Louisiana Connectors

Science

Kindergarten Science MOTION AND STABILITY: FORCES AND INTERACTIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
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.	**LC-K-PS2-1a** Identify the effect caused by different strengths or directions of pushes and pulls on the motion of an object.
	LC-K-PS2-1b Explain the effect of pushes and pulls on the motion of an object.
	LC-K-PS2-1c Identify the effect of different strengths and directions of pushes and pulls on the motion of an object.
	LC-K-PS2-1d Compare different strengths or different directions of pushes and pulls on an object.
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.	**LC-K-PS2-2a** Identify if something designed to push or pull an object makes it move the way it is intended.
	LC-K-PS2-2b Identify if something designed to change the speed of an object makes it move the way it is intended.
	LC-K-PS2-2c Identify if something designed to change the direction of an object makes it move the way it is intended.

Kindergarten Science ENERGY	
K-PS3-1 Make observations to determine the effect of sunlight on Earth's surface.	**LC-K-PS3-1a** Identify examples of sunlight heating different surfaces on Earth.
K-PS3-2 Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.	**LC-K-PS3-2a** Identify a design structure (e.g., umbrella, canopy, tent) that will reduce the warming caused by the sun.
	LC-K-PS3-2b Identify tools and materials that can be used to build a structure that will reduce the warming effect of sunlight on an area.

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Kindergarten Science FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSESS	
K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive.	**LC-K-LS1-1a** Identify that animals need water and food to live and grow.
	LC-K-LS1-1b Identify that plants need water and light to live and grow.
	LC-K-LS1-1c Identify patterns of what living things need to survive.

Kindergarten Science EARTH'S SYSTEMS	
K-ESS2-1 Use and share observations of local weather conditions to describe patterns over time.	**LC-K-ESS2-1a** Identify patterns in weather conditions using observations of local weather.
K-ESS2-2 Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.	**LC-K-ESS2-2a** Identify examples of how animals change their environments to meet their needs.
	LC-K-ESS2-2b Identify examples of how plants change their environments to meet their needs.
	LC-K-ESS2-2c Identify ways that humans can affect the environment in which they live.

Kindergarten Science EARTH AND HUMAN ACTIVITY	
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.	**LC-K-ESS3-1a** Given a model (e.g., representation, diagram, drawing), describe the relationship between the needs of different animals and the places they live (e.g., deer eat buds and leaves and live in forests).
K-ESS3-2 Ask questions to obtain information about the purpose of weather forecasting to prepare for and respond to severe weather.	**LC-K-ESS3-2a** Identify how weather forecasting can help people avoid the most serious impacts of severe weather events.
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.	**LC-K-ESS3-3a** Identify different solutions that people can apply to the way they live to reduce the impact on the land, water, air, and other living things.

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Grade 1 Science WAVES AND THEIR APPLICATIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
1-PS4-1 Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.	**LC-1-PS4-1a** Through collaborative investigations, recognize that sounds can cause materials to vibrate.
	LC-1-PS4-1b Through collaborative investigations, recognize that vibrating materials can make sound.
	LC-1-PS4-1c Use evidence to describe that vibrating materials can make sound.
	LC-1-PS4-1d Use evidence to describe that sound can make matter vibrate.
1-PS4-2 Make observations to construct an evidence-based account that objects can be seen only when illuminated.	**LC-1-PS4-2a** Through observations, recognize that objects can be seen only when illuminated by an external light source or when they give off their 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.	**LC-1-PS4-3a** Through collaborative investigations, recognize that some materials allow light to pass through them.
	LC-1-PS4-3b Through collaborative investigations, recognize that some materials allow only some light to pass through them.
	LC-1-PS4-3c Through collaborative investigations, recognize that some materials block all the 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.	**LC-1-PS4-4a** When using tools and materials to design and build a device, identify features of devices that people use to send and receive information over long distances.

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Grade 1 Science FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES	
Louisiana Student Standards	**Louisiana Connectors (LC)**
1-LS1-1 Use tools and 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.	**LC-1-LS1-1a** Identify how animals use their external parts to help them survive, grow, and meet their needs.
	LC-1-LS1-1b Identify how plants use their external parts to help them survive, grow, and meet their needs.
	LC-1-LS1-1c Identify a design solution to a human problem which is similar to how a plant or animal uses its external parts to help it survive, grow, and meet its needs.
1-LS1-2 Read grade-appropriate texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.	**LC-1-LS1-2a** Use texts or media to identify behaviors of offspring that help them survive.
	LC-1-LS1-2b Use texts or media to identify behaviors between parents and offspring that help the offspring survive.
	LC-1-LS1-2c Use texts or media to identify patterns in behavior between parents and offspring that help the offspring survive.

Grade 1 Science HEREDITY: INHERITANCE AND VARIATION OF TRAITS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
1-LS3-1 Make observations to construct an evidence-based account that young plants and animals are similar, but not exactly like, their parents.	**LC-1-LS3-1a** Make observations to identify a similarity or a difference in an external feature (e.g., shape of ears) between young animals and their parents.
	LC-1-LS3-1b Make observations to identify a similarity or a difference in an external feature (e.g., shape of leaves) between young plants and their parents.

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Grade 1 Science EARTH'S PLACE IN THE UNIVERSE	
Louisiana Student Standards	**Louisiana Connectors (LC)**
1-ESS1-1 Use observations of the sun, moon, and stars to describe patterns that can be predicted.	**LC-1-ESS1-1a** Use observations to describe patterns of movement of the sun, moon, and stars as seen from Earth.
	LC-1-ESS1-1b Use observations of patterns of movement to predict appearances of the sun or moon.
1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.	**LC-1-ESS1-2a** Use observations to make relative comparisons between the amount of daylight in the winter to the amount of daylight in the spring or fall.

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Grade 2 Science MATTER AND ITS INTERACTIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
2-PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.	**LC-2-PS1-1a** Use data to describe different kinds of materials by their observable properties (e.g., color, texture).
	LC-2-PS1-1b Use data to classify different kinds of materials by their observable properties (e.g., color, texture).
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.	**LC-2-PS1-2a** Match a property of a material (e.g., hard, flexible, absorbent) to a potential purpose (e.g., hardness of a wooden shelf results in it being better suited for supporting materials than a soft sponge).
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.	**LC-2-PS1-3a** Identify how a variety of objects can be built up from a small set of pieces.
2-PS1-4 Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.	**LC-2-PS1-4a** Identify examples of heating substances which cause changes that are sometimes reversible and sometimes not.
	LC-2-PS1-4b Identify examples of cooling substances which cause changes that are sometimes reversible and sometimes not.

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Grade 2 Science ECOSYSTEMS: INTERACTIONS, ENERGY, AND DYNAMICS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
2-LS2-1 Plan and conduct an investigation to determine if plants need sunlight and water to grow.	**LC-2-LS2-1a** Use data to describe that plants need water and light to grow.
2-LS2-2 Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.	**LC-2-LS2-2a** Identify that plants need animals to move their seeds around.
	LC-2-LS2-2b Identify a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

Grade 2 Science BIOLOGICAL EVOLUTION: UNITY AND DIVERSITY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
2-LS4-1 Make observations of plants and animals to compare the diversity of life in different habitats.	**LC-2-LS4-1a** Make observations to explain that different kinds of living things live in different habitats on land and in water.

Grade 2 Science EARTH'S PLACE IN THE UNIVERSE	
Louisiana Student Standards	**Louisiana Connectors (LC)**
2-ESS1-1 Use information from several sources to provide evidence that Earth events can occur quickly or slowly.	**LC-2-ESS1-1a** Use evidence to understand that some Earth events happen quickly and can be observed (e.g., flood, volcano eruption, earthquake, or erosion of soil).
	LC-2-ESS1-1b Use evidence to understand that some Earth events happen slowly (e.g., erosion or weathering of rocks).

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Grade 2 Science EARTH'S SYSTEMS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
2-ESS2-1 Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.	**LC-2-ESS2-1a** Identify a solution (e.g., using shrubs, grass, or trees) to slow or prevent wind from changing the shape of the land.
	LC-2-ESS2-2b Identify a solution (e.g., using shrubs, grass, or trees) to slow or prevent water from changing the shape of the land.
2-ESS2-2 Develop a model to represent the shapes and kinds of land and bodies of water in an area.	**LC-2-ESS2-2a** Use a model to Identify land features and bodies of water (e.g., hill, lake) in an area using a model.
2-ESS2-3 Obtain and communicate information to identify where water is found on Earth and that it can be solid or liquid.	**LC-2-ESS2-3a** Use information to identify that water is found in many types of places.
	LC-2-ESS2-3b Use information to identify that that water exists as solid ice and in liquid form.

