Louisiana Student Standards for Science

The Louisiana Student Standards for Science were created by over eighty content experts and educators with input from parents and teachers from across the state. Educators envisioned what students should know and be able to do to compete in our communities and created standards that would allow students to do so. The Louisiana Student Standards for Science provide appropriate content for all grades or courses, maintain high expectations and create a logical connection of content across and within grades.

The Louisiana Student Standards for Science represent the knowledge and skills needed for students to successfully transition to postsecondary educations and the workplace. The standards call for students to:

- Apply content knowledge to real world phenomena and to design solutions
- Demonstrate the practices of scientists and engineers
- Connect scientific learning to all disciplines of science
- Express ideas grounded in scientific evidence

The Louisiana Student Standards do not dictate curriculum or teaching methods. Decisions about how to teach these expectations are left to local districts, schools, and teachers.

Structure and Components of the Standards

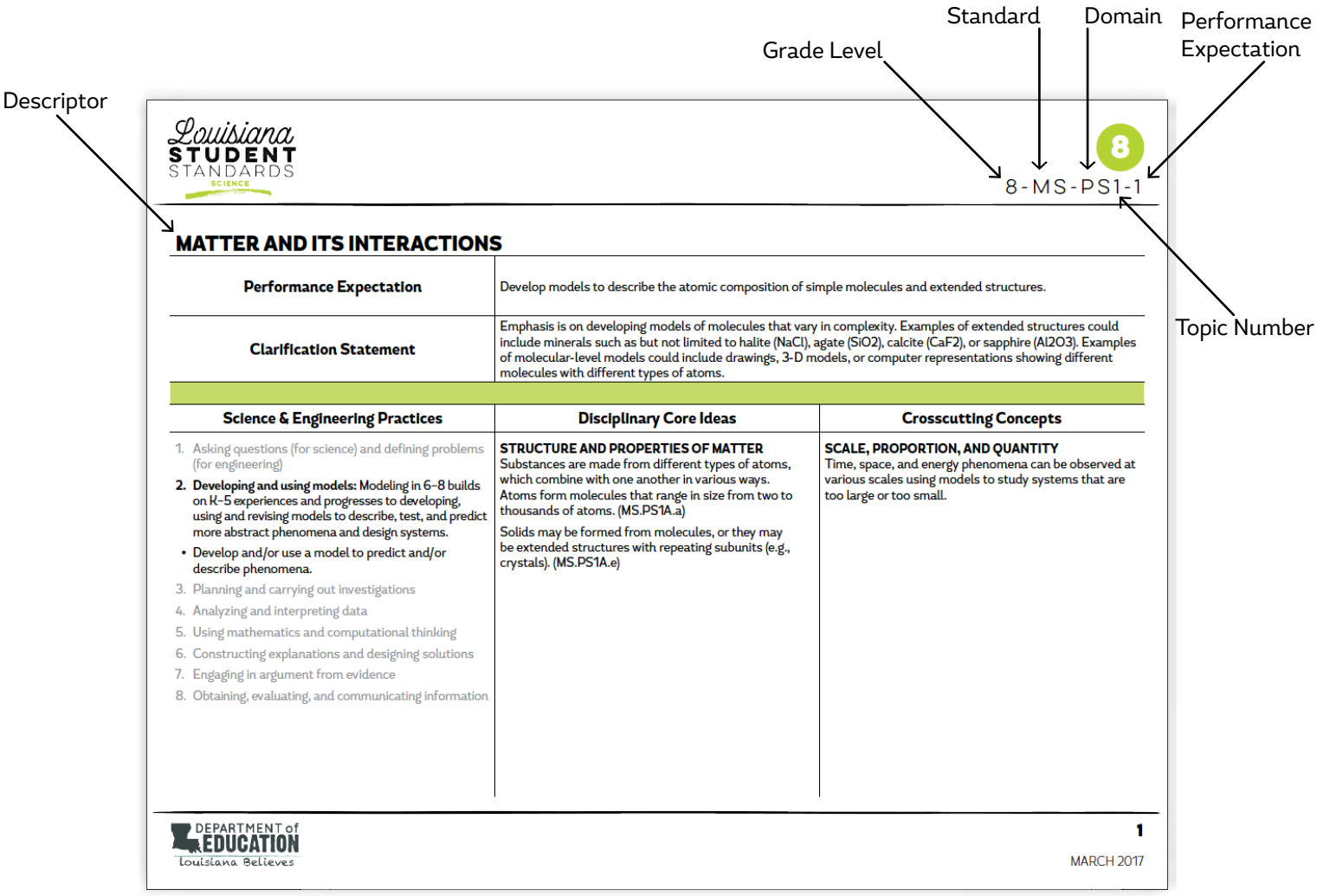
The Louisiana Student Standards for Science are arranged by grade levels for kindergarten through grade 8 and content areas for high school. The standards include:

