSE AND EFFECT** Cause and effect relationships are routinely identified, tested, and used to explain change. ***Cause and effect relationships may be identified.*** ***Cause and effect relationships may be tested.*** ***Cause and effect relationships may be used to explain change.***

Clarification Statement
Examples of renewable energy resources could include wind energy, hydroelectric energy, and solar energy; nonrenewable energy resources are fossil fuels. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning fossil fuels.

Performance Expectation *and Louisiana Connectors*
4-ESS3-2 Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. ***LC-4-ESS3-2a Describe solutions to reduce the impact of a natural Earth process (e.g., earthquake, flood, volcanic activity) on humans.***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Constructing explanations and designing solutions: Constructing explanations (science) and designing solutions (engineering) in 3-5 builds on K-2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. • Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. ***A design solution must include specifying constraints and criteria for desired qualities of the solution.*** ***Multiple solutions to a problem may be developed.*** ***Solutions can be compared.*** ***Comparisons should be based on how well each solution meets the constraints and criteria of the design.*** ***Design solutions can be revised and***	**NATURAL HAZARDS** A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (UE.ESS3B.a) ***Natural hazards are the result of natural processes.*** ***Earth's processes can affect human life.*** ***Humans can take steps to reduce the impacts that natural hazards have on humans.*** ***Among other things, structures can be built outside of the natural floodplains; structures can be built to prevent areas from flooding (levees, barrier islands); and forecasting can prevent loss of life.*** **DEVELOPING POSSIBLE SOLUTIONS TO ENGINEERING PROBLEMS** Testing a solution involves investigating how well it performs under a range of likely conditions. (UE.ETS1B.d) ***Part of the engineering process is testing a solution.*** ***Testing a possible solution to a problem will help show how well it is likely to meet the identified criteria for a successful solution under different conditions.*** ***Engineers test their solutions under many conditions to determine the strengths and weaknesses of the solution.***	**CAUSE AND EFFECT** Cause and effect relationships are routinely identified, tested, and used to explain change. ***Cause and effect relationships may be identified.*** ***Cause and effect relationships may be tested.*** ***Cause and effect relationships may be used to explain change.***

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
improved as part of the design process.		

Clarification Statement
Examples of solutions could include designing flood, wind, or earthquake resistant structures and models to prevent soil erosion.