Grade 3 Science MOTION AND STABILITY: FORCES AND INTERACTIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
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.	**LC-3-PS2-1a** Identify ways to change the motion of an object (e.g., number, size, or direction of forces).
	LC-3-PS2-1b Describe how objects in contact exert forces on each other.
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.	**LC-3-PS2-2a** Describe the patterns of an object's motion in various situations (e.g., a pendulum swinging, a ball moving on a curved track, a magnet repelling another magnet).
	LC-3-PS2-2b Predict future motion of an object given its pattern of motion.
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.	**LC-3-PS2-3a** Ask questions to identify cause and effect relationships of magnetic interactions between two objects not in contact with each other (e.g., how the orientation of magnets affects the direction of the magnetic force).
	LC-3-PS2-3b Ask questions to identify cause and effect relationships of electric interactions (e.g., the force on hair from an electrically charged balloon) between two objects not in contact with each other (e.g., how the distance between objects affects the strength of the force).
3-PS2-4 Define a simple design problem that can be solved by applying scientific ideas about magnets.	**LC-3-PS2-4a** Identify and describe the scientific ideas necessary for solving a given problem about magnets (e.g., size of the force depends on the properties of objects, distance between the objects, and orientation of magnetic objects relative to one another).

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Grade 3 Science FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES	
Louisiana Student Standards	**Louisiana Connectors (LC)**
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.	**LC-3-LS1-1a** Identify that organisms have unique and diverse life cycles.
	LC-3-LS1-1b Identify a common pattern between models of different life cycles.

Grade 3 Science ECOSYSTEMS: INTERACTIONS, ENERGY, AND DYNAMICS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
3-LS2-1 Construct and support an argument that some animals form groups that help members survive.	**LC-3-LS2-1a** Describe that animals within a group help the group obtain food for survival, defend themselves, and survive changes in their ecosystem.

Grade 3 Science HEREDITY: INHERITANCE AND VARIATION OF TRAITS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
3-LS3-1 Analyze and interpret data to provide evidence that plants and animals have traits inherited from their parents and that variation of these traits exists in a group of similar organisms.	**LC-3-LS3-1a** Identify similarities in the traits of a parent and the traits of an offspring.
	LC-3-LS3-1b Identify that characteristics of organisms are inherited from their parents.
	LC-3-LS3-1c Identify variations in similar traits in a group of similar organisms.
3-LS3-2 Use evidence to support the explanation that traits can be influenced by the environment.	**LC-3-LS3-1a** Identify examples of inherited traits that vary between organisms of the same type.
	LC-3-LS3-1b Identify a cause and effect relationship between an environmental factor and its effect on a given variation in a trait (e.g., not enough water produces plants that have fewer flowers than plants that had more water available).

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Grade 3 Science BIOLOGICAL EVOLUTION: UNITY AND DIVERSITY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
3-LS4-1 Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.	**LC-3-LS4-1a** Identify that fossils represent plants and animals that lived long ago.
	LC-3-LS4-1b Identify that fossils provide evidence about the environments in which organisms lived long ago (e.g., fossilized seashells indicate shelled organisms that lived in aquatic environments).
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.	**LC-3-LS4-2a** Identify features and characteristics that enable an organism to survive in a particular environment.
	LC-3-LS4-2b Identify features and characteristics that increase an organism's chances of finding mates.
	LC-3-LS4-2c Identify features and characteristics that increase an organism's chances of reproducing.
3-LS4-3 Construct and support an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.	**LC-3-LS4-3a** Identify changes in a habitat that would cause some organisms to move to new locations.
	LC-3-LS4-3b Identify changes in a habitat that would cause some organisms to die.
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.	**LC-3-LS4-4a** Identify evidence that supports a claim that changes in habitats affect the organisms living there.
	LC-3-LS4-4b Identify a solution to a problem that is caused when the environment changes.

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Grade 3 Science EARTH'S SYSTEMS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
3-ESS2-1 Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.	**LC-3-ESS2-1a** Use data to describe observed weather conditions (e.g., temperature, precipitation, wind direction) during a season.
	LC-3-ESS2-1b Use data to predict weather conditions (e.g., temperature, precipitation, wind direction) during a season.
3-ESS2-2 Obtain and combine information to describe climates in different regions around the world.	**LC-3-ESS2-2a** Identify and describe climates in different regions of the world (e.g., equatorial, polar).

Grade 3 Science EARTH AND HUMAN ACTIVITY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
3-ESS3-1 Make a claim about the merit of a design solution that reduces the impact of a weather-related hazard.	**LC-3-ESS3-1a** Identify the positive impact of a solution humans can take to reduce the impact of weather-related hazards (e.g., barriers to prevent flooding).

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Grade 4 Science ENERGY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
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.
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).
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).
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).

Grade 4 Science WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER	
Louisiana Student Standards	**Louisiana Connectors (LC)**
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.
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.

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Grade 4 Science FROM MOLECULES TO ORGANISMS: STRUCTURE AND PROCESSES	
Louisiana Student Standards	**Louisiana Connectors (LC)**
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.
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.

Grade 4 Science EARTH'S PLACE IN THE UNIVERSE	
Louisiana Student Standards	**Louisiana Connectors (LC)**
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.

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Grade 4 Science EARTH'S SYSTEM	
Louisiana Student Standards	**Louisiana Connectors (LC)**
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.
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.
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).

Grade 4 Science EARTH AND HUMAN ACTIVITY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
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.
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.

Grade 5 Science MATTER AND ITS INTERACTIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen.	**LC-5-PS1-1a** Identify in a model (e.g., picture, diagram) which shows that all matter can be broken down into smaller and smaller pieces until they are too small to be seen by human eyes.
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 amount of matter is conserved.	**LC-5-PS1-2a** Identify using measurements that the total weight of matter is conserved when it changes form.
	LC-5-PS1-2b Identify using measurements that the total weight of matter is conserved before and after they are heated, cooled, or mixed.
5-PS1-3 Make observations and measurements to identify materials based on their properties.	**LC-5-PS1-3a** Identify that materials can be classified based on a variety of observable physical properties (e.g., shape, texture, buoyancy, color, magnetism, solubility).
	LC-5-PS1-3b Classify materials (e.g., shape, texture, buoyancy, color, magnetism, solubility) by measurable physical properties.
5-PS1-4 Conduct an investigation to determine whether the mixing of two or more substances results in new substances.	**LC-5-PS1-4a** Identify that when two or more different substances are mixed, a new substance with different properties may be formed.
	LC-5-PS1-4b Identify the changes that occur when two or more substances are mixed using evidence provided from data.

Grade 5 Science MOTION AND STABILITY: FORCES AND INTERACTIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
5-PS2-1 Support an argument that the gravitational force exerted by the Earth is directed down.	**LC-5-PS2-1a** Identify that the gravitational force exerted by Earth on objects is directed down.

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Grade 5 Science MATTER AND ENERGY IN ORGANISMS AND ECOSYSTEMS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
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.	**LC-5-PS3-1a** Identify that the energy in animals' food was once energy from the sun.

Grade 5 Science FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES	
Louisiana Student Standards	**Louisiana Connectors (LC)**
5-LS1-1 Ask questions about how air and water affect the growth of plants.	**LC-5-LS1-1a** Identify that plants acquire material for growth chiefly from air and water, not from soil.

Grade 5 Science ECOSYSTEMS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.	**LC-5-LS2-1a** Identify a model that shows the movement of matter (e.g., plant growth, eating, composting) through living things.

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Grade 5 Science EARTH'S PLACE IN THE UNIVERSE	
Louisiana Student Standards	**Louisiana Connectors (LC)**
5-ESS1-1 Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.	**LC-5-ESS1-1a** Identify that the sun appears larger and brighter than other stars because the sun is much closer to Earth than other stars.
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.	**LC-5-ESS1-2a** Describe similarities and differences in the timing of observable changes in shadows.
	LC-5-ESS1-2b Describe similarities and differences in the timing of observable changes in day and night.
	LC-5-ESS1-2c Describe similarities and differences in the timing of observable changes in the appearance of stars that are visible only in particular months

Grade 5 Science EARTH'S SYSTEMS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.	**LC-5-ESS2-1a** Describe that the Earth's major systems interact and affect Earth's surface materials and processes.
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.	**LC-5-ESS2-2a** Determine that the majority of water on Earth is found in the oceans as salt water and most of the Earth's fresh water is stored in glaciers.

