This scope and sequence document was developed to assist teachers with the implementation of the Louisiana Student Standards for Science. This tool is not full curriculum and will need to be further built out by science educators. It has been designed to help in the initial transition to the new standards.

This document is considered a "living" document, as we believe that teachers and other educators will find ways to improve it as they use it. Please send feedback to classroomsupporttoolbox@la.gov so that we may use your input when updating this tool.

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About the Sample Scope and Sequence Tools

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

- Apply content knowledge
- Investigate, evaluate, and reason scientifically
- Connect ideas across disciplines

This scope and sequence document is designed to assist teachers, schools, and districts with the development of instructional resources that align with the Louisiana Student Standards for Science. This scope and sequence is only a sample; it does not illustrate the only appropriate sequence to teach the standards or the only possible ways to bundle the standards. The bundles can be reorganized around different phenomenon, including phenomenon specific to Louisiana or to a region in Louisiana.

Based on the instructional shifts, this tool uses phenomena to drive 3-dimensional science instruction. The incorporated phenomena are observable events that occur in the universe and can be explained by science. They establish the purpose for learning and help students to connect their learning to real-world events.

- The standards are bundled into units.
- The units are built around an anchor phenomenon.
- One unit has been built out further to contain a series of investigative phenomena, which have been sequentially organized to reinforce one another and build toward the performance expectations.

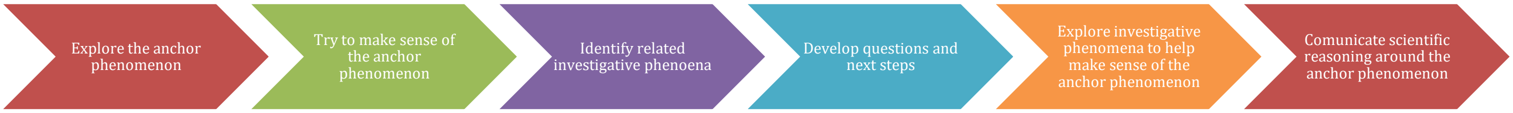
Throughout each unit, students should have multiple opportunities to apply the science and engineering practices, make sense of the crosscutting concepts, and develop a deep understanding of disciplinary core ideas.

Building out the Science Scope and Sequences for Classroom Instruction

How to Use the Anchor and Investigative Phenomena[1]

1. Explore the anchor phenomenon
2. Attempt to make sense of the phenomenon
3. Identify related phenomena
4. Develop questions and next steps
5. Explore investigative phenomena to help make sense of the anchor phenomenon
6. Communicate scientific reasoning around the anchor phenomenon

Instructional Process



Choosing an Anchor Phenomenon

Students should be able to make sense of anchoring phenomenon, but not immediately, and not without investigating it using sequences of the science and engineering practices. With instruction and guidance, students should be able to figure out, step by step, how and why the phenomenon works. [2]

A good anchor phenomenon[3]:

- ☐ is too complex for students to explain or design a solution for after a single lesson.
  - The explanation is just beyond the reach of what students can figure out without instruction.
  - Searching online will not yield a quick answer for students to copy.
- ☐ can be a case (pine beetle infestation, building a solution to a problem), something that is puzzling (why isn't rainwater salty?), or a wonderment (how did the solar system form?).
- ☐ has relevant data, images, and text to engage students in the range of ideas students need to understand. It should allow them to use a broad sequence of science and engineering practices to learn science through first-hand or second-hand investigations.
- ☐ will require students to develop an understanding of and apply multiple performance expectations while also engaging in related acts of mathematics, reading, writing, and

[1] adapted from How do we bring 3-dimensional learning into our classroom?

[2] Using Phenomena

[3] Qualities of a Good Anchor Phenomenon

communication.

- ☐ is observable to students. "Observable" can be with the aid of scientific procedures (e.g., in the lab) or technological devices to see things at very large and very small scales (telescopes, microscopes), video presentations, demonstrations, or surface patterns in data.

Choosing Investigative Phenomena

Students should be able to make sense of investigative phenomenon, but not immediately, and not without investigating it using sequences of the science and engineering practices. With instruction and guidance, students should be able to figure out, step-by-step, how and why the phenomenon works.[4]

A good investigative phenomenon:

- ☐ helps students make sense of one or two parts of the anchor phenomenon.
- ☐ has relevant data, images, and text to engage students in the range of ideas students need to understand.
- ☐ can be understood or explained by students using the science and engineering practices.

