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 LouisianaStandards@la.gov so that we may use your input when updating this tool.

## 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?

[4] Using Phenomena

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

## Third Grade Science Overview

The third grade course focuses on the study of motion and stability: forces and interactions, from molecules to organism: structures and processes, ecosystems: interactions, energy, and dynamics, heredity: inheritance and variation of traits, biological evolution: unity and diversity.

| | **Science and Engineering Practices** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Crosscutting Concepts** | | 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 | **All Domains** |
| | Patterns | 3-PS2-4 | 3-LS1-1 | 3-PS2-2 | 3-LS3-1<br>3-ESS2-1 | | | | 3-ESS2-2 | |
| | Cause and Effect | 3-PS2-3 | | 3-PS2-1 | | | 3-LS3-2<br>3-LS4-2 | 3-LS4-3<br>3-ESS3-1 | | |
| | Scale, Proportion and Quantity | | | | 3-LS4-1 | | | | | |
| | Systems and System Models | | | | | | | 3-LS2-1<br>3-LS4-4 | | |
| | Energy and Matter | | | | | | | | | |
| | Structure and Function | | | | | | | | | |
| | Stability and Change | | | | | | | | | |

## Overview of Sample Units

| | Unit 1<br><br>Forces, Interactions, and Variation of Traits | Unit 2<br><br>Electric and Magnetic Forces | Unit 3<br><br>Earth's Systems | Unit 4<br><br>Inheritance and Variation of Traits | Unit 5<br><br>Fossils |
|---|---|---|---|---|---|
| **Anchor Phenomenon** | Two male deer fight | The Empire State Building is struck by lightning approximately 23 times a year, yet it doesn't experience any damage. | Gorillas live in groups of 20s to 30s in the Rainforest. | The Namib Desert can reach up to 140 degrees and is considered one the hottest and driest places in the world. However, Namib beetles can survive in this harsh environment. | Fully grown Sequoia trees can survive the hottest wildfires in Yosemite National Park. |
| **Standards** | 3-PS2-1<br>3-PS2-2<br>3-LS4-2 | 3-PS2-3<br>3-PS2-4<br>3-ESS3-1 | 3-LS2-1<br>3-LS4-3*<br>3-ESS2-1<br>3-ESS2-2* | 3-LS3-1<br>3-LS3-2<br>3-LS4-3*<br>3-ESS2-2* | 3-LS1-1<br>3-LS4-1<br>3-LS4-4 |

* The performance expectation is only partially addressed using the identified phenomenon. The performance expectation is addressed in other unit(s).

## Unit 1: Forces and Interactions

### About the Standards

**Performance Expectations**

- 3-PS2-1 Motion and Stability: Forces and interactions: Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
- 3-PS2-2 Motion and Stability: Forces and interactions: Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motions.
- 3-LS4-2 Biological Evolution: Unity and Diversity: 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.

**Disciplinary Core Ideas**

| DCI | Partial Unpacking of the DCI |
|---|---|
| Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it but they add to give zero net force on the object. (DCI: UE.PS2A.a; PE3-PS2-1) | • A force is a push or pull.<br>• A force can cause an object to start moving, stop moving, or change the object's direction.<br>• Forces typically occur in pairs and can be either balanced or unbalanced.<br>• When different strengths and directions of balanced forces (forces that sum to zero) are applied to an object, the object does not move. |
| Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (Qualitative and conceptual, but not quantitative addition of forces are used at this level.) (DCI: UE.PS2A.a; PE: 3-PS2-1) | • When different strengths and directions of unbalanced forces (forces that do not sum to zero) are applied to an object, the object moves.<br>• When unbalanced forces are applied to an object, they can cause the object to increase in speed or change in direction.<br>• The greater the force placed on an object, the greater the change in motion.<br>• The greater the mass of an object, the greater the force needed to move the object. |
| Objects in contact exert forces on each other. (UE.PS2B.a; PE: 3-PS2-1) | • When two objects are in contact with one another, there is a force upon each of the objects. |

| | |
|---|---|
| | • When two objects are no longer in contact with one another, the two objects no longer experience the force. |
| The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed. (DCI: UE.PS2A.a; PE: 3-PS2-2) | • Some objects move in a pattern (e.g. a pendulum swinging, a ball moving on a curved track, a magnet repelling another magnet).<br>• When an object moves in a pattern, the future motion of the object can be predicted.<br>• The motion of an object can typically be observed and measured. |
| Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (DCI: UE.LS4B.a; PE: 3-LS4-2) | • Different plants and animals of the same species have some different characteristics.<br>• There are potential benefits for the some variations of different traits.<br>• Certain variations in characteristics make it harder or easier for an animal to survive, find mates, and reproduce (e.g., longer thorns prevent predators more effectively and increase the likelihood of survival; light coloration of some moths provides camouflage in certain environments, making it more likely that they will live long enough to be able to mate and reproduce).<br>• Characteristics that make it easier for some organisms to survive, find mates, and reproduce give those organisms an advantage over other organisms of the same species that don't have those characteristics.<br>• There can be a cause-and-effect relationship between a specific variation in a characteristic (e.g., longer thorns, coloration of moths) and its effect on the ability of the individual organism to survive and reproduce (e.g., plants with longer thorns are less likely to be eaten, darker moths are less likely to be seen and eaten on dark trees). |

**Science and Engineering Practices**

- Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.
- 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.
- Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.