Grade 5 Science EARTH AND HUMAN ACTIVITY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
5-ESS3-1 Generate and compare multiple solutions about ways individual communities can use science to protect the Earth's resources and environment.	**LC-5-ESS3-1a** Identify ways people can help protect the Earth's resources and environment.

Grade 6 Science MATTER AND ITS INTERACTIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
6-MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures.	**LC-6-MS-PS1-1a** Identify a model that shows an atom's nucleus is made of protons and neutrons, and is surrounded by electrons.
	LC-6-MS-PS1-1b Identify a model that shows individual atoms of the same or different types that repeat to form compounds (e.g., sodium chloride).

Grade 6 Science MOTION AND STABILITY: FORCES AND INTERACTIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
6-MS-PS2-1 Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.	**LC-6-MS-PS2-1a** Describe the motion of two colliding objects in terms of the strength of the force and the relationship of action and reaction forces given a model or scenario.
	LC-6-MS-PS2-1b Develop a solution to a problem involving the motion of two colliding objects.
6-MS-PS2-2 Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	**LC-6-MS-PS2-2a** Identify using provided data, that a change in an object's motion is due to the mass of an object and the forces acting on that object.
6-MS-PS2-3 Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.	**LC-6-MS-PS2-3a** Identify that electricity can be used to produce magnetism, or magnetism can be used to make electricity.
	LC-6-MS-PS2-3b Examine data of objects (e.g., a model that demonstrates that a piece of metal, when magnetized by electricity, can pick up many times its own weight) to identify cause and effect relationships that affect electromagnetic forces.
6-MS-PS2-4 Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.	**LC-6-MS-PS2-4a** Using a chart displaying the mass of those objects and the strength of interaction, compare the magnitude of gravitational force on interacting objects of different mass (e.g., the Earth and the sun)
6-MS-PS2-5 Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.	**LC-6-MS-PS2-5a** Evaluate a change in the strength of a force (i.e., electric and magnetic) using data.
	LC-6-MS-PS2-5b Identify evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

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Grade 6 Science ENERGY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
6-MS-PS3-1 Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.	**LC-6-MS-PS3-1a** Use graphical displays of data to describe the relationship of kinetic energy to the mass of an object and to the speed of an object.
6-MS-PS3-2 Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.	**LC-6-MS-PS3-2a** Describe, using models, how changing distance changes the amount of potential energy stored in the system (e.g., carts at varying positions on a hill).

Grade 6 Science WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER	
Louisiana Student Standards	**Louisiana Connectors (LC)**
6-MS-PS4-1 Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave and how the frequency and wavelength change the expression of the wave.	**LC-6-MS-PS4-1a** Identify how the amplitude of a wave is related to the energy in a wave using a mathematical or graphical representation.
6-MS-PS4-2 Develop and use a model to describe that waves are refracted, reflected, absorbed, transmitted, or scattered through various materials.	**LC-6-MS-PS4-2a** Describe, using a model, how sound waves are reflected, absorbed, or transmitted through various materials (e.g., water, air, glass).
	LC-6-MS-PS4-2b Describe, using a model, how light waves are reflected, absorbed, or transmitted through various materials (e.g., water, air, glass).

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Grade 6 Science EARTH'S PLACE IN THE UNIVERSE	
Louisiana Student Standards	**Louisiana Connectors (LC)**
6-MS-ESS1-1 Develop and use a model of the Earth-sun-moon system to describe the reoccurring patterns of lunar phases, eclipses of the sun and moon, and seasons.	**LC-6-MS-ESS1-1a** Use an Earth-sun-moon model to show that the Earth-moon system orbits the sun once an Earth year and the orbit of the moon around Earth corresponds to a month.
	LC-6-MS-ESS1-1b Use an Earth-sun-moon model to explain eclipses of the sun and the moon.
	LC-6-MS-ESS1-1c Use an Earth-sun-moon model to explain how variations in the amount of the sun's energy hitting Earth's surface results in seasons.
6-MS-ESS1-2 Use a model to describe the role of gravity in the motions within galaxies and the solar system.	**LC-6-MS-ESS1-2a** Use a model to identify the solar system as one of many systems orbiting the center of the larger system of the Milky Way galaxy, which is one of many galaxy systems in the universe.
	LC-6-MS-ESS1-2b Use a model to describe the relationships and interactions between components of the solar system as a collection of many varied objects held together by gravity.
6- MS-ESS1-3 Analyze and interpret data to determine scale properties of objects in the solar system.	**LC-6-MS-ESS1-3a** Use data (e.g., statistical information, drawings and photographs, and models) to determine similarities and differences among solar system objects.

Grade 6 Science EARTH AND HUMAN ACTIVITY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
6-MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	**LC-6-MS-ESS3-4** Identify changes that human populations have made to Earth's natural systems using a variety of resources.

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Grade 6 Science FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES	
Louisiana Student Standards	**Louisiana Connectors (LC)**
6-MS-LS1-1 Conduct an investigation to provide evidence that living things are made of cells, either one or many different numbers and types.	**LC-6-MS-LS1-1a** Identify that living things may be made of one cell or many different numbers and types of cells.
6-MS-LS1-2 Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.	**LC-6-MS-LS1-2a** Using a model(s), identify the function of a cell as a whole.
	LC-6-MS-LS1-2b Using a model(s), identify special structures within cells are responsible for particular functions.
	LC-6-MS-LS1-2c Using a model(s), identify the components of a cell.
	LC-6-MS-LS1-2d Using a model(s), identify the functions of components of a cell.

Grade 6 Science ECOSYSTEMS: INTERACTIONS, ENERGY, AND DYNAMICS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
6-MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	**LC-6-MS-LS2-1a** Recognize data that shows growth of organisms and population increases are limited by access to resources.
	LC-6-MS-LS2-1b Identify factors (e.g., resources, climate or competition) in an ecosystem that influence growth in populations of organisms.
6-MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.	**LC-6-MS-LS2-2a** Use an explanation of interactions between organisms in an ecosystem to identify examples of competitive, predatory, or symbiotic relationships.
6-MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.	**LC-6-MS-LS2-3a** Using a model(s), describe energy transfer between producers and consumers in an ecosystem using a model (e.g., producers provide energy for consumers).
	LC-6-MS-LS2-3b Using a model(s), describe the cycling of matter among living and nonliving parts of a defined system (e.g., the atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem).

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Grade 7 Science MATTER AND ITS INTERACTIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
7-MS-PS1-2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	**LC-7-MS-PS2-1a** Using data, identify changes that occur after a chemical reaction has taken place (e.g., change in color occurs, gas is created, heat or light is given off or taken in).
7-MS-PS1-4 Develop a model that predicts and describes changes in particle motion, temperature, and the state of a pure substance when thermal energy is added or removed.	**LC-7-MS-PS1-4a** Use drawings and diagrams to Identify that adding or removing thermal energy increases or decreases particle motion until a change of state occurs.
7-MS-PS1-5 Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.	**LC-7-MS-PS1-5a** Use a model to identify a chemical reaction in which the mass of the reactants is shown to be equal to the mass of the products.
	LC-7-MS-PS1-5b Use a model to show how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

Grade 7 Science ENERGY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
7-MS-PS3-4 Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.	**LC-7-MS-PS3-4a** Using examples and data measurements, describe the relationship between different masses of the same substance and the change in average kinetic energy when thermal energy is added to or removed from the system.

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Grade 7 Science EARTH'S SYSTEMS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
7-MS-ESS2-4 Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.	**LC-7-MS-ESS2-4a** Using a model(s), identify components in a model of water cycling among land, ocean, and atmosphere, and recognize how it is propelled by sunlight and gravity.
7-MS-ESS2-5 Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.	**LC-7-MS-ESS2-5a** Using data, identify how water influences weather and weather patterns through atmospheric, land, and oceanic circulation.
	LC-7-MS-ESS2-5b Using data, identify examples of how the sun drives all weather patterns on Earth (e.g., flow of energy that moves through Earth's land, air, and water).
7-MS-ESS2-6 Develop and use a model to describe how unequal heating and rotation of the Earth causes patterns of atmospheric and oceanic circulation that determine regional climates.	**7-MS-ESS2-6a** Using a model(s), identify that as the sun's energy warms the air over the land (expands and rises), the air over the ocean (cooler air) rushes in to take its place and is called wind (sea breeze).
	7-MS-ESS2-6b Using a model(s), identify that weather and climate vary with latitude, altitude, and regional geography.