Investigating the Phenomena

When a phenomenon is introduced, whether anchor or investigative, students should have the opportunity to make observations, discuss current understandings, and pose questions about the phenomenon. Once questions are compiled, it may be helpful to categorize questions as follows:

- Questions that can be investigated by our class
- Questions that can be investigated but not with our current resources and equipment
- Questions that can be researched
- Questions that cannot be answered (due to current technologies or scientific limitations)

Other Useful Questions When Designing a Sequence of Learning[5]

- How do we kick off investigations in a unit?
- How do we work with students to motivate the next step in an investigation?
- How do we help students use practices to figure out the pieces of the science ideas?
- How do we push students to go deeper and revise the science ideas we have built together so far?
- How do we help students put together pieces of the disciplinary core ideas and crosscutting concepts?

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[4] Using Phenomena

[5] Questions to Guide the Development of a Classroom Culture That Supports "Figuring Out"

First Grade Science Standards Overview

The First Grade Science course focuses on the study of waves and their applications, from molecules to organisms: structures and processes, heredity: inheritance and variation of traits, Earth’s place in the universe.

		Science and Engineering Practices								
		Asking Questions and Defining Problems	Developing and Using Models	Planning and Carrying Out Investigations	Analyzing and Interpreting Data	Using Mathematics and Computational Thinking	Constructing Explanations and Designing Solutions	Engaging in Argument from Evidence	Obtaining, Evaluating, and Communicating Information	
Crosscutting Concepts	Patterns			1-ESS1-2	1-ESS1-1		1-LS3-1		1-LS1-2	All Domains
	Cause and Effect			1-PS4-1 1-PS4-3			1-PS4-2			
	Scale, Proportion and Quantity									
	Systems and System Models						1-PS4-4			
	Energy and Matter									
	Structure and Function						1-LS1-1			
	Stability and Change									

Overview of Sample Units

	Unit 1 Light and Sound	Unit 2 Earth and the Solar System	Unit 3 Plants and Animals	Unit 4 Parents and Their Offspring
Anchor Phenomenon	People use light to see things and communicate with others.	The sun appears to move across the sky. **Multidisciplinary Opportunity:** Louisiana Guidebook Mooncake Unit or Frogs Unit	The necks of giraffes help them survive. **Multidisciplinary Opportunity:** Louisiana Guidebook Spiders Unit	Female adult kangaroos carry their offspring, which have similar characteristics to the mother kangaroo, in a front pouch.
Standards	1-PS4-1 1-PS4-2 1-PS4-3 1-PS4-4	1-ESS1-1 1-ESS1-2	1-LS1-1	1-LS1-2 1-LS3-1

Unit 1: Light and Sound

About the Standards

Performance Expectations

- 1 PS4-1: Waves and Their Applications: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
- 1-PS4-2: Make observations to construct an evidence-based account that objects can be seen only when illuminated.
- 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.
- 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.

Disciplinary Core Ideas

DCI	Partial Unpacking of the DCI
Sound can make matter vibrate, and vibrating matter can make sound. (DCI: LE.PS4A.a; PE:1-PS4-1)	• Sound can make materials vibrate. • When materials vibrate, they can make a sound.
Objects can be seen if light is available to illuminate them or if they give off their own light. Some objects give off their own light. (DCI: LE.PS4B.a; PE: 1-PS4-2)	• Darkness is the partial or total absence of light. • Light is the visible portion of the electromagnetic spectrum. • Things that give off light are known as light sources including: stars, flashlights, street lamps, house lamps, sun. • The presence of light in a space makes it possible for objects to be seen. • Objects cannot be seen if there is no light to illuminate them, but the same object in the same space can be seen if a light source is introduced. • Objects in a space with no light are not visible or somewhat visible but difficult to see. • Objects in a space with little light are somewhat visible. • Objects in a space with light are visible. • The ability of an object to give off its own light causes the object to be seen in a space where these is no other light.

