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 Phenomenon

[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 Phenomenon

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

Fifth Grade Science Standards Overview

The fifth grade course focuses on the study of matter and its interactions, motion and stability: forces and interactions, matter and energy in organisms and ecosystems, from molecules to organisms: structures and processes, ecosystems, Earth's place in the universe and Earth's systems.

		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				5-ESS1-2					
	Cause and Effect			5-PS1-4				5-PS2-1		
	Scale, Proportion and Quantity		5-PS1-1	5-PS1-3		5-ESS2-2		5-ESS1-1		
	Systems and System Models		5-LS2-1 5-ESS2-1				5-ESS3-1			
	Energy and Matter	5-LS1-1	5-PS3-1			5-PS1-2				
	Structure and Function									
	Stability and Change									

Overview of Sample Units

	Unit 1 Matter and Its Interactions	Unit 2 Matter and Energy	Unit 3 Ecosystems	Unit 4 Earth's Systems	Unit 5 Earth's Place in the Universe
Anchor Phenomenon	A sugar refinery experienced a series of violent explosions due to sugar dust particles in the air.	Astronauts are able to grow plants in space without soil.	The chemical content of bears' hair reveals their eating habits.	The reduction of native plants in Hawaii's native forest, such as the kamakahala, have caused Hawaii to lose half of its fresh water.	Dung Beetles can navigate using the starry sky and the glow of the Milky Way Galaxy.
Standards	5-PS1-1* 5-PS1-2 5-PS1-3 5-PS1-4	5-PS1-1* 5-LS1-1	5-PS3-1 5-LS2-1	5-ESS2-1 5-ESS2-2 5-ESS3-1	5-ESS1-1 5-ESS1-2 5-PS2-1

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

Unit 1: Matter and Its Interactions

About the Standards

Performance Expectations

- 5-PS1-1* Matter and its interactions: Develop a model to describe that matter is made of particles that are too small to be seen.
- 5-PS1-2 Matter and its interactions: Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling or mixing substances, the total weight of matter is conserved.
- 5-PS1-3 Matter and its interactions: Make observations and measurements to identify materials based on their properties
- 5-PS1-4 Matter and its interactions: Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

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

Disciplinary Core Ideas

DCI	Partial Unpacking of the DCI
Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (DCI: UE.PS1A.a; PE: 5-PS1-1)	• Matter is anything that occupies space and has mass. • Matter is made up of particles too small to be seen. • Matter that cannot be seen can be detected in other ways. • Some gases are made up of matter particles that are too small to be seen. • Gas particles freely move around in space until they hit a material that keeps them from moving further, thus trapping the gas (e.g. air inflating a basketball, ice melting into water, an expanding balloon).

The amount of mass in matter is conserved when it changes form, even in transitions in which it seems to vanish. (DCI: PS1A.a; PE: 5-PS1-2)	• A physical change occurs when one or more substances change, but their chemical composition remains the same. • The mass of substances are the same before and after they change form (e.g. heating, cooling, or mixing).
When two or more different substances are mixed, a new substance with different properties may be formed. (DCI: UE.PS1A.b; PE: 5-PS1-2 and 5-PS1-4)	• A chemical change occurs when two or more different substances are mixed together and a new substance forms. • Substances change during a chemical reaction. The new substance(s) have new properties after a chemical reaction takes place.
No matter what reaction or change in properties occurs, the total mass of the substances does not change. (DCI: UE.PS1B.b; PE: 5-PS1-2 and 5-PS1-4)	• During a physical or chemical change the total mass of the substances do not change. • When two or more substances are mixed, a new substance with different properties may be formed, but the mass of the substances will remain the same. • The total mass of matter is conserved after heating, cooling or mixing substances.
Measurements of a variety of properties can be used to identify materials. (DCI: UE.PS1A.c; PE: 5-PS1-3)	• Materials can be identified based on their observable and measureable properties. • Properties of materials may include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility. • Qualitative and quantitative measures are used to describe and identify materials.

