

Louisiana Believes

Louisiana Student Standards for Science (LSS):
Scope and Sequence Documents

September 2017



Purpose

Objectives

- Understand how to use LSSS scope and sequence documents
 - Evaluate Louisiana Student Standards for Science sample scope and sequence documents
 - Describe phenomenon-based learning
 - Determine if a phenomenon is instructionally strong or weak
 - Describe how to use natural phenomena and LSSS scope and sequence documents to drive classroom instruction

Schedule

- Instructional Shifts
- What is a phenomenon?
- Why use phenomena?
- Sample Instructional Process
- LSS Implementation Support
- Assessment Updates

Instructional Shifts

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
- Investigate, Evaluate, and Reason Scientifically
- Connect Ideas Across Disciplines

Analyze the “[shifts](#)” page. Define, in your own words, what each of these “shifts” mean.

Louisiana Student Standards for Science

The new standards call for changes in the science classroom. Key shifts called for by the [Louisiana Student Standards for Science](#):

| | |
|--|--|
| Apply content knowledge | Content knowledge is critical and evident in the standards in the Disciplinary Core Ideas , the key ideas in science that have broad importance within or across multiple science or engineering disciplines. However, simply having content knowledge is not enough. Students must investigate and apply content knowledge to scientific phenomenon. |
| Investigate, evaluate, and reason scientifically | Scientists do more than learn about science; they “do” science. Science instruction must integrate the practices, or behaviors, of scientists and engineers as they investigate real-world phenomenon and design solutions to problems. |
| Connect ideas across disciplines | For students to develop a coherent and scientifically-based view of the world, they must make connections across the domains of science (life science, physical science, earth and space science, environmental science, and engineering, technology, and applications of science). The crosscutting concepts have applications across all domains. |

Three Dimensional Learning: the integration of the **Science and Engineering Practices**, **Disciplinary Core Ideas**, and **Crosscutting Concepts** in science instruction

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What is a phenomenon?

Phenomena are observable events that occur in the universe and that we can use our science knowledge to explain or predict.

| Science Idea (not a phenomenon) | Sample Phenomenon |
|---------------------------------|--|
| Planets revolve around stars | Mercury's orbit travels across the sun in 2012, 2016, and 2019 |
| Evolution of species | Smart moths have evolved to fly away from city lights |
| The Universal Gas Law | Water on Mount Everest does not boil at 100° Celsius |

What is a phenomenon?

Examples of phenomenon from Louisiana Student Standards for Science sample scope and sequence documents.

| Science Idea (not a phenomenon) | Sample Phenomenon |
|--|--|
| Weathering and erosion | <u>Louisiana Coastal Erosion</u> |
| Interdependent relationships in ecosystems | <u>Bleaching of Coral Reefs</u> |
| Global temperature changes and the greenhouse effect | <u>Ice Calving Event</u> |

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Why use phenomena?

- The LSSS scope and sequence documents will guide teachers on how to engage students in science using phenomena. In the documents, observing and explaining phenomenon and designing solutions provide the purpose and opportunity for students to engage in learning.

| Past Science Learning | Phenomenon-Based Learning |
|--|--|
| Focused on teaching general knowledge | Allow students to build general science knowledge in the context of their application to understanding phenomena |
| Failed to clarify why students needed to learn key content knowledge | Supports students agency for wanting to build science and engineering knowledge |
| Focused on teaching specific topics | Help students figure out what or why something happens |

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Sample Scope and Sequence

Instructional Process



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 make sense of the anchor phenomenon
6. Communicate scientific reasoning around the anchor phenomenon

Sample Scope and Sequence

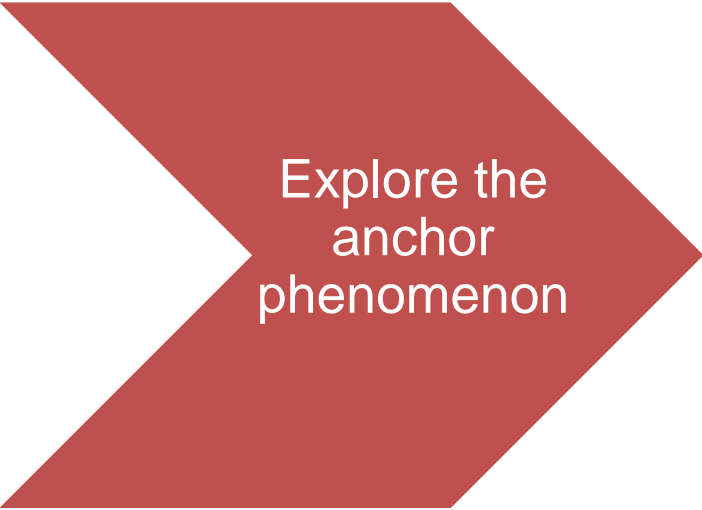
Instructional Process



As a table,

- Select a sample scope and sequence document to review (elementary, middle or high school).
- Review *About the Standards* and the standard document pages for the first unit of study and the performance expectations for unit one.
- How is *About the Standards* supporting LSSS instructional shifts?