**Crosscutting Concepts**

- Cause and effect relationships are routinely identified, tested, and used to explain change.
- Patterns of change can be used to make predictions.

**Putting the Standards into Practice**

**Sample Anchor Phenomenon**: Two male deer fight

Explore the anchor phenomenon

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

- A Fawn in the Forest
- Wild Things
- Leaf Deer
- White-tailed Deer and Mule Deer
- Mule Deer: Changing Landscapes, Changing Perspectives

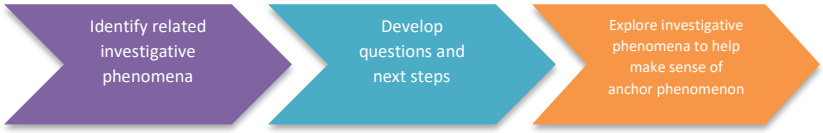
**Questions students may pose that could be used for future learning or investigations:**

Try to make sense of the anchor phenomenon

Why do the deer fight?
Will the deer with the biggest antlers win the fight?
Will the biggest deer win the fight?
Why do the deer stop moving at times even though they are pushing against each other?
Why do the deer keep changing the direction that they are moving?

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

## Sample Investigative Phenomena




**Sample 1**: Bumper Cars "react" when they are hit by another bumper car.

**Sample questions for students to investigate:**

- What happens to an object when a force acts upon it?
- Does an object always move when something hits it?
- How do balanced and unbalanced forces acting on an object impact the motion of an object?
- Using supplies such as toy cars, balls, or blocks, investigate the effects of forces on an object.
- Using a model, show the impact of balanced and unbalanced forces.
- How does the size of an object impact the force needed to move the object?
- How does the video of the deer fighting illustrate both balanced and unbalanced forces?

**3-D learning opportunities:**

SEP: Plan and carry out an investigation; Ask questions; Construct an explanation

DCI: UE.PS2A.a; UE.PS2A.b; UE.PS2B.a

CC: Cause and effect

**Sample 2**: A ball that is hit or pushed follows a predictable path.

Golf Hole in One Compilation
Home Run Compilation
583-Foot Basketball Shot

**Sample questions for students to investigate:**

- How can the path that a ball travels be predicted?
- What impacts the path that a ball travels?
- Does how hard the ball is hit impact where it goes?
- Does the type of ball impact the path that it travels?
- Does the surface on which the ball is traveling impact the path that it travels?
- Design an investigation (pose a question, collect and analyze data, draw conclusions) to explain how one variable impacts the path that a ball travels.
- How can the movement of the deer in the anchor phenomenon video be predicted?

**3-D learning opportunities:**

SEP: Ask questions; Plan and carry out an investigation; Analyze and interpret data; Use mathematical and computational thinking

DCI: UE.PS2B.a; UE.PS2A.a

CC: Cause and effect; Patterns

**Sample 3**: A Dozen Frog Species Discovered in India's Western Ghats

**Sample questions for students to investigate:**

- Why do different types of frogs have different colorings?
- Why do frogs differ in sizes even though they live in the same general environment?
- What other traits vary between different frog species?
- Do the physical traits of frogs in the same species vary?
- Are there traits of some frogs that help them to better survive?
- Do other species of animals, such as deer, have varying traits like frogs do?

**3-D learning opportunities:**

SEP: Obtain, evaluate, and communicate information

DCI: UE.LS4B.a

CC: Cause and effect

**Sample Anchor Phenomenon Reflections**

Communicate scientific reasoning around the anchor phenomenon

- Construct an explanation (or narration of the video) that describes both the life science and physical science behind the deer fighting.
    - Why do deer fight?
    - What traits make some deer have an advantage over other deer?
    - What types of forces play a role in the deer fighting?

## Unit 2: Electric and Magnetic Forces

### About the Standards

**Performance Expectations**

- 3-PS2-3 Motion and Stability: Forces and Interactions: Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.
- 3-PS2-4 Motion and Stability: Forces and Interactions: Define a simple design problem that can be solved by applying scientific ideas about magnets.
- 3-ESS3-1 Earth and Human Activity: Make a claim about the merit of a design solution that reduces the impact of a weather-related hazard.