Science and Engineering Practices

- Develop and/or use models to describe and/or predict phenomena.
- Describe, measure, estimate, and/or graph quantities (e.g. area, volume, time) to address scientific and engineering questions and problems.
- 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.

Crosscutting Concepts

- Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long time periods.
- Standard units are used to measure and describe physical quantities such as mass, time, temperature, and volume.
- Matter flows and cycles can be tracked in terms of mass of the substances before and after a process occurs. The total mass of the substances does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and within systems.
- Cause and effect relationships are routinely identified, tested, and used to explain change.

Putting the Standards into Practice

Sample Anchor Phenomenon: On February 7, 2008, Imperial Sugar Refinery in Port Wentworth, Georgia experienced a series of violent explosions due to sugar dust particles in the air.

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 fifth 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.

Imperial Sugar Refinery
Inferno: Dust Explosion at Imperial Sugar
Sugar, An Unusual Explosive

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

Try to make sense of the anchor phenomenon

What caused the explosion at Imperial Sugar Refinery?
What role did sugar dust particles play in the explosion?
How does sugar dust travel through the air?
What is combustion?
Why did several explosions take place at the refinery?
Will the sugar in my house ever explode?

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

Sample Investigative Phenomena

Sample 1: Hot air balloons float in the sky.
Matter is everywhere
Hot Air Balloons Gas and Go

Sample questions for students to investigate:

- Develop and use a model to show the movement of gas particles in a hot air balloon.
- How is the mass of a hot air balloon different when air is in it? Why?
- How can you detect that air in a hot air balloon is made up of matter?
- How is the movement of gas particles different from the movement of particles in a liquid and solid?
- What role does heat play in the movement of a hot air balloon?
- Design an investigation to prove that air has mass.
- What is sugar dust? How did it get in the factory?

3-D learning opportunities:

SEP: Develop and use a model; Using mathematics and computational thinking; Plan and conduct an investigation

DCI: UE.PS1A.a

CC: Scale, proportion and quantity

Sample 2: A black dress crystalizes after being in the salty Dead Sea for two years.
Dead Sea Transforms Dress
Electrical Conductivity

Sample questions for students to investigate:

- What salt properties caused the black dress to crystalize?
- Use quantitative and qualitative measurements from an experiment to describe various materials during physical and chemical changes (e.g. sugar, baking soda, salt etc.).
- How is color, conductivity and solubility used to identify and classify materials such as salt, sugar and baking soda?
- How are the properties of two substances combined different from when they are separated?
- How are physical and chemical changes different from one another?
- How does sugar react when heat is added to it? How does it look before and after a chemical reaction takes place?

3-D learning opportunities:

SEP: Plan and carry out an investigation; Using mathematics and computational thinking

DCI: UE.PS1A.c

CC: Scale, proportion and quantity

Sample 3: A titanium rod is surgically implanted in an athlete's thigh bone to lengthen his leg.

Limb-lengthening system adds inched to athlete's shorter leg
Titanium Alloys in Medical Applications

Sample questions for students to investigate:	**3-D learning opportunities:**
• Why is titanium used for medical procedures such as bone lengthening and hip joint replacement? • What properties make titanium a good substance for medical procedures? Why are the properties of titanium important for medical procedures? • What properties of sugar contributed to the Imperial Sugar Refinery explosion?	SEP: Ask questions; Obtain, evaluate and communicate information DCI: UE.PS1A.c CC: Cause and effect

Sample 4: Bubbles form and carbon dioxide gas is released when baking soda and vinegar are mixed together.

Fill Up a Balloon with a Chemical Reaction

Sample questions for students to investigate:	**3-D learning opportunities:**
• Measure the baking soda, vinegar, balloon, and bottle before and after they are mixed together. How does the mass of the system-baking soda, vinegar, balloon and bottle-change after the substances are mixed together? • How are the properties of two substances combined different from when they are separated? • How can mixing baking soda and vinegar to fill a balloon support the explanation that matter is conserved when it changes form, even in transitions in which it seems to vanish? • Develop a model to describe the movement of gas particles in the balloon. • Is a chemical or physical change taking place when baking soda and vinegar are mixed with one another? Use qualitative and quantitative evidence to support your response. • Is a chemical or physical change taking place when sugar combusts?	SEP: Using mathematics and computational thinking; Plan and carry out an investigation DCI: UE.PS1A.b; UE.PS1B.a; UE.PS1B.b CC: Energy and Matter; Cause and Effect