Anchor Phenomenon



Explore the
anchor
phenomenon

As a table,

- Analyze,
 - *Choosing an Anchor Phenomenon (page 3)*
 - *Overview of Sample Units*
- How can teachers use *Choosing an Anchor Phenomenon* when planning science instruction?

Anchor Phenomenon



Explore the
anchor
phenomenon

As a table,

- Review *Putting the Standards into Practice*.
- How will phenomenon-based instruction engage students in learning and set the purpose for learning?
- How will teachers have to shift their instructional practices to implement phenomenon-based instruction?
- How will the questions that students ask shape the unit of study?
- What should science classrooms look like when using the scope and sequence documents?

Anchor Phenomenon

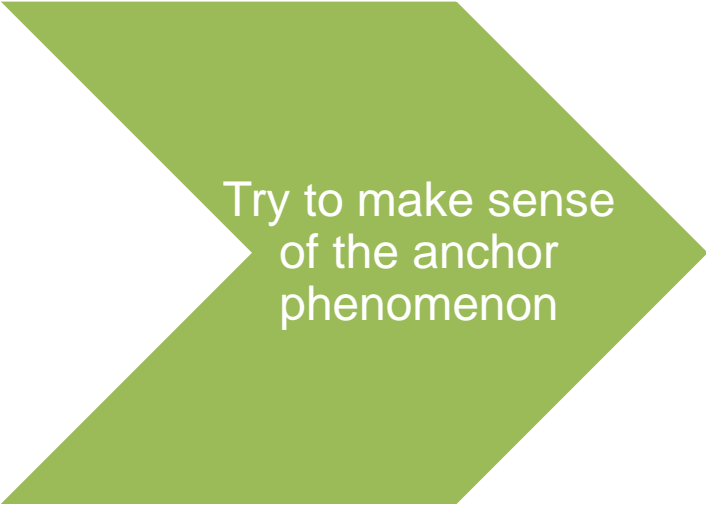


Explore the
anchor
phenomenon

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.

Anchor Phenomenon



Try to make sense
of the anchor
phenomenon

As a table,

- Review *Questions students may pose that could be used for future learning or investigations*
- How can teachers use the questions that students pose to shape the unit of study?
- How can teachers elicit student generated questions about the anchor phenomenon?
- What role should teachers take as students try to make sense of the phenomenon?

Investigative Phenomenon



Identify related
investigative
phenomena

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.

Investigative Phenomenon



Identify related
investigative
phenomena



Develop
questions and
next steps

As a table,

- Review the *Sample Investigative Phenomena* for unit one.
- How are the investigative phenomena helping students make sense of the anchor phenomenon?
- What steps will teachers have to take to help students connect their learning of the investigative to the anchor phenomenon?
- How do the resources support three-dimensional learning?
- How will exploration activities and investigations drive student learning?
- How will the role of the teacher and student shift when using LSSS scope and sequence documents?

Investigative Phenomenon



Identify related
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.



Develop
questions and
next steps

With instruction and guidance, students should be able to figure out, step-by-step, how and why the phenomenon works.