Some materials allow light to pass through them, others allow some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light) (DCI: LE.PS4B.b; PE: 1-PS4-3)	• Objects (e.g., clear plastic, cardboard, clouded plastic, mirror, windows) are made of different materials • The material that an object is made of impacts if light can or cannot pass through it. • An object can block or reflect light. • A beam of light can pass through some objects, but it cannot pass through all objects. • A material that allows all light through (e.g., clear plastic, clear glass) results in the background lighting up. • A material that allows only some light through (e.g., wax paper, clouded plastic) results in the background lighting up, but not as bright as when the material allows all light in. • A material that blocks all of the light (e.g., cardboard, wood) will create a shadow. • A material that changes the direction of the light (e.g., mirror, aluminum foil) will light up the surrounding space in a different direction.
People also use a variety of devices to communicate (send and receive information over long distances. (DCI: LE.PS4C.a; PE: 1-PS4-4)	• Communication occurs when people or animals share information with one another through the use of words, sounds, or signals. • Animals and people communicate in different ways. • People verbally communicate when they speak to others or make sounds. • Animals verbally communicate when they make sounds (e.g., birds sing, dogs bark, and cats meow). • People nonverbally communicate (e.g., wave a hand, smile). • Animals nonverbally communicate (e.g., fireflies light up). • Light and sound can be used to communicate over long distances if nothing blocks the communication. • A device can use light or sound to send or receive information over a given distance (e.g., cell phones, lighthouses).

A situation that people want to change or create can be approached as a problem to be solved through engineering. (DCI: LE.ETS1A.a; PE: 1-PS4-4)	• People look for ways to solve their problems (e.g., communicating over long distances). • Engineers use technology to help people solve problems or develop solutions to problems. • Before engineers develop a solution to a problem, they ask questions to understand the problems that people face. • Engineers design devices or other items to help people solve problems. • The devices or items are used by people to overcome their problems.

Science and Engineering Practices

- Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question.
- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.
- Use tools and/or materials to design and/or build a device that solves a specific problem or a solution to a specific problem.
- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.

Crosscutting Concepts

- Events have causes that generate observable patterns.
- Simple tests can be designed to gather evidence to support or refute student ideas and causes.
- Systems in the natural and designed world have parts that work together.

Putting the Standards into Practice

Sample Anchor Phenomenon: People use light to see things and communicate with others.

Explore the anchor phenomenon

Resources: A fully aligned, high-quality unit published by Next Generation Science Storylines is linked here.

Questions students may pose that could be used for future learning or investigations:

Try to make sense of the anchor phenomenon

What can you see in a room with no light?
How can we make a room dark?
How can I block the light that shines through a window in my home?
How is light used to illuminate objects?
How is light used to communicate over a distance?

Teachers should provide Investigative Phenomenon based on student observations, questions, and the Characteristics of Quality Investigative Phenomenon.

Sample Anchor Phenomenon Reflections

Communicate scientific reasoning around the anchor phenomenon

- Explain that vibrating materials can make sound and that sound can make materials vibrate.
- Make a claim supported by evidence that objects can be seen only when illuminated.
- Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.
- Design and build a device that uses light or sound to solve the problem of communicating over a distance.

Unit 2: Earth and the Solar System

About the Standards

Performance Expectations

- 1-ESS1-1 Earth's Place in the Universe: Use observations of the sun, moon, and stars to describe patterns that can be predicted.
- 1-ESS1-2 Earth's Place in the Universe: Make observations at different times of year to relate the amount of daylight to the time of year.

Science and Engineering Practices

- Use observations to describe patterns in the natural world in order to answer scientific questions
- Make observations to collect data that can be used to make comparisons.

Crosscutting Concepts

- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

Putting the Standards into Practice

Explore the anchor phenomenon

Sample Anchor Phenomenon: The sun appears to move across the sky.

Resources: A number of resources for the anchor phenomenon are included below. Teachers should screen the resources and pull photos, quotes, and data that are appropriate to share with first grade students. These resources may not be appropriate to be given to students as they are due to the length, content, or accessibility of the content.

Sunrise and Sunset Time Lapse
Read Works: The Sun and Us (article set)
Read Works: Why Don't We See Stars in the Daytime?
Phases of the Moon
Moon Phases Calendar
Day and Night World Calendar
Google Moon

Questions students may pose that could be used for future learning or investigations:

Try to make sense of the anchor phenomenon

- What is a sunset?
- Why is it possible to see the moon in the daytime?
- Why does the sun appear to change positions during the day?
- Why are some stars only visible at night?
- Why are shadows different sizes during the day?
- Can we see shadows at night?
- How do some plants "face" the sun during daylight hours?

Teachers should provide Investigative Phenomenon based on student observations, questions, and the Characteristics of Quality Investigative Phenomenon.