**Science and Engineering Practices**

- Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.
- Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost.
- Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem.

**Crosscutting Concepts**

- Cause and effect relationships are routinely identified, tested, and used to explain change.
- Patterns can be used as evidence to support an explanation.

**Putting the Standards into Practice**

Explore the anchor phenomenon

**Sample Anchor Phenomenon**: The Empire State Building is struck by lightning approximately 23 times a year, yet it doesn't experience any damage.

**Resources:** A number of resources for the phenomena are included below. Teachers should screen the resources and pull photos, quotes, and data that are appropriate to share with third 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.

Lightning Strikes Empire State Building
Empire State Building Facts
Read Works: Magnetism
Read Works: The Dangerous Bolt of Electricity: Lightning
Read Works: Storms (article set)
How Lightning Works

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

Try to make sense of the anchor phenomenon

- Why is the Empire State Building often struck by lightning?
- Is the Empire State Building protected from bolts of lightning?
- Has the Empire State Building ever experienced damage from lightning bolts?
- How do electric currents travel to the Empire State Building?
- What is a lightning rod and why is a lightning rod on top of the Empire State Building?
- During thunderstorms, is the lightning rod on the Empire State Building in direct contact with lightning bolts?
- How are electric and magnetic forces different from one another? How are they similar?

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 cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.
- Define a simple design problem that can be solved by applying scientific ideas about magnets.
- Make a claim supported by evidence about the merit of a design solution (e.g. lightning rod) that reduces the impact of a weather-related hazard (e.g. thunderstorms).

## Unit 3: Earth's Systems

### About the Standards

**Performance Expectations**

- 3-ESS2-1 Earth's System: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
- 3-ESS2-2* Earth's System: Obtain and combine information to describe climates in different regions around the world.
- 3-LS2-1 Ecosystems: Interactions, Energy and Dynamics: Construct and support an argument that some animals form groups that help members survive.
- 3-LS4-3* Biological Evolution: Unity and Diversity: 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.

* The performance expectation is only partially addressed using the identified phenomenon. The performance expectation is addressed in other unit(s).

**Science and Engineering Practices**

- Represent data in tables and/or various graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.
- Construct and/or support an argument with evidence, data, and/or a model.
- Obtain and combine information from books and/ or other reliable media to explain phenomena or solutions to a design problem.

**Crosscutting Concepts**

- Patterns of change can be used to make predictions.
- Cause and effect relationships are routinely identified, tested, and used to explain change.
- A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.

**Putting the Standards into Practice**

**Sample Anchor Phenomenon**: Gorillas live in groups of 20s to 30s in the Rainforest.

Explore the anchor phenomenon

**Resources:** A number of resources for the phenomena are included below. Teachers should screen the resources and pull photos, quotes, and data that are appropriate to share with third 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: Western Lowland Gorilla
WWF: Western Lowland Gorilla
Tropical Rainforest Biome: Hot, Wet and Home to Millions
NASA Earth Observatory: Rainforest
NOAA: Climate at a Glance
NOAA: Global Temperature and Precipitation Maps
Read Works: Rain Forest Rescue
Read Works: Animals of the Tropical Rainforest
Gestural Communication by a Group of Western Lowland Gorillas

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

Try to make sense of the anchor phenomenon

- Where is the Amazon Rainforest?
- Why do gorillas live in the Amazon Rainforest?
- What type of food do gorillas eat?
- Do other animals and plants live near gorillas? What types of plants and animals live near gorillas?
- How does the equator impact the rainfall, weather, and temperature in that region of the world?
- Are the weather conditions in a gorilla's habitat different from the weather conditions in my community?
- How are plants and animals that live near gorillas different from plants and animals that live in colder regions of the world?
- Can gorillas live and survive in the tundra or cold regions of the world?
- Why do western lowland gorillas live in small groups?
- Can young and female gorillas protect themselves without support and help from silverback male gorillas?
- How do western lowland gorillas communicate with one another?

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 graphical displays of data to describe typical weather patterns and conditions in various biomes around the world.
- Construct and support an argument with evidence that some animals, such as gorillas, form groups that help members survive.
- 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.

## Unit 4: Inheritance and Variation of Traits

### About the Standards

**Performance Expectations**

- 3-LS3-1 Heredity: Inheritance and Variation of Traits: 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.
- 3-LS3-2 Heredity: Inheritance and Variation of Traits: Use evidence to support the explanation that traits can be influenced by the environment.
- 3-ESS2-2* Earth's System: Obtain and combine information to describe climates in different regions around the world.
- 3-LS4-3* Biological Evolution: Unity and Diversity: 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.

* The performance expectation is only partially addressed using the identified phenomenon. The performance expectation is addressed in other unit(s).

