Louisiana Believes

Crosswalk for Louisiana Student Standards for Science and NGSS: 4th grade

This document provides guidance to assist teachers, schools, and systems with determining alignment to Louisiana Student Standards for Science for resources designed for the Next Generation Science Standards. This guidance document is considered a "living" document, as we believe that teachers and other educators will find ways to improve the document as they use it. Please send feedback to STEM@la.gov so that we may use your input when updating this guide.

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DEPARTMENT of EDUCATION
Louisiana Believes

ENERGY	**4-PS3-1**
LSSS	**NGSS**
Use evidence to construct an explanation relating the speed of an object to the energy of that object.	
Clarification Statement	
Relating the speed of an object to the energy of the object does not require calculation of the object's speed	Assessment does not include quantitative measures of changes in the speed of an object or on any precise or quantitative definition of energy.
Science and Engineering Practice:	Constructing explanations and designing solutions
Disciplinary Core Ideas:	Definitions of energy
The faster a given object is moving, the more energy it possesses. (UE.PS3A.a)	
Crosscutting Concepts:	Energy and matter
Energy can be transferred in various ways and between objects.	

Underlined sections denote **information that does **not** appear in both sets of standards.*

ENERGY	**4-PS3-2**
LSSS	**NGSS**
Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.	
Clarification Statement	
When energy is transferred it may change forms such as when light from the sun warms a window panel.	Assessment does not include quantitative measurements of energy
Science and Engineering Practice:	Planning and carrying out Investigations
Disciplinary Core Ideas:	Definitions of energy
Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (UE.PS3A.b)	
Disciplinary Core Ideas:	Conservation of energy and energy transfer
Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (UE.PS3B.a) Light also transfers energy from place to place. (UE.PS3B.b) Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (UE.PS3B.c)	
Crosscutting Concepts:	Energy and matter
Energy can be transferred in various ways and between objects	Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy.

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ENERGY	**4-PS3-3**
LSSS	**NGSS**
Ask questions and predict outcomes about the changes in energy that occur when objects collide.	
Clarification Statement	
Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact. Quantitative measurements of energy are not included.	
Science and Engineering Practice:	Asking questions and defining problems
Disciplinary Core Ideas:	Definitions of energy
Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (UE.PS3A.b)	
Disciplinary Core Ideas:	Conservation of energy and energy transfer
Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (UE.PS3B.a)	
Disciplinary Core Ideas:	Relationship between energy and forces
When objects collide, the contact forces transfer energy so as to change the objects' motions. (UE.PS3C.a)	
Crosscutting Concepts:	Energy and matter
Energy can be transferred in various ways and between objects	

ENERGY	**4-PS3-4**
LSSS	**NGSS**
Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.	
Clarification Statement	
Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound and a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device.	
Science and Engineering Practice:	Constructing explanations and designing solutions
Disciplinary Core Ideas:	Conservation of energy and energy transfer
Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (UE.PS3B.c)	
Disciplinary Core Ideas:	Energy in chemical processes and everyday life
The expression “produce energy” typically refers to the conversion of stored energy into a desired form for practical use. (UE.PS3D.a)	
Disciplinary Core Ideas:	Optimizing the design solution
Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (UE.ETS1C.a)	NONE PROVIDED IN NGSS
Disciplinary Core Ideas:	Defining engineering problems
NONE PROVIDED IN LSSS	Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. *(secondary)*
Crosscutting Concepts:	Energy and matter
Energy can be transferred in various ways and between objects.	

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WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER	4-PS4-1
LSSS	**NGSS**
Develop a model of waves to describe patterns in terms of amplitude and wavelength and to show that waves can cause objects to move.	
Clarification Statement	
Examples of models could include diagrams, analogies, or physical models using wire to illustrate wavelength and amplitude of waves. Examples of wave patterns could include the vibrating patterns associated with sound or the vibrating patterns of seismic waves produced by earthquakes. Does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength	Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves. Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.
Science and Engineering Practice:	Developing and building models
Disciplinary Core Ideas:	Wave properties
Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; it does not move in the direction of the wave except when the water meets the beach. (UE.PS4A.a) Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (UE.PS4A.b)	
Crosscutting Concepts:	Patterns
Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena and designed products.	Similarities and differences in patterns can be used to sort, classify, and analyze simple rates of change for natural phenomena.