Grade 7 Science EARTH AND HUMAN ACTIVITY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
7-MS-ESS3-5 Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.	**LC-7-MS-ESS3-5a** Identify evidence of the effects of human activities on changes in global temperatures over the past century using a variety of resources (e.g., tables, graphs, and maps of global and regional temperatures; atmospheric levels of gases, such as carbon dioxide and methane; and rates of human activities).
	LC-7-MS-ESS3-5b Using a variety of resources, ask questions or make observations about how the effects of human activities have changed global temperatures.

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Grade 7 Science FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES	
Louisiana Student Standards	**Louisiana Connectors (LC)**
7-MS-LS1-3 Use an argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.	**LC-7-MS-LS1-3a** Identify that the body is a system of multiple interacting subsystems.
	LC-7-MS-LS1-3b Identify evidence which supports a claim about how the body is composed of various levels of organization for structure and function which includes cells, tissues, organs, organ systems, and organisms using models or diagrams.
7-MS-LS1-6 Construct a scientific explanation based on evidence for the role of photosynthesis and cellular respiration in the cycling of matter and flow of energy into and out of organisms.	**LC-MS-LS1-6** Use a scientific explanation about photosynthesis to identify the movement of matter and flow of energy as plants use the energy from light to make sugars.
7-MS-LS1-7 Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.	**LC-7-MS-LS1-7a** Use a model to identify the outcome of the process of breaking down food molecules (e.g., sugar) as the release of energy, which can be used to support other processes within the organism.

Grade 7 Science ECOSYSTEMS: INTERACTIONS, ENERGY, AND DYNAMICS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
7-MS-LS2-5 Undertake a design project that assists in maintaining diversity and ecosystem services.	**LC-7-MS-LS2-5a** Identify a design project that shows the stability of an ecosystem's biodiversity is the foundation of a healthy, functioning ecosystem.
7-MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	**LC-7-MS-LS2-4a** Using evidence, identify the outcome of changes in physical or biological components of an ecosystem to populations of organisms in that ecosystem.

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Grade 7 Science HEREDITY: INHERITANCE AND VARIATION OF TRAITS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
7-MS-LS3-2 Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.	**LC-7-MS-LS3-2a** Using a model(s), identify that in asexual reproduction identical inherited traits are passed from parents to offspring.
	LC-7-MS-LS3-2b Using a model(s), identify that in sexual reproduction a variety of inherited traits are passed from parents to offspring and lead to differences in offspring (e.g., eye color).

Grade 7 Science BIOLOGICAL EVOLUTION: UNITY AND DIVERSITY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
7-MS-LS4-4 Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.	**LC-7-MS-LS4-4a** Identify a similarity or difference in an external feature (e.g., shape of ears on animals or shape of leaves on plants) between young plants and animals and their parents.
	LC-7-MS-LS4-4b Describe the relationship between genetic variation and the success of organisms in a specific environment (e.g., individual organisms that have genetic variations and traits that are disadvantageous in a particular environment will be less likely to survive, and those traits will decrease from generation to generation due to natural selection).
7-MS-LS4-5 Gather, read, and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms.	**LC-7-MS-LS4-5a** Identify ways in which technologies (e.g., artificial selection for breeding of certain plants and animals) have changed the way humans influence the inheritance of desired traits in plants and animals.

Grade 8 Science MATTER AND ITS INTERACTIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
8-MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures.	**LC-8-MS-PS1-1a** Using a model(s), identify that an atom's nucleus as made of protons and neutrons and is surrounded by electrons.
	LC-8-MS-PS1-1b Using a model(s), identify that individual atoms of the same or different types that repeat to form extended structures (e.g., sodium chloride).
8-MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.	**LC-8-MS-PS1-3a** Compare and contrast characteristics of natural and synthetic materials (e.g., fibers) from provided information (e.g., text, media, visual displays, data).
	LC-8-MS-PS1-3b Identify ways in which natural resources undergo a chemical process to form synthetic materials (e.g., medicine, textiles, clothing) which impact society.
8-MS-PS1-6 Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.	**LC-8-MS-PS1-6a** Identify a chemical process that releases or absorbs thermal energy (e.g., dissolving ammonium chloride or calcium chloride) which, given the features of a problem, may provide a solution.
	LC-8-MS-PS1-6b Identify a way to test or modify a device that either releases or absorbs thermal energy by chemical processes

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Grade 8 Science ENERGY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
8-MS-PS3-3 Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.	**LC-8-MS-PS3-3a** Use information (e.g., graph, model) to identify a device (e.g., foam cup, insulated box) that either minimizes or maximizes thermal energy transfer (e.g., keeping liquids hot or cold).
8-MS-PS3-5 Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.	**LC-8-MS-PS3-5a** Using information from graphical displays of data and models, describe the change in the kinetic energy of an object as energy transferred to or from an object.

Grade 8 Science EARTH'S PLACE IN THE UNIVERSE	
Louisiana Student Standards	**Louisiana Connectors (LC)**
8-MS-ESS1-4 Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's geologic history.	**LC-8-MS-ESS1-4a** Sequence the relative order of events from Earth's history shown by rock strata and patterns of layering (organize was more complex as a task/term than sequence).

Grade 8 Science EARTH'S SYSTEMS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
8-MS-ESS2-1 Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.	**LC-8-MS-ESS2-1a** Identify relationships between components in a model showing the cycling of energy flows and matter within and among Earth's systems, including the sun and Earth's interior as primary energy sources.
8-MS-ESS2-2 Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.	**LC-8-MS-ESS2-2a** Identify examples of processes to explain that change Earth's surface at varying time and spatial scales that can be large (e.g., plate motions) or small (e.g., landslides).
8-MS-ESS2-3 Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and sea floor structures to provide evidence of the past plate motions.	**LC-8-MS-ESS2-3a** Using graphical displays of data, identify how the shapes of the continents (e.g., fit like a jigsaw puzzle) and fossil comparisons (e.g., fit together) along the edges of continents to demonstrate lithospheric plate movement.

Grade 8 Science EARTH AND HUMAN ACTIVITY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
8-MS-ESS3-1 Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.	**LC-8-MS-ESS3-1a** Identify explanations of the uneven distributions of Earth's minerals, energy, and groundwater resources due to past and current geoscience processes or by removal of resources.
8-MS-ESS3-2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.	**LC-8-MS-ESS3-2a** Use maps, charts, and images of natural hazards to look for patterns in past occurrences of catastrophic events in each of two regions to predict which location may receive a future similar catastrophic event.
	LC-8-MS-ESS3-2b Identify technologies that mitigate the effects of natural hazards (e.g., the design of buildings and bridges to resist earthquakes, storm shelters for tornados, levees along rivers to prevent flooding).
8-MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing human impact on the environment.	**LC-8-MS-ESS3-3** Using data from a design solution for minimizing a human impact on the environment, identify limitations of the solution.

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Grade 8 Science FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES	
Louisiana Student Standards	**Louisiana Connectors (LC)**
8-MS-LS1-4 Construct and use argument(s) based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of survival and successful reproduction of animals and plants respectively.	**LC-8-MS-LS1-4a** Identify behaviors animals engage in (e.g., vocalization) that increase the likelihood of reproduction.
	LC-8-MS-LS1-4b Identify specialized plant structures (e.g., bright flower parts) that increase the likelihood of reproduction.
8-MS-LS1-5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	**LC-8-MS-LS1-5a** Identify a scientific explanation for how environmental factors (e.g., availability of light, space, water, size of habitat) affect the growth of animals and plants.
	LC-8-MS-LS1-5b Identify a scientific explanation for how genetic factors (e.g., specific breeds of plants and animals and their typical sizes) affect the growth of animals and plants.

Grade 8 Science HEREDITY: INHERITANCE AND VARIATION OF TRAITS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
8-MS-LS3-1 Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.	**LC-8-MS-LS3-1a** Use a model to explain how genetic variations in specific traits may occur as organisms pass on their genetic material from one generation to the next, along with small changes.

Grade 8 Science BIOLOGICAL EVOLUTION: UNITY AND DIVERSITY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
8-MS-LS4-1 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.	**LC-8-MS-LS4-1a** Use data to identify that fossils of different animals that lived at different times are placed in chronological order (i.e., fossil record) and located in different sedimentary layers.
8-MS-LS4-2 Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.	**LC-8-MS-LS4-2a** Recognize that similarities and differences in external structures can be used to infer evolutionary relationships between living and fossil organisms.
	LC-8-MS-LS4-2b Identify an explanation of the evolutionary relationships between modern and fossil organisms.
8-MS-LS4-3 Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.	**LC-8-MS-LS4-3a** Identify patterns (i.e., pictorial displays, representations, data) in the embryological development as evidence of relationships among species.
8-MS-LS4-6 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations of species over time.	**LC-8-MS-LS4-6a** Analyze numerical data sets that represent a proportional relationship between some change in the environment and corresponding changes in genetic variation (i.e., traits) over time.