- **Performance expectations** define what students should be able to do by the end of the year.
- **Science and engineering practices** are the practices that scientists and engineers use when investigating real world phenomena and designing solutions to problems. There are eight science and engineering practices that apply to all grade levels and content areas.
    1. Asking questions (science) and defining problems (engineering)
    2. Developing and using models
    3. Planning and carrying out investigations
    4. Analyzing and interpreting data
    5. Using mathematical and computational thinking
    6. Constructing explanations (science) and designing solutions (engineering)
    7. Engaging in argument with evidence
    8. Obtaining, evaluating, and communicating information
- **Disciplinary Core Ideas** describe the most essential ideas (content) in the major science disciplines that students will learn. Disciplinary Core Ideas are grouped into five science domains.
    1. Physical Science (PS)
    2. Life Science (LS)
    3. Earth and Space Science (ESS)
    4. Environmental Science (EVS)
    5. Engineering, Technology, and Applications of Science (ETS)
- **Crosscutting Concepts** are common themes that have application across all disciplines of science and allow students to connect learning within and across grade levels or content areas. The seven crosscutting concepts apply to all grade levels and content areas.
    1. Patterns
    2. Cause and effect
    3. Scale, proportion, and quantity
    4. Systems and models
    5. Energy and matter
    6. Structure and function
    7. Stability and change
- **Clarification statements** provide examples or additional explanation to the performance expectation.

Interpreting Standard Codes

Each performance expectation is identified by a code and descriptor. The coding is derived by the following formula: Grade level- Domain and Topic Number- Performance Expectation Number (space)

3-PS2-1 **Motion and Stability: Forces and Interactions**	The grade level is 3, the domain is Physical Science, the topic number is 2, and the performance expectation number is 1. The descriptor is, "Motion and Stability: Forces and Interactions."
7-MS-ESS2-4 **Earth's Systems**	The grade level is 7, the standard is middle school, the domain is Earth and Space Science, the topic number is 2, and the performance expectation is 1. The descriptor is, "Earth's Systems."
HS-LS1-1 **From Molecules to Organisms: Structures and Processes**	The standard is high school, the domain is Life Science, the topic number is 1, and the performance expectation number is 1. The descriptor is, "From Molecules to Organisms: Structures and Processes."



MOTION AND STABILITY: FORCES AND INTERACTIONS

Performance Expectation	Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
Clarification Statement	Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, or two objects colliding and pushing on each other. Content includes contact forces with different relative strengths or different directions, but not both at the same time.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
1. Asking questions and defining problems 2. Developing and using models **3. Planning and carrying out investigations:** Planning and carrying out investigations to answer questions (science) or test solutions (engineering) to problems in K-2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. • With guidance, plan and conduct an investigation in collaboration with peers. 4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations and designing solutions 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information	**FORCES AND MOTION** Pushes and pulls can have different strengths and directions. (LE.PS2A.a) Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (LE.PS2A.b) **TYPES OF INTERACTIONS** When objects touch or collide, they push on one another and can change motion. (LE.PS2B.a) **RELATIONSHIP BETWEEN ENERGY AND FORCES** A bigger push or pull makes things speed up or slow down more quickly. (LE.PS3C.a)	**CAUSE AND EFFECT** Simple tests can be designed to gather evidence to support or refute student ideas about causes.