Sample Anchor Phenomenon Reflections

Communicate scientific reasoning around the anchor phenomenon

- How did sugar dust particles travel through the Imperial Sugar Refinery?
- How did the particles of matter contribute to the explosion?
- How did the properties of sugar change after the explosion took place?
- Would the outcome of the explosion have been different if sugar dust didn't travel through the air? Use evidence from the unit to support your response.

Unit 2: Matter and Energy

About the Standards

Performance Expectations

- 5-PS1-1* Matter and its interactions: Develop a model to describe that matter is made of particles that are too small to be seen.
- 5-LS1-1 From Molecules to Organisms: Structures and Processes: Ask questions about how air and water affect the growth of plants.

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

Science and Engineering Practices

- Develop and/or use models to describe and/or predict phenomena.
- Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships

Crosscutting Concepts

- Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long time periods.
- Matter is transported into, out of, and within systems

Putting the Standards into Practice

Sample Anchor Phenomenon: Astronauts are able to grow plants in space without soil.

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 fifth 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.

Scientists Have Already Build a Prototype Greenhouse for Mars
Growing Plants and Vegetables in a Space Garden
Farming for the Future
Meals Ready to Eat: Crew Members Sample Leafy Greens Grown on Space Station
NASA Astronauts Take First Bites of Lettuce Grown in Space: Tastes Like Arugula

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

Try to make sense of the anchor phenomenon

- How do astronauts grow food in space without soil?
- How do plants get nutrients without soil?
- How often do the astronauts water the plants?
- Is NASA concerned about the availability of the water on the spacecraft?
- How do the plants receive sunlight?
- What is hydroponics and how is it different from other types of farming?
- Is hydroponics gardening only used in space?
- What materials do plants need to grow? What materials are essential to their growth and development?

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

- Create a model to describe that matter is made of particles too small to be seen.
- Use a model to explain that matter is transported into, out of and within systems.
- Make a claim supported by evidence that plant matter comes mostly from air and water, not from the soil.

Unit 3: Ecosystems

About the Standards

Performance Expectations

- 5-PS3-1 Matter and Energy in Organisms and Ecosystems: Use models to describe that energy in animals' food (used for body repair, growth, motion and to maintain body warmth) was once energy from the sun.
- 5-LS2-1 Ecosystems: Develop a model to describe the movement of matter among plants, animals, decomposers and the environment.

Science and Engineering Practices

- Develop and/or use models to describe and/or predict phenomena.

Crosscutting Concepts

- A system can be described in terms of its components and their interactions.
- Energy can be transferred in various ways and between objects.

Putting the Standards into Practice

Sample Anchor Phenomenon: The chemical content of bears' hair reveals their eating habits.

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 fifth 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: Grizzly Bear Attacks Prey
Grizzly Diet Has Several Surprises, Bear Hair Chemistry Shows
Single Hair Shows Researchers What a Bear Has Been Eating
What a Grizzly Bear's Hair Reveals About Its Diet
Bears, Their Hair and Their Fishy Fare
BBC: Grizzly Bears Catching Salmon
National Wildlife Federation: Grizzly Bear

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

Try to make sense of the anchor phenomenon

- How can scientists determine a grizzly bear's diet using its hair?
- What do grizzly bears eat?
- How do the diets of grizzly bears impact their ecosystems?
- What are apex predators?
- Are grizzly bears apex predators?
- How do ecosystems change when grizzly bears are hibernating?
- Do plant and animal populations increase or decrease during winter months?