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Physical Science MATTER AND ITS INTERACTIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-PS1-1 Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level and the composition of the nucleus of atoms.	**LC-HS-PS1-1a** Identify the periodic table as a model to use to predict the properties of elements.
	LC-HS-PS1-1b Identify that the periodic table was created based on the patterns of electrons in the outermost energy level of atoms.
	LC-HS-PS1-1c Identify that the number of electrons in the outermost energy level of atoms impacts the behavior of the element.
	LC-HS-PS1-1d Identify the periodic table as a model that predicts the number of electrons and other subatomic particles.
HS-PS1-2 Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.	**LC-HS-PS1-2a** Identify an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms.
	LC-HS-PS1-2b Identify an explanation for the outcome of a simple chemical reaction based on trends in the periodic table.
	LC-HS-PS1-2c Construct an explanation for the outcome of a simple chemical reaction based on the chemical properties of the elements involved.
HS-PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	**LC-HS-PS1-7a** Identify a chemical equation, and identify the reactants and products which support the claim that matter (i.e., atoms) is neither created or destroyed in a chemical reaction.
	LC-HS-PS1-7b Identify a mathematical representation (e.g., table, graph) or pictorial depictions that illustrates the claim that mass is conserved during a chemical reaction.
HS-PS1-8 Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.	**LC-HS-PS1-8a** Identify models that illustrate nuclear processes (i.e., fusion, fission, and radioactive decays), involve the release or absorption of energy.
	LC-HS-PS1-8b Contrast changes during the processes of alpha, beta, or gamma radioactive decay using graphs or pictorial depictions of the composition of the nucleus of the atom and the energy released.

Physical Science MOTION AND STABILITY: FORCES AND INTERACTIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.	**LC-HS-PS2-1a** Predict changes in the motion of a macroscopic object, such as a falling object, an object rolling down a ramp, or a moving object being pulled by a constant force using data (e.g., tables or graphs of position or velocity as a function of time for an object subject to a net unbalanced force).
HS-PS2-2 Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.	**LC-HS-PS2-2a** Identify an example of the law of conservation of momentum (e.g., in a collision, the momentum change of an object is equal to and opposite of the momentum change of the other object) represented using graphical or visual displays (e.g., pictures, pictographs, drawings, written observations, tables, charts).
HS-PS2-3 Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.	**LC-HS-PS2-3a** Evaluate a device (e.g., football helmet or a parachute) designed to minimize force by comparing data (i.e., momentum, mass, velocity, force, or time).
HS-PS2-5 Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.	**LC-HS-PS2-5a** Identify situations and provide evidence where an electric current is producing a magnetic field.
	LC-HS-PS2-5b Identify situations and provide evidence where a magnetic field is producing an electric current.

Physical Science ENERGY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-PS3-2 Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles/objects and energy associated with the relative positions of particles/objects.	**LC-HS-PS3-2a** Identify that two factors, an object's mass and height above the ground, affect gravitational potential energy (i.e., energy stored due to position of an object above Earth) at the macroscopic level.
	LC-HS-PS3-2b Identify that the mass of an object and its speed determine the amount of kinetic energy the object possesses.
HS-PS3-3 Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.	**LC-HS-PS3-3a** Identify the forms of energy that will be converted by a device that converts one form of energy into another form of energy.
	LC-HS-PS3-3b Identify steps in a model of a device showing the transformations of energy that occur (e.g., solar cells, solar ovens, generators, turbines).
	LC-HS-PS3-3c Describe constraints to the design of the device which converts one form of energy into another form of energy (e.g., cost or efficiency of energy conversion).
HS-PS3-4 Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).	**LC-HS-PS3-4a** Identify the temperatures of two liquids of different temperature before mixing and after combining to show uniform energy distribution.
	LC-HS-PS3-4b Investigate the transfer of thermal energy when two substances are combined within a closed system.
HS-PS3-5 Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.	**LC-HS-PS3-5a** Use a model to identify the cause and effect relationships between forces produced by electric or magnetic fields and the change of energy of the objects in the system.

Physical Science WAVES AND THEIR APPLICATIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-PS4-1 Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.	**LC-HS-PS4-1a** Qualitatively describe cause and effect relationships between changes in wave speed and type of media through which the wave travels using mathematical and graphical representations.
	LC-HS-PS4-1b Identify examples that illustrate the relationship between the frequency and wavelength of a wave.
	LC-HS-PS4-1c Identify evidence that the speed of a wave depends on the media through which it travels.
PS4-4 Evaluate the validity and reliability of claims in published materials regarding the effects that different frequencies of electromagnetic radiation have when absorbed by matter.	**LC-PS4-4a** Recognize the relationship between the damage to living tissue from electromagnetic radiation and the energy of the radiation.

Chemistry MATTER AND ITS INTERACTIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-PS1-1 Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level and the composition of the nucleus of atoms.	**LC-HS-PS1-1a** Identify the periodic table as a model to use to predict the properties of elements.
	LC-HS-PS1-1b Identify that the periodic table was created based on the patterns of electrons in the outermost energy level of atoms.
	LC-HS-PS1-1c Identify that the number of electrons in the outermost energy level of atoms impacts the behavior of the element.
	LC-HS-PS1-1d Identify the periodic table as a model that predicts the number of electrons and other subatomic particles.
HS-PS1-2 Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.	**LC-HS-PS1-2a** Identify an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms.
	LC-HS-PS1-2b Identify an explanation for the outcome of a simple chemical reaction based on trends in the periodic table.
	LC-HS-PS1-2c Construct an explanation for the outcome of a simple chemical reaction based on the chemical properties of the elements involved.
HS-PS1-3 Plan and conduct an investigation to gather evidence to compare the structure of substances at the macroscale to infer the strength of electrical forces between particles.	**LC-HS-PS1-3a** Identify bulk properties of substances (i.e., melting point, boiling point, and surface tension).
	LC-HS-PS1-3b Identify that electrical forces within and between atoms can keep particles close together.
	LC-HS-PS1-3c Conduct an experiment to gather evidence of the strength of electrical forces between particles.
HS-PS1-4 Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.	**LC-HS-PS1-4a** Determine whether energy is released or absorbed in a chemical reaction system using various types of models (e.g., drawings, graphs, etc.).

Chemistry MATTER AND ITS INTERACTIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-PS1-5 Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.	**LC-HS-PS1-5a** Identify the effects of changing the temperature of the reacting particles at the rate at which a simple reaction (i.e., two reactants) occurs using a model (e.g., a table of data) of the number and energy of collisions between particles.
	LC-HS-PS1-5b Identify the effects of changing the concentration of the reacting particles at the rate at which a simple reaction (i.e., two reactants) occurs using a model (e.g., a table of data) of the number and energy of collisions between particles.
HS-PS1-6 Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.	**LC-HS-PS1-6a** Identify a change in one variable (i.e., temperature, concentration, pressure) of a chemical equation that would produce increased amounts of products at equilibrium.
HS-PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	**LC-HS-PS1-7a** Identify a chemical equation, and identify the reactants and products which support the claim that matter (i.e., atoms) is neither created or destroyed in a chemical reaction.
	LC-HS-PS1-7b Identify a mathematical representation (e.g., table, graph) or pictorial depictions that illustrates the claim that mass is conserved during a chemical reaction.
HS-PS1-8 Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.	**LC-HS-PS1-8a** Identify models that illustrate nuclear processes (i.e., fusion, fission, and radioactive decays), involve the release or absorption of energy.
	LC-HS-PS1-8b Contrast changes during the processes of alpha, beta, or gamma radioactive decay using graphs or pictorial depictions of the composition of the nucleus of the atom and the energy released.

Chemistry MOTION AND STABILITY: FORCES AND INTERACTIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-PS2-6 Communicate scientific and technical information about why the atomic-level, subatomic-level, and/or molecular level structure is important in the functioning of designed materials.	**LC-HS-PS2-6a** Communicate that different materials have different molecular structures and properties which determine different functioning of the material (e.g., flexible, but durable).