Sample Anchor Phenomenon Reflections

Communicate scientific reasoning around the anchor phenomenon

- Use observations to describe patterns of the sun, moon and stars.
- Use observations to explain the amount of daylight at different times of the year.
- Construct an explanation about why the sun appears to move in the sky.
- Construct a model that shows the movement of particular objects in the sky.

Unit 3: Plants and Animals

About the Standards

Performance Expectations

- 1-LS1-1 From Molecules to Organisms: Structures and Processes: 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.

Science and Engineering Practices

- Use tools and/or materials to design and/or build a device that solves a specific problem or a solution to a specific problem.

Crosscutting Concepts

- The shape and stability of structures of natural and designed objects are related to their function(s).

Putting the Standards into Practice

Sample Anchor Phenomenon: The necks of giraffes help them survive.

Explore the anchor phenomenon

Resources: A number of resources for the anchor phenomenon are included below. Teachers should screen the resources and pull photos, quotes, and data that are appropriate to share with first grade students. These resources may not be appropriate to be given to students as they are due to the length, content, or accessibility of the content.

All Things Animals: Giraffe
Giraffes for Kids
Little Fox: Episode 16 Giraffes
Defending the Towers: Giraffe Conservation Update
National Geographic: A Neck and Neck Battle
National Geographic Wild: Giraffe Drool
Read Works: Animals of Africa
Read Works: Mammals and Great Giraffes (article set)
African Wildlife Foundation: Giraffes
Animals and Plants: Giraffe
National Geographic Lives of Giraffes

Questions students may pose that could be used for future learning or investigations:

Try to make sense of the anchor phenomenon

- How long is a giraffe's neck?
- How do the necks of giraffes help them survive?
- How are the necks of giraffes different from the necks of other animals?
- Could a giraffe survive if it didn't have a long neck?

Teachers should provide Investigative Phenomenon based on student observations, questions, and the Characteristics of Quality Investigative Phenomenon.

Sample Anchor Phenomenon Reflections

Communicate scientific reasoning around the anchor phenomenon

- Construct an explanation of how two different animals use their external parts to survive.
- Use tools and materials to design a solution to a human problem by mimicking how animals use their external parts survive, grow, and meet their needs.

Unit 4: Parents and Their Offspring

About the Standards

Performance Expectations

- 1-LS1-2: Read grade-appropriate texts and use media to determine patterns in behavior of parents and offspring that help off spring survive.
- 1-LS3-1: Make observations to construct evidence-based account that young plants and animals are similar to, but not exactly like, their parents.

Science and Engineering Practices

- Obtaining, evaluating, and communicating information in K-2 builds on prior experiences and uses observations and texts to communicate new information.
- Read grade-appropriate texts and or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world.

Crosscutting Concepts

- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

Putting the Standards into Practice

Explore the anchor phenomenon

Sample Anchor Phenomenon: Female adult kangaroos carry their offspring, which have similar characteristics to the mother kangaroo, in a front pouch.

Resources: A number of resources for the anchor phenomenon are included below. Teachers should screen the resources and pull photos, quotes, and data that are appropriate to share with first grade students. These resources may not be appropriate to be given to students as they are due to the length, content, or accessibility of the content.

National Geographic Kids: Eastern Gray Kangaroo
National Geographic Kids: Kangaroo
Read Works: A Kangaroo's Life Cycle
Read Works: Kerry Kangaroo Hops
Life Cycle of Kangaroo
Kangaroo Footprints (Photo Gallery)
Kangaroo Facts

Questions students may pose that could be used for future learning or investigations:

Try to make sense of the anchor phenomenon

- What are offspring?
- Why do adult kangaroos carry their babies in their front pouch?
- Do baby kangaroos ever fall out of the front pouch?
- Do all animals take care of their young?
- Do plants take care of their young?
- Are there any other animal moms who carry their young in pouches?
- Do some animal dads take care of their young?
- Why are young kangaroos called joeys?
- Do joeys look like their parents?
- How are joeys similar to their parents?
- How are joeys different from their parents?

Teachers should provide Investigative Phenomenon based on student observations, questions, and the Characteristics of Quality Investigative Phenomenon.

Sample Anchor Phenomenon Reflections

Communicate scientific reasoning around the anchor phenomenon

- Describe patterns in behavior of parents and offspring that help offspring survive.
- Make observations to explain that young plants and animals are similar to, but not exactly like, their parents.