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

- Create a model and use evidence from your model to
  - Describe the movement of matter among plants, animals, and the environment.
  - Explain how the food sources of grizzly bears can be traced back to plants.
  - Describe that energy in animals' food (used from body repair, growth, and to maintain body warmth) was once energy from the sun

Unit 4: Earth's Systems

About the Standards

Performance Expectations

- 5-ESS2-1 Earth's Systems: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
- 5-ESS2-2 Earth's Systems: Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
- 5-ESS3-1 Earth and Human Activity: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Science and Engineering Practices

- Develop and/or use models to describe and/or predict phenomena.
- Describe, measure, estimate and/or graph quantities (e.g. area, volume, time) to address scientific questions and problems.
- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution

Crosscutting Concepts

- A system can be described in terms of its components and their interactions.
- Standard units are used to measure and describe physical quantities such as mass, time, temperature and volume.

Putting the Standards into Practice

Explore the anchor phenomenon

Sample Anchor Phenomenon: The reduction of native plants in Hawaii's native forest, such as the kamakahala, have caused O'ahu, Hawaii to lose half of its fresh water.

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 fifth 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.

Protecting Hawaii's Precious Water Supply
USGS Hydrologic Data Collection
Large Fresh Water Supply Discovered by UH Researchers on Hawaii Island
Read Works: Water and the Earth (article set)
Ground Water in Hawaii
Oahu's Water History
Earth's Water Distribution

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

Try to make sense of the anchor phenomenon

- How do the reduction of native trees in Hawaii contribute to its water supply?
- What other factors positively or negatively impact Hawaii's water supply?
- How do native plants, such as the kamakahala, help Hawaii maintain its fresh water?
- Do the location of the island and distribution of water around the island impact its fresh water supply?
- How is water distributed around and within the island?
- How are kamakahala plants different from other plants?
- Why is water an important resource for Hawaii?
- How does the reduction of water on Hawaii's islands impact its ecosystems?

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

Communicate scientific reasoning around the anchor phenomenon

Sample Anchor Phenomenon Reflections

- Develop a model to describe the geosphere, biosphere, hydrosphere, and/or atmosphere.
- Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
- Explain ways that communities can use science to protect the Earth's water resources and environment.

Unit 5: Earth's Place in the Universe

About the Standards

Performance Expectations

- 5-ESS1-1 Earth's Place in the Universe: Support an argument that the apparent brightness of the sun and stars is due to their relative distances from the Earth.
- 5-ESS1-2 Earth's Place in the Universe: Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky
- 5-PS2-1 Motion and Stability: Forces and Interaction: Support an argument that the gravitational force exerted by Earth on objects is directed down.

Science and Engineering Practices

- Construct and/or support an argument with evidence data and/or a model.
- Represent data in tables and/or various graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.

Crosscutting Concepts

- Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long time periods.
- Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena and designed products.
- Cause and effect relationships are routinely identified, tested, and used to explain change.

Putting the Standards into Practice

Sample Anchor Phenomenon: Dung Beetles can navigate using the starry sky and the glow of the Milky Way Galaxy.

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 fifth 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.

Dung Beetle
New Atlantis Wild: Dung Beetle
BBC: Flight of the Dung Beetle
Dung Beetles Navigate by the Stars
Scientists Have Worked Out How Dung Beetles Use the Milky Way to Hold Their Course
Dung Beetles Navigate Via the Milky Way
Dung Beetles Navigate Using the Milky Way
National Geographic: Meet a Beautiful Beetle That Loves to Eat Poop

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

Try to make sense of the anchor phenomenon

- What is the Milky Way?
- How do dung beetles use the Milky Way to navigate where they are going?
- Do the brightness of the stars impact dung beetles ability to navigate?
- Do other animals use the Milky Way to navigate?
- How do other animals navigate where they are going?
- How does the Dung Beetle use patterns found in the Milky Way to survive?
- Do the patterns of motion of dung beetles change during the day?
- How do dung beetles navigate during the day?

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

- Make a claim supported by evidence that the differences in the brightness of the sun compared to other stars is due to their relative distance from the Earth. How does the brightness of stars help dung beetles navigate?
- Explain how the patterns of day and night and the seasonal appearance of stars impact dung beetles.
- Construct an argument supported by evidence that the gravitational force exerted by the Earth is directed down.