Chemistry ENERGY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-PS3-1 Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.	**LC-HS-PS3-1a** Identify a model showing the change in the energy of one component in a system compared to the change in energy of another component in the system.
	LC-HS-PS3-1b Identify a model showing the change in energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.
HS-PS3-3 Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.	**LC-HS-PS3-3a** Identify the forms of energy that will be converted by a device that converts one form of energy into another form of energy.
	LC-HS-PS3-3b Identify steps in a model of a device showing the transformations of energy that occur (e.g., solar cells, solar ovens, generators, turbines).
	LC-HS-PS3-3c Describe constraints to the design of the device which converts one form of energy into another form of energy (e.g., cost or efficiency of energy conversion).
HS-PS3-4 Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).	**LC-HS-PS3-4a** Identify the temperatures of two liquids of different temperature before mixing and after combining to show uniform energy distribution.
	LC-HS-PS3-4b Investigate the transfer of thermal energy when two substances are combined within a closed system.
HS-PS3-6 Evaluate the validity and reliability of claims in published materials about the viability of nuclear power as a source of alternative energy relative to other forms of energy (e.g., fossil fuels, wind, solar, geothermal).	**LC-HS-PS3-6a** Identify the relationship between increasing energy demand and the technologies developed to meet these needs.
	LC-HS-PS3-6b Identify an alternative energy system with minimal social and environmental consequences.
	LC-HS-PS3-6c Evaluate a claim about nuclear energy as an alternative source of energy as opposed to other forms of energy.

Physics MOTION AND STABILITY: FORCES AND INTERACTIONS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.	**LC-HS-PS2-1a** Predict changes in the motion of a macroscopic object, such as a falling object, an object rolling down a ramp, or a moving object being pulled by a constant force using data (e.g., tables or graphs of position or velocity as a function of time for an object subject to a net unbalanced force).
HS-PS2-2 Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.	**LC-HS-PS2-2a** Identify an example of the law of conservation of momentum (e.g., in a collision, the momentum change of an object is equal to and opposite of the momentum change of the other object) represented using graphical or visual displays (e.g., pictures, pictographs, drawings, written observations, tables, charts).
HS-PS2-3 Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.	**LC-HS-PS2-3a** Evaluate a device (e.g., football helmet or a parachute) designed to minimize force by comparing data (i.e., momentum, mass, velocity, force, or time).
HS-PS2-4 Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.	**LC-HS-PS2-4a** Use Newton's law of universal gravitation as a mathematical model to qualitatively describe or predict the effects of gravitational forces in systems with two objects.
	LC-HS-PS2-4b Use Coulomb's law to qualitatively describe or predict the electrostatic forces in systems with two objects.
HS-PS2-5 Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.	**LC-HS-PS2-5a** Identify situations and provide evidence where an electric current is producing a magnetic field.
	LC-HS-PS2-5b Identify situations and provide evidence where a magnetic field is producing an electric current.

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Physics ENERGY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-PS3-1 Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.	**LC-HS-PS3-1a** Identify a model showing the change in the energy of one component in a system compared to the change in energy of another component in the system.
	LC-HS-PS3-1b Identify a model showing the change in energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.
HS-PS3-2 Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects).	**LC-HS-PS3-2a** Identify that two factors, an object's mass and height above the ground, affect gravitational potential energy (i.e., energy stored due to position of an object above Earth) at the macroscopic level.
	LC-HS-PS3-2b Identify that the mass of an object and its speed determine the amount of kinetic energy the object possesses.
HS-PS3-3 Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.	**LC-HS-PS3-3a** Identify the forms of energy that will be converted by a device that converts one form of energy into another form of energy.
	LC-HS-PS3-3b Identify steps in a model of a device showing the transformations of energy that occur (e.g., solar cells, solar ovens, generators, turbines).
	LC-HS-PS3-3c Describe constraints to the design of the device which converts one form of energy into another form of energy (e.g., cost or efficiency of energy conversion).
HS-PS3-4 Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).	**LC-HS-PS3-4a** Identify the temperatures of two liquids of different temperature before mixing and after combining to show uniform energy distribution.
	LC-HS-PS3-4b Investigate the transfer of thermal energy when two substances are combined within a closed system.
HS-PS3-5 Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.	**LC-HS-PS3-5a** Use a model to identify the cause and effect relationships between forces produced by electric or magnetic fields and the change of energy of the objects in the system.

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Physics WAVES AND THIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-PS4-1 Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.	**LC-HS-PS4-1a** Qualitatively describe cause and effect relationships between changes in wave speed and type of media through which the wave travels using mathematical and graphical representations.
	LC-HS-PS4-1b Identify examples that illustrate the relationship between the frequency and wavelength of a wave.
	LC-HS-PS4-1c Identify evidence that the speed of a wave depends on the media through which it travels.
HS-PS4-3 Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.	**LC-HS-PS4-3a** Identify a model or description of electromagnetic radiation as a wave model.
	LC-HS-PS4-3b Identify a model or description of electromagnetic radiation as a particle model.

Earth Science EARTH'S PLACE IN THE UNIVERSE	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-ESS1-1 Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation.	**LC-HS-ESS1-1a** Describe components of a model illustrating that the sun shines because of nuclear fusion reactions which release light and heat energy which make life on Earth possible.
HS-ESS1-3 Communicate scientific ideas about the way stars, over their life cycle, produce elements.	**LC-HS-ESS1-3a** Communicate by using models that solar activity creates elements through nuclear fusion.
HS-ESS1-4 Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.	**LC-HS-ESS1-4a** Recognize that objects in the solar system orbit the sun and have an orderly motion (e.g., elliptical paths around the sun).
	LC-HS-ESS1-4b Relate Earth's orbital characteristics to other bodies in the solar system.
	LC-HS-ESS1-4c Use a mathematical or computational representation to predict the motion of orbiting objects in the solar system.
HS-ESS1-5 Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.	**LC-HS-ESS1-5a** Explain the relationship between the motion of continental plates and how materials of different ages are arranged on Earth's surface.
	LC-HS-ESS1-5b Relate/evaluate evidence of past and/or current movements in Earth's crust (plate tectonics) with the ages of crustal rocks.

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Earth Science HISTORY OF EARTH	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-ESS1-6 Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.	**LC-HS-ESS1-6a** Identify ancient Earth materials, lunar rocks, asteroids, and meteorites as sources of evidence scientists use to understand Earth's early history.

Earth Science SPACE SYSTEMS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-ESS1-2 Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.	**LC-HS-ESS1-2a** Identify that the universe is expanding and must have been smaller in the past based on astronomical evidence (i.e., light spectra, motion of distant galaxies, and composition of matter in the universe).

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Earth Science EARTH'S SYSTEMS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-ESS2-1 Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.	**LC-HS-ESS2-1a** Use a model of Earth to identify that the motion of the mantle and its plates occurs primarily through thermal convection, which is primarily driven by radioactive decay within Earth's interior.
HS-ESS2-2 Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth's systems.	**LC-HS-ESS2-2a** Identify relationships, using a model, of how the Earth's surface is a complex and dynamic set of interconnected systems (i.e., geosphere, hydrosphere, atmosphere, and biosphere).
HS-ESS2-3 Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.	**LC-HS-ESS2-3a** Use a model of Earth to identify that the motion of the mantle and its plates occurs primarily through thermal convection, which is primarily driven by radioactive decay within Earth's interior.
HS-ESS2-4 Analyze and interpret data to explore how variations in the flow of energy into and out of Earth's systems result in changes in atmosphere and climate.	**LC-HS-ESS2-4a** Identify different causes of climate change and results of those changes with respect to the Earth's surface temperatures, precipitation patterns or sea levels over a wide range of temporal and spatial scales using a model.
HS-ESS2-5 Plan and conduct an investigation on the properties of water and its effects on Earth materials and surface processes.	**LC-HS-ESS2-5a** Identify a connection between the properties of water and its effects on Earth materials.
	LC-HS-ESS2-5b Investigate the effects of water on Earth materials and/or surface processes.
HS-ESS2-6 Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.	**LC-HS-ESS2-6a** Use a model of photosynthesis to identify that carbon is exchanged between living and nonliving systems.
	LC-HS-ESS2-6b Use a model of cellular respiration to identify that carbon is exchanged between living and nonliving systems.
	LC-HS-ESS2-6c Develop and/or use a quantitative model to identify relative amount of and/or the rate at which carbon is transferred among hydrosphere, atmosphere, geosphere, and biosphere.
HS-ESS2-7 Construct an argument based on evidence about the simultaneous coevolution of Earth systems and life on Earth.	**LC-HS-ESS2-7a** Identify examples of coevolution of Earth's systems and the evolution of life on Earth.