**Science and Engineering Practices**

- Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.
- Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.
- Obtain and combine information from books and/ or other reliable media to explain phenomena or solutions to a design problem.
- Construct and/or support an argument with evidence, data, and/or a model.

**Crosscutting Concepts**

- Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena and designed product
- Patterns of change can be used to make predictions.
- Cause and effect relationships are routinely identified, tested, and used to explain change.

**Putting the Standards into Practice**

**Sample Anchor Phenomenon**: The Namib Desert can reach up to 140 degrees and is considered one the hottest and driest places in the world. However, Namib beetles can survive in this harsh environment.

Explore the anchor phenomenon

**Resources:** A number of resources for the phenomena are included below. Teachers should screen the resources and pull photos, quotes, and data that are appropriate to share with third 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.

Namib Beetle Picture
African Beetles Beat the Heat
Nets Turn Fog Into Drinking Water
Read Works: The Namib Beetle and Fog Nets
Out of Thick Air
Namib Beetle
Namib Desert Southwestern Africa (Desert Biome)
Namib Desert Sidewinder
Elephants in the Namib Desert-Wild Africa
NOAA: Climate at a Glance
NOAA: Global Temperature and Precipitation Maps

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

Try to make sense of the anchor phenomenon

- How are the climate, rainfall, and temperature in the Namib Desert different from the Amazon Rainforest?
- Why do Namib beetles climb sand dunes on foggy mornings?
- Do Namib beetles climb sand dunes in the afternoon or at night?
- How and why do Namib beetles use their bodies to harvest fog?
- Do Namib beetles harvest fog in the afternoon or evening?
- How much water do Namib beetles harvest from fog?
- Can Namib beetles drink water from streams or other bodies of water?
- Do the bumps (traits) on Namib beetles help them survive in their environment?
- Do beetles living in other regions have the same traits as Namib beetles?
- Why do Namib beetles stand on their heads to harvest water?
- What other animals and plants live in the Namib Desert?
- How do other animals and plants in the Namib Desert get water?

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

- Analyze and interpret data to provide evidence that plants and animals have traits inherited from their parents and that variations of these traits exists in a group of similar organisms.
- Use evidence to support the explanation that traits can be influenced by the environment.
- Use graphical displays of data to describe typical weather patterns and conditions in various biomes around the world. How are weather patterns and conditions in the Amazon Rainforest different from the Namib Desert?
- 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. How are Namib beetles or other organisms suited to survive in a desert?

## Unit 5: Fossils

### About the Standards

**Performance Expectations**

- 3-LS1-1 From Molecules to Organisms: Structures and Processes: Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
- 3-LS4-1 Biological Evolution: Unity and Diversity: Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.
- 3-LS4-4 Biological Evolution: Unity and Diversity: 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.

**Science and Engineering Practices**

- Develop and/or use models to describe and/or predict phenomena.
- Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.
- Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of a problem.

**Crosscutting Concepts**

- Patterns of change can be used to make predictions.
- Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long time periods.
- A system can be described in terms of its components and their interactions.

**Putting the Standards into Practice**

**Sample Anchor Phenomenon**: Fully grown Sequoia trees can survive the hottest wildfires in Yosemite National Park.

Explore the anchor phenomenon

**Resources:** A number of resources for the phenomena are included below. Teachers should screen the resources and pull photos, quotes, and data that are appropriate to share with third 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.

How Sequoias Survive Wildfires, in Yosemite and Beyond
Fossil of Oldest Pine Tree Discovered
From Cone to Tree: How Does a Pine Tree Reproduce?
National Geographic: Giant Sequoias Need Fire
PBS: Why the Giant Sequoia Needs Fire to Grow
Giant Sequoia Tree
Capturing the Second Largest Tree in the World in a Single Image
Read Works: When Trees Get Thirsty
National Geographic: Stunning 360 Pictures Reveal Tops of Giant Sequoias
National Geographic: Sequoia in a Snowstorm
NASA: Deciduous Forest (Biome)
Size of the Giant Sequoia

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

Try to make sense of the anchor phenomenon

- How are the climate, rainfall, and temperature in the Namib Desert and Amazon Rainforest different from Yosemite National Park?
- Do gorillas live in Yosemite National Park and eat Sequoia trees?
- What types of plants and animals live in Yosemite National Park?
- How do Sequoia trees survive wildfires?
- Why do Sequoia trees need wildfires to grow?
- How do scientists know the age of trees?
- Did trees that lived millions of years ago survive wildfires?
- Why do Sequoia trees live a long time?
- How tall are Sequoia trees?
- How long does it take a baby Sequoia tree to get large?
- What causes Sequoia trees to die?
- Why do firefighters allow fires to burn in California?
- Do the wildfires harm other plants and animals that live in the forests?

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

- Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
- Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.
- 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.