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WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER	**4-PS4-2**
LSSS	**NGSS**
Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.	
Clarification Statement	
Develop a model to make sense of a phenomenon involving the relationship between light reflection and visibility of objects. In the model, identify the relevant components including light and its source, objects, the path that light follows, and the eye.	
Science and Engineering Practice:	Developing and using models
Disciplinary Core Ideas:	Electromagnetic radiation
An object can be seen when light reflected from its surface enters the eyes. (UE.PS4B.a)	
Crosscutting Concepts:	Cause and effect
Cause and effect relationships are routinely identified, <u>tested, and used to explain change.</u>	Cause and effect relationships are routinely identified.

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WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER	4-PS4-3
LSSS	**NGSS**
4-PS4-3 DOES NOT APPEAR IN LSSS	Generate and compare multiple solutions that use patterns to transfer information.
Clarification Statement	
4-PS4-3 DOES NOT APPEAR IN LSSS	Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.
Science and Engineering Practice:	Constructing explanations and designing solutions
Disciplinary Core Ideas:	Information technologies and instrumentation
4-PS4-3 DOES NOT APPEAR IN LSSS	Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information — convert it from digitized form to voice — and vice versa.
Disciplinary Core Ideas:	Optimizing the design solution
4-PS4-3 DOES NOT APPEAR IN LSSS	Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.
Crosscutting Concepts:	Patterns
4-PS4-3 DOES NOT APPEAR IN LSSS	Similarities and differences in patterns can be used to sort and classify designed products.
Crosscutting Concepts:	Interdependence of science, engineering, and technology
4-PS4-3 DOES NOT APPEAR IN LSSS	Knowledge of relevant scientific concepts and research findings is important in engineering.

FROM MOLECULES TO ORGANISMS: STRUCTURE AND PROCESSES	**4-LS1-1**
LSSS	**NGSS**
Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.	
Clarification Statement	
Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, <u>shells, fur or</u> skin.	Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, <u>and</u> skin.
Science and Engineering Practice:	Engaging in argument from evidence
Disciplinary Core Ideas:	Structure and function
Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (UE.LS1A.a)	
Crosscutting Concepts:	Systems and system models
A system can be described in terms of its components and their interactions.	

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FROM MOLECULES TO ORGANISMS: STRUCTURE AND PROCESSES	**4-LS1-2**
LSSS	**NGSS**
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.	Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
Clarification Statement	
Emphasis is on systems of information transfer. Responses could include animals running from predators, animals returning to breeding grounds, animals scavenging for food, or humans responding to stimuli.	Emphasis is on the systems of information transfer.
Science and Engineering Practice:	Constructing explanations and designing solutions
Constructing explanations (science) and designing solutions (engineering) in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. Construct an explanation of observed relationships (e.g., the distribution of plants in the back yard).	NONE PROVIDED IN NGSS
	Developing and using models
NONE PROVIDED IN LSSS	Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. ● Use a model to test interactions concerning the functioning of a natural system.

Disciplinary Core Ideas:	Structure and function
Different sense receptors are specialized for particular kinds of information, which then may be processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (UE.LS1D.a)	NONE PROVIDED IN NGSS
	Information Processing
NONE PROVIDED IN LSSS	Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.
Crosscutting Concepts:	Cause and effect
Events that occur together with regularity might or might not be a cause and effect relationship.	NONE PROVIDED IN NGSS
	Systems and system models
NONE PROVIDED IN LSSS	A system can be described in terms of its components and their interactions.

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EARTH'S PLACE IN THE UNIVERSE	4-ESS1-1
LSSS	**NGSS**
Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in landforms over time	
Clarification Statement	
Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time, and a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock. Does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formation and layers.	
Science and Engineering Practice:	Constructing explanations and designing solutions
Disciplinary Core Ideas:	The history of planet earth
Local, regional, and global patterns of rock formations reveal changes over time due to Earth's forces such as earthquakes and volcanoes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (UE.ESS1C.a)	
Crosscutting Concepts:	Patterns
Patterns can be used as evidence to support an explanation.	