	LC-HS-ESS2-7b Identify evidence (e.g., causal links and/or feedback mechanisms between changes in the biosphere and changes in Earth's other systems) in an argument that there is simultaneous coevolution of Earth's systems and life on Earth.

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Earth Science HUMAN SUSTAINABILITY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.	**LC-HS-ESS3-1a** Explain the relationship between human activity (e.g., population size, where humans live, types of crops grown) and changes in the amounts of natural resources using evidence.
	LC-HS-ESS3-1b Explain the relationship between human activity (e.g., population size, where humans live, types of crops grown) and changes in the occurrence of natural hazards using evidence.
HS-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.	**LC-HS-ESS3-2a** Identify a solution that demonstrates the most preferred cost-benefit ratios for developing, managing, and utilizing energy and mineral resources (i.e., conservation, recycling, and reuse of resources).
	LC-HS-ESS3-2b Compare design solutions for developing, managing, and/or utilizing energy or mineral resources.
HS-ESS3-3 Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.	**LC-HS-ESS3-3a** Use numerical data to determine the effects of a conservation strategy to manage natural resources and to sustain human society and plant and animal life.
HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.	**LC-HS-ESS3-4a** Connect a technological solution (e.g., wet scrubber; baghouse) to its outcome (e.g., clean air) and its outcome to the human activity impact that it is reducing (e.g., air pollution).
HS-ESS3-5 Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.	**LC-ESS3-5a** Use geoscience data to determine the relationship between a change in climate (e.g., precipitation, temperature) and its impact in a region.
HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.	**LC-HS-ESS3-6a** Use representations to describe the relationships among Earth systems and how those relationships are being modified due to human activity (e.g., increase in atmospheric carbon dioxide, increase in ocean acidification, effects on organisms in the ocean (coral reef), carbon cycle of the ocean, possible effects on marine populations).

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Life Science FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-LS1-1 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	**LC-HS-LS1-1a** Relate DNA molecules to the way cells store and use information to guide their functions.
	LC-HS-LS1-1b Relate groups of specialized cells (e.g., heart cells, nerve cells, muscle cells, epithelial cells, fat cells, blood cells) within organisms to the performance of essential functions of life.
	LC-HS-LS1-1c Identify evidence supporting an explanation of how a substance called DNA carries genetic information in all organisms which codes for the proteins that are essential to an organism.
HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	**LC-HS-LS1-2a** Using model(s), identify that different systems of the body carry out essential functions (e.g., digestive system, respiratory system, circulatory system, nervous system).
	LC-HS-LS1-2b Using model(s), identify the hierarchical organization of systems that perform specific functions within multicellular organisms.
HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis in living organisms.	**LC-HS-LS1-3a** Identify how different organisms react (e.g., heart rate, body temperature) to changes in their external environment.
	LC-HS-LS1-3b Identify examples of how organisms use feedback mechanisms to maintain dynamic homeostasis.
HS-LS1-4 Use a model to illustrate the role of the cell cycle and differentiation in producing and maintaining complex organisms.	**LC-HS-LS1-4a** Identify how growth and/or maintenance (repair/replacement) occurs when cells multiply (i.e., mitosis) using a model.
HS-LS1-5 Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	**LC-HS-LS1-5a** Identify model of photosynthesis, which shows the conversion of light energy to stored chemical energy.
HS-LS1-6 Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.	**LC-HS-LS1-6a** Using a model(s), identify how organisms take in matter and rearrange the atoms in chemical reactions to form different products allowing for growth and maintenance.
HS-LS1-7 Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen	**LC-HS-LS1-7a** Using a model(s), identify respiration as the transfer of stored energy to the cell to sustain life's processes (i.e., energy to muscles or energy for maintaining body temperature).

Life Science FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES	
Louisiana Student Standards	**Louisiana Connectors (LC)**
molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.	
HS-LS1-8 Obtain, evaluate, and communicate information about (1) viral and bacterial reproduction and adaptation, (2) the body's primary defenses against infection, and (3) how these features impact the design of effective treatment.	**LC-LS1-8a** Identify the process by which a virus uses a host cell's functions to make new viruses.
	LC-LS1-8b Recognize that most bacteria reproduce asexually resulting in two cells exactly like the parent cell.
	LC-LS1-8c Identify ways to protect against infectious diseases to maintain a body's health (e.g., eat nutritious food, washing hands, rest, exercise, etc.).
	LC-LS1-8d Identify treatments and/or prevention of viral and/or bacterial infections (e.g., antibiotics and vaccines).

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Life Science ECOSYSTEMS: INTERACTIONS, ENERGY AND DYNAMICS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-LS2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity, biodiversity and populations of ecosystems at different scales.	**LC-HS-LS2-1a** Recognize that the carrying capacities of ecosystems are related to the availability of living and nonliving resources and challenges (e.g., predation, competition, disease).
	LC-HS-LS2-1b Use a graphical representation to identify carrying capacities in ecosystems as limits to the numbers of organisms or populations they can support.
HS-LS2-4 Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	**LC-HS-LS2-4a** Use a graphical or mathematical representation to identify the changes in the amount of matter as it travels through a food web.
	LC-HS-LS2-4b Use a graphical or mathematical representation to identify the changes in the amount of energy as it travels through a food web.
HS-LS2-6 Evaluate the claims, evidence and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	**LC-HS-LS2-6a** Use evidence to identify how modest biological or physical changes versus extreme changes affect stability and change (e.g., number and types of organisms) in ecosystems.
	LC-HS-LS2-6b Evaluate explanations of how living things in an ecosystem are affected by changes in the environment (e.g., changes to the food supply, climate change, or the introduction of predators).
	LC-HS-LS2-6c Evaluate explanations of how interactions in ecosystems maintain relatively stable conditions, but changing conditions may result in a new ecosystem.
HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	**LC-HS-LS2-7a** Describe how people can help protect the Earth's environment and biodiversity (e.g., preserving ecosystems) and how a human activity would threaten Earth's environment and biodiversity (e.g., pollution, damaging habitats, over hunting).
	LC-HS-LS2-7b Evaluate or refine a solution to changes in an ecosystem (biodiversity) resulting from a human activity.

Life Science HEREDITY: INHERITANCE AND VARIATION OF TRAITS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-LS3-1 Formulate, refine, and evaluate questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	**LC-HS-LS3-1a** Identify that DNA molecules in all cells contain the instructions for traits passed from parents to offspring.
	LC-HS-LS3-1b Identify appropriate questions about the relationships between DNA and chromosomes and how traits are passed from parents to offspring.
HS-LS3-2 Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	**LC-HS-LS3-2a** Identify a model showing evidence that parents and offspring may have different traits.
	LC-HS-LS3-2b Identify that meiosis is a process which distributes genetic material among the new cells (i.e., gametes) produced, which results in genetic variation.
	LC-HS-LS3-2c Identify that when DNA makes a copy of itself, sometimes errors occur that may lead to genetic variations.
	LC-HS-LS3-2d Identify examples of mutations in DNA caused by environmental factors.
	LC-HS-LS3-2e Use evidence to support a claim about a source of inheritable genetic variations.
HS-LS3-3 Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	**LC-HS-LS3-3a** Calculate the probability (e.g., two out of four) of a particular trait in an offspring based on a completed Punnett square.
	LC-HS-LS3-3b Identify examples, using data, of environmental factors which affect the expression of traits, and so then affect the probability of occurrences of traits in a population.

Life Science BIOLOGICAL EVOLUTION: UNITY AND DIVERSITY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-LS4-1 Analyze and interpret scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	**LC-HS-LS4-1a** Identify patterns (e.g., DNA sequences, fossil records) as evidence to a claim of common ancestry.
HS-LS4-2 Construct an explanation based on evidence that biological diversity is influenced by (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	**LC-HS-LS4-2a** Recognize that as a species grows in number, competition for limited resources also increases.
	LC-HS-LS4-2b Recognize that different individuals have specific traits that give advantages (e.g., survive and reproduce at higher rates) over other individuals in the species.
	LC-HS-LS4-2c Identify how evolution may be a result of genetic variation through mutations and sexual reproduction in a species that is passed on to their offspring.
HS-LS4-3 Apply concepts of statistics and probability to support explanations that populations of organisms adapt when an advantageous heritable trait increases in proportion to organisms lacking this trait.	**LC-HS-LS4-3a** Use patterns in data to identify how heritable variations in a trait may lead to an increasing proportion of individuals within a population with that trait (i.e., an advantageous characteristic).
HS-LS4-4 Construct an explanation based on evidence for how natural selection and other mechanisms lead to genetic changes in populations.	**LC-HS-LS4-4a** Use data to provide evidence for how specific biotic or abiotic differences in ecosystems (e.g., ranges of seasonal temperature, acidity, light, geographic barriers) support the claim that organisms with an advantageous heritable trait are better able to survive over time.
HS-LS4-5 Evaluate evidence supporting claims that changes in environmental conditions can affect the distribution of traits in a population causing: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	**LC-HS-LS4-5a** Identify the relationship between naturally occurring or human-induced changes in the environment (e.g., drought, flood, deforestation, fishing, application of fertilizers) and the expression of traits in a species (e.g., peppered moth studies).
	LC-HS-LS4-5b Identify the relationship between naturally occurring or human-induced changes in the environment (e.g., drought, flood, deforestation, fishing, application of fertilizers) and the emergence of new species over time.
	LC-HS-LS4-5c Identify that species become extinct because they can no longer survive and reproduce given changes in the environment.