MOTION AND STABILITY: FORCES AND INTERACTIONS

Performance Expectation	Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.
Clarification Statement	Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, or knock down other objects. Examples of solutions could include tools such as a ramp to increase the speed of the object, a structure that would cause an object such as a marble or ball to turn or using a rope or string to pull an object. Content does not include friction as a mechanism for change in speed.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
1. Asking questions and defining problems 2. Developing and using models 3. Planning and carrying out investigations **4. Analyzing and interpreting data:** Analyzing data in K-2 builds on prior experiences and progresses to collecting, recording, and sharing observations. • Analyze data from tests of an object or tool to determine if it works as intended. 5. Using mathematics and computational thinking 6. Constructing explanations and designing solutions 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information	**FORCES AND MOTION** Pushes and pulls can have different strengths and directions. (LE.PS2A.a) Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (LE.PS2A.b) **ENGINEERING DESIGN** A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. (LE.ETS1A.a)	**CAUSE AND EFFECT** Simple tests can be designed to gather evidence to support or refute student ideas about causes.

ENERGY

Performance Expectation	Make observations to determine the effect of sunlight on Earth's surface.
Clarification Statement	Sunlight heats Earth's natural surfaces including sand, soil, rocks, or water and the unnatural surfaces including man-made objects like plastics, asphalt, or concrete. Examples of observations could be relative changes in temperature of surfaces exposed to sunlight.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
1. Asking questions and defining problems 2. Developing and using models 3. **Planning and carrying out investigations:** Planning and carrying out investigations to answer questions or test solutions to problems in K-2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. • Make observations (firsthand or from media) and/or measurements of a proposed object or tool or solution to determine if it solves a problem or meets a goal. 4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations and designing solutions 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information	**CONSERVATION OF ENERGY AND ENERGY TRANSFER** Sunlight warms Earth's surface. (LE.PS3B.a)	**CAUSE AND EFFECT** Events have causes that generate observable patterns.

ENERGY

Performance Expectation	Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.
Clarification Statement	Examples of structures could include umbrellas, canopies, or tents that minimize the warming effect of the sun.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
1. Asking questions and defining problems 2. Developing and using models 3. Planning and carrying out investigations 4. Analyzing and interpreting data 5. Using mathematics and computational thinking **6. Constructing explanations and designing solutions:** Constructing explanations (science) and designing solutions (engineering) in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. • Use tools and/or materials to design and/or build a device that solves a specific problem or a solution to a specific problem. 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information	**CONSERVATION OF ENERGY AND ENERGY TRANSFER** Sunlight warms Earth's surface. (LE.PS3B.a)	**CAUSE AND EFFECT** Simple tests can be designed to gather evidence to support or refute student ideas about causes.

FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSE

Performance Expectation	Use observations to describe patterns of what plants and animals (including humans) need to survive.
Clarification Statement	Examples of patterns could include that plants make their own food while animals do not, the different kinds of food needed by different types of animals, the requirement of plants to have light, or that all living things need water.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
1. Asking questions and defining problems 2. Developing and using models 3. Planning and carrying out Investigations **4. Analyzing and interpreting data:** Analyzing data in K-2 builds on prior experiences and progresses to collecting, recording, and sharing observations. • Use observations to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems. 5. Using mathematics and computational thinking 6. Constructing explanations and designing solutions 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information	**ORGANIZATION FOR MATTER AND ENERGY FLOW IN ORGANISMS** All animals need food in order to live and grow. Animals obtain their food from plants or from other animals. Plants need water and light to live and grow. (LE.LS1C.a)	**PATTERNS** Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