EARTH'S SYSTEM	**4-ESS2-1**
LSSS	**NGSS**
Plan and conduct investigations on the effects of water, ice, wind, and vegetation on the relative rate of weathering and erosion	Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
Clarification Statement	
Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.	
Science and Engineering Practice:	Planning and carrying out investigations
Planning and carrying out investigations to answer questions (science) or test solutions (engineering) to problems in 3-5 builds on K-2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered	Planning and carrying out investigations to answer questions (science) or test solutions (engineering) to problems in 3-5 builds on K-2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomena.
Disciplinary Core Ideas:	Earth materials and systems
Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (UE.ESS2A.a) BIOGEOLOGY Living things affect the physical characteristics of their environment. (UE.ESS2E.a)	
Disciplinary Core Ideas:	Biogeology
NONE PROVIDED IN LSSS	Living things affect the physical characteristics of their regions.
Crosscutting Concepts:	Cause and effect
Cause and effect relationships are routinely identified, tested, and used to explain change	

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EARTH'S SYSTEM	**4-ESS2-2**
LSSS	**NGSS**
Analyze and interpret data from maps to describe patterns of Earth's features.	
Clarification Statement	
Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.	
Science and Engineering Practice:	Analyzing and interpreting data
Disciplinary Core Ideas:	Plate tectonics and large-scale system interactions
The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features of Earth. (UE.ESS2B.a)	
Crosscutting Concepts:	Patterns
Patterns can be used as evidence to support an explanation.	

EARTH SYSTEMS	**4-ESS2-3**
***Standard 4-ESS2-3 appears in the Louisiana Student Standards for Science (LSSS) ONLY.**	
Ask questions that can be investigated and predict reasonable outcomes about how living things affect the physical characteristics of their environment	
Clarification Statement	
Investigations include making observations in various habitats in real life or virtual circumstances. Living things could include animals such as beavers, crawfish, armadillos, nutria, gophers, and plants such as kudzu, water hyacinth, and Chinese tallow.	
Science and Engineering Practice:	Asking questions and defining problems
Disciplinary Core Ideas:	Biology
Living things affect the physical characteristics of their environment. (UE.ESS2E.a	
Crosscutting Concepts:	Cause and effect
Cause and effect relationships are routinely identified, tested, and used to explain change.	

EARTH AND HUMAN ACTIVITY	**4-ESS3-1**
LSSS	**NGSS**
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.	
Clarification Statement	
Examples of renewable energy resources could include wind energy, hydroelectric energy, and solar energy; nonrenewable energy resources are fossil fuels. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning fossil fuels.	Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; nonrenewable energy resources are fossil fuels. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning fossil fuels
Science and Engineering Practice:	Obtaining, evaluating, and communicating information
Disciplinary Core Ideas:	Natural resources
Energy and fuels (fossil fuels, wind energy, solar energy, hydroelectric energy) that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (UE.ESS3A.a)	Energy and fuels that humans use are derived from natural resources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not.
Crosscutting Concepts:	Cause and effect
Cause and effect relationships are routinely identified, tested, and used to explain change.	

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EARTH AND HUMAN ACTIVITY	**4-ESS3-2**
LSSS	**NGSS**
Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.	
Clarification Statement	
Examples of solutions could include designing flood, wind, or earthquake resistant structures and models to prevent soil erosion.	Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.
Science and Engineering Practice:	Constructing explanations and designing solutions
Disciplinary Core Ideas:	Natural hazards
A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (UE.ESS3B.a)	
Disciplinary Core Ideas:	Developing possible solutions to engineering problems
Testing a solution involves investigating how well it performs under a range of likely conditions. (UE.ETS1B.d)	
Crosscutting Concepts:	Cause and effect
Cause and effect relationships are routinely identified, tested, and used to explain change	

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