Environmental Science RESOURCES AND RESOURCE MANAGEMENT	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-EVS1-1 Analyze and interpret data to identify the factors that affect sustainable development and natural resource management in Louisiana.	**LC-HS-EVS1-1a** Identify factors (e.g., human activity, population size, types of crops grown) that affect sustainable development in Louisiana.
	LC-HS-EVS1-1b Identify factors (e.g., human activity, population size, types of crops grown) that affect natural resource management in Louisiana.
HS-EVS1-2 Obtain, evaluate and communicate information on the effectiveness of management or conservation practices for one of Louisiana's natural resources with respect to common considerations such as social, economic, technological, and influencing political factors over the past 50 years.	**LC-HS-EVS1-2a** Identify the effectiveness of management practices for one of Louisiana's natural resources related to social factors over the past 50 years.
	LC-HS-EVS1-2b Identify the effectiveness of management practices for one of Louisiana's natural resources related to economic factors over the past 50 years.
	LC-HS-EVS1-2c Identify the effectiveness of management practices for one of Louisiana's natural resources related to technological factors over the past 50 years.
	LC-HS-EVS1-2d Identify the effectiveness of management practices for one of Louisiana's natural resources related to political factors over the past 50 years.
HS-EVS1-3 Analyze and interpret data about the consequences of environmental decisions to determine the risk-benefit values of actions and practices implemented for selected issues.	**LC-HS-EVS1-3a** Identify the risk-benefit values of implemented actions using data for selected environmental issues.
	LC-HS-ESV1-3b Identify the risk-benefit values of implemented practices using data for selected environmental issues.

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Environmental Science ENVIRONMENTAL AWARENESS AND PROTECTION	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-EVS2-1 Design and evaluate a solution to limit the introduction of non-point source pollution into state waterways.	**LC-HS-EVS2-1a** Use data or qualitative scientific and technical information to evaluate a solution to limit a non-point source pollution (e.g., land or urban runoff, abandoned mines) into state waterways.
HS-EVS2-2 Use a model to predict the effects that pollution as a limiting factor has on an organism's population density.	**LC-HS-EVS2-2a** Recognize the relationship between pollution and its effect on an organism's population size.
	LC-HS-EVS2-2b Predict the effects that pollution as a limiting factor has on an organism's population density using a model (e.g., mathematical, diagrams, simulations).
HS-EVS2-3 Use multiple lines of evidence to construct an argument addressing the negative impacts that introduced organisms have on Louisiana's native species.	**LC-HS-EVS2-3a** Evaluate evidence supporting an argument regarding negative impacts of introduced organisms (e.g., zebra mussel, fire ant, nutria) have on Louisiana's native species.

Environmental Science PERSONAL RESPONSIBILITIES	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-EVS3-1 Construct and evaluate arguments about the positive and negative consequences of using disposable resources versus reusable resources.	**LC-HS-EVS3-1** Evaluate evidence supporting the positive consequences of using disposable resources versus reusable resources.
	LC-HS-EVS3-2 Evaluate evidence supporting the negative consequences of using disposable resources versus reusable resources.

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Environmental Science EARTH'S SYSTEMS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-ESS2-2 Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth's systems.	**LC-HS-ESS2-2a** Identify relationships, using a model, of how the Earth's surface is a complex and dynamic set of interconnected systems (i.e., geosphere, hydrosphere, atmosphere, and biosphere).
HS-ESS2-4 Analyze and interpret data to explore how variations in the flow of energy into and out of Earth's systems result in changes in atmosphere and climate.	**LC-HS-ESS2-4a** Identify different causes of climate change and results of those changes with respect to the Earth's surface temperatures, precipitation patterns or sea levels over a wide range of temporal and spatial scales using a model.
HS-ESS2-5 Plan and conduct an investigation on the properties of water and its effects on Earth materials and surface processes.	**LC-HS-ESS2-5a** Identify a connection between the properties of water and its effects on Earth materials.
	LC-HS-ESS2-5b Investigate the effects of water on Earth materials and/or surface processes.
HS-ESS2-6 Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.	**LC-HS-ESS2-6a** Use a model of photosynthesis to identify that carbon is exchanged between living and nonliving systems.
	LC-HS-ESS2-6b Use a model of cellular respiration to identify that carbon is exchanged between living and nonliving systems.
	LC-HS-ESS2-6c Develop and/or use a quantitative model to identify relative amount of and/or the rate at which carbon is transferred among hydrosphere, atmosphere, geosphere, and biosphere.

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Environmental Science HUMAN SUSTAINABILITY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.	**LC-HS-ESS3-1a** Explain the relationship between human activity (e.g., population size, where humans live, types of crops grown) and changes in the amounts of natural resources using evidence.
	LC-HS-ESS3-1b Explain the relationship between human activity (e.g., population size, where humans live, types of crops grown) and changes in the occurrence of natural hazards using evidence.
HS-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.	**LC-HS-ESS3-2a** Identify a solution that demonstrates the most preferred cost-benefit ratios for developing, managing, and utilizing energy and mineral resources (i.e., conservation, recycling, and reuse of resources).
	LC-HS-ESS3-2b Compare design solutions for developing, managing, and/or utilizing energy or mineral resources.
HS-ESS3-3 Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.	**LC-HS-ESS3-3** Use numerical data to determine the effects of a conservation strategy to manage natural resources and to sustain human society and plant and animal life.
HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.	**LC-HS-ESS3-4a** Connect a technological solution (e.g., wet scrubber; baghouse) to its outcome (e.g., clean air) and its outcome to the human activity impact that it is reducing (e.g., air pollution).
HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.	**LC-HS-ESS3-6a** Use representations to describe the relationships among Earth systems and how those relationships are being modified due to human activity (e.g., increase in atmospheric carbon dioxide, increase in ocean acidification, effects on organisms in the ocean (coral reef), carbon cycle of the ocean, possible effects on marine populations).

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Environmental Science ECOSYSTEMS: INTERACTIONS, ENERGY AND DYNAMIC	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-LS2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity, biodiversity and populations of ecosystems at different scales.	**LC-HS-LS2-1a** Recognize that the carrying capacities of ecosystems are related to the availability of living and nonliving resources and challenges (e.g., predation, competition, disease).
	LC-HS-LS2-1b Use a graphical representation to identify carrying capacities in ecosystems as limits to the numbers of organisms or populations they can support.
HS-LS2-4 Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	**LC-HS-LS2-4a** Use a graphical or mathematical representation to identify the changes in the amount of matter as it travels through a food web.
	LC-HS-LS2-4b Use a graphical or mathematical representation to identify the changes in the amount of energy as it travels through a food web.
HS-LS2-6 Evaluate the claims, evidence and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	**HS-LS2-6a** Use evidence to identify how modest biological or physical changes versus extreme changes affect stability and change (e.g., number and types of organisms) in ecosystems.
	HS-LS2-6b Evaluate explanations of how living things in an ecosystem are affected by changes in the environment (e.g., changes to the food supply, climate change, or the introduction of predators).
	HS-LS2-6c Evaluate explanations of how interactions in ecosystems maintain relatively stable conditions, but changing conditions may result in a new ecosystem.
HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	**LC-HS-LS2-7a** Describe how people can help protect the Earth's environment and biodiversity (e.g., preserving ecosystems) and how a human activity would threaten Earth's environment and biodiversity (e.g., pollution, damaging habitats, over hunting).
	LC-HS-LS2-7b Evaluate or refine a solution to changes in an ecosystem (biodiversity) resulting from a human activity.