Investigative Phenomenon

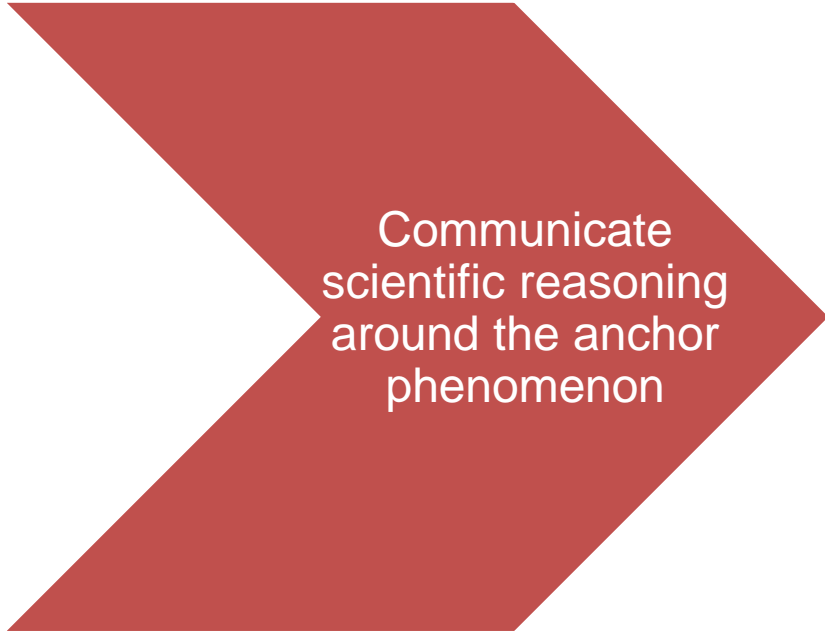


Explore investigative phenomenon to help make sense of the anchor phenomenon

As a table,

- Review the *Sample Investigative Phenomena* for unit one.
- How are the science and engineering practices and crosscutting concepts incorporated into the investigative phenomena?
- How are the investigative phenomena helping students understand the disciplinary core ideas and anchor phenomenon?

Phenomenon-Based Learning



Communicate
scientific reasoning
around the anchor
phenomenon

As a table,

- Review the *Sample Anchor Phenomenon Reflection Questions*
- How are the reflection questions connected to the performance expectations?

Phenomenon-Based Learning

Instructional Process



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Standards Implementation Support

Tools: A number of documents have been released regarding the [Louisiana Student Standards for Science](#).

- [Shifts in Science](#)
- [Appendix A: Progressions of Learning](#)
- [Appendix B: Connections to ELA and Math Standards](#)
- [Middle School Sample Transition Plan](#)
- [Sample Scope and Sequence Documents](#)
- Sample Instructional Tasks – Fall 2017

Professional Development:

- LDOE will offer sessions at the November Teacher Leader Collaboration.
- LDOE recorded a series of [webinars](#) this summer that aligns to the LSSS.
- [LA Tech](#) and [LSU](#) have conducted summer workshops and will work with districts to do personalized training.

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Key Goals for New Science Assessments

- All students will take the LEAP 2025 science assessments, starting in the 2018-2019 school year, which provide
 - questions that have been reviewed by Louisiana educators to ensure their alignment to the [Louisiana Student Standards for Science](#) (LSS for Science) and appropriateness for Louisiana students;
 - measurement of the full range of student performance, including that of high- and low-performing students; and
 - information for educators and parents about student readiness in science and whether students are “on track” for college and careers.

Set-Based Design

- Set-Based Design

- a scientific phenomenon provides the focus for the sets
- a stimulus or stimuli material describe the scientific phenomenon
- comprised of four to five questions
- students use stimuli and course knowledge to answer the questions

- Item Sets

- selected-response (multiple-choice and/or multiple-select) and two-part questions
- some sets culminate with a 2-point constructed-response item

- Task Set

- selected-response questions
- culminates with a 6-point extended-response item

- Discrete Items

- selected-response and two-part questions
- not part of a set of related questions

Features of the Science Field Test: Grades 3-8

- No operational science test for grades 3-8, students take the science field test in Spring 2018.
- Features of the Science Field Tests
 - two Sessions
 - timed
 - in the same test window as LEAP 2025 grades 3-8 tests
 - administered online for all grades, districts have the option for paper-based tests at grades 3 and 4
 - all items reviewed by educator committees for multi-dimensional alignment and appropriateness for grade level and Louisiana students
- Resources
 - [Science Field Test Overview](#)
 - Science Field Test Guides – per grade, available September/October 2017
 - Online Tools Training – available Winter 2017-2018

Biology Embedded Field Test

- Biology remains as four-level EOC test assessing the old GLEs
- Field Test items aligned to the new Louisiana Student Standards for Science will be embedded within each test session in the Spring 2018 administration only
- All embedded field test items will be reviewed and approved by educator committees for multi-dimensional alignment and appropriateness for course and Louisiana students
- Test remains untimed for 2017-2018
- Resources
 - [Science Field Test Overview](#)
 - [Biology Assessment Guide](#)
 - Biology Field Test Guide – available September/October 2017
 - Online Tools Training – available Winter 2017-2018

Contacts & Resources

Lydia.hill@la.gov

Jill.Cowart@la.gov

Resources

- [How do we bring 3-dimensional learning into our classroom?](#)
- [Using Phenomenon](#)
- [Qualities of a Good Anchor Phenomenon](#)