EARTH'S SYSTEMS

Performance Expectation	Use and share observations of local weather conditions to describe patterns over time.
Clarification Statement	Examples of qualitative observations could include descriptions of the weather (such as sunny, cloudy, rainy, or warm); examples of quantitative observations could include numbers of sunny, windy, or rainy days in a month. Examples of patterns could include that it is cooler in the morning than in the afternoon or the number of sunny days versus cloudy days in different months.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
1. Asking questions and defining problems 2. Developing and using models 3. Planning and carrying out investigations **4. Analyzing and interpreting data:** Analyzing data in K-2 builds on prior experiences and progresses to collecting, recording, and sharing observations. • Use observations to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems. 5. Using mathematics and computational thinking 6. Constructing explanations and designing solutions 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information	**WEATHER AND CLIMATE** Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time. (LE.ESS2D.a)	**PATTERNS** Patterns in the natural and human designed world can be observed, used to describe phemonena, and used as evidence.

EARTH'S SYSTEMS

Performance Expectation	Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
Clarification Statement	Examples of plants and animals changing their environment could include a squirrel digging in the ground to hide its food, tree roots breaking concrete, or a dandelion spreading seeds to generate more dandelions.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
1. Asking questions and defining problems 2. Developing and using models 3. Planning and carrying out Investigations 4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations and designing solutions **7. Engaging in argument from evidence:** Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s). • Construct an argument with evidence to support a claim. 8. Obtaining, evaluating, and communicating information	**BIOGEOLOGY** Plants and animals can change their environment. (LE.ESS2E.a) **HUMAN IMPACTS ON EARTH SYSTEMS** Things that people do to live comfortably can affect the world around them; but they can make choices that reduce their impacts on the land, water, air, and other living things. (LE.ESS3C.a)	**SYSTEMS AND SYSTEM MODELS** Systems in the natural and designed world have parts that work together.

EARTH AND HUMAN ACTIVITY

Performance Expectation	Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.
Clarification Statement	Examples of relationships could include that deer eat buds and leaves and therefore usually live in forested areas; grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
1. Asking questions and defining problems 2. **Developing and using models:** Modeling in K-2 builds on prior experiences and progresses to include using and developing models (e.g., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. • Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s). 3. Planning and carrying out investigations 4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations and designing solutions 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information	**NATURAL RESOURCES** Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (LE.ESS3A.a)	**SYSTEMS AND SYSTEM MODELS** Systems in the natural and designed world have parts that work together.

EARTH AND HUMAN ACTIVITY

Performance Expectation	Ask questions to obtain information about the purpose of weather forecasting to prepare for and respond to severe weather.
Clarification Statement	Emphasis is on local forms of severe weather and safety precautions associated with that severe weather.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
1. **Asking questions and defining problems:** Asking questions (science) and defining problems (engineering) in K-2 builds on prior experiences and progresses to simple descriptive questions that can be tested. • Ask questions based on observations to find more information about the natural and/or designed world(s). 2. Developing and using models 3. Planning and carrying out investigations 4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations and designing solutions 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information	**NATURAL HAZARDS** Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events. (LE.ESS3B.a)	**CAUSE AND EFFECT** Events have causes that generate observable patterns.

EARTH AND HUMAN ACTIVITY

Performance Expectation	Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.
Clarification Statement	Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
1. Asking questions and defining problems 2. Developing and using models 3. Planning and carrying out investigations 4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations and designing solutions 7. Engaging in argument from evidence **8. Obtaining, evaluating, and communicating information:** Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information. • Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.	**HUMAN IMPACTS ON EARTH SYSTEMS** Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (LE.ESS3C.a) **DEVELOPING POSSIBLE SOLUTIONS** Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solution(s) to other people. (LE.ETS1B.a)	**CAUSE AND EFFECT** Events have causes that generate observable patterns.