A New Vision for Science Standards and Assessments

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

1) apply content knowledge;
2) investigate, evaluate, and reason scientifically; and
3) connect ideas across disciplines.

This guide includes:

INTRODUCTION TO THE FIELD TEST

Transition to New Science Assessments

Students in grades 3-8 will take a science **field test only** during the regular testing window, and will not take an operational science test in Spring 2018. New full-length science assessments will be developed from successful field-tested items. This will allow the Department to end the multi-grade assessments in grades 4 and 8, and align the assessment in all tested grades to the LSS for Science.

Key Goals for New Science Assessments

Starting in the 2018-2019 school year, students in grades 3-8 will take the new LEAP 2025 science assessments, 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.

ITEM AND SET DESIGN

Supporting Key Shifts in Science Instruction

The spring 2018 field test is designed to produce questions for a spring 2019 operational test that will assess a student's understanding of the grade 4 LSS for Science, reflecting the multiple dimensions of the standards.

Shift: Apply content knowledge and skills (Disciplinary Core Idea, DCI)

In the classroom, students develop skills and content knowledge reflected in the Performance Expectations (PE) and detailed in the Disciplinary Core Ideas (DCI), the key ideas in science that have broad importance within or across multiple science or engineering disciplines. However, simply having content knowledge and scientific skills are not enough. Students must investigate and apply content knowledge to scientific phenomena. Phenomena are real world observations that can be explained through scientific knowledge and reasoning (e.g., water droplets form on the outside of a water glass, plants tend to grow toward their light source, different layers of rock can be seen on the side of the road).
On the field test, students answer questions aligned to PE bundles (groupings of like PEs) and the corresponding DCIs. The students begin each set of questions by reading through stimulus materials connected to a scientific phenomenon.

Shift: Investigate, evaluate, and reason scientifically (Science and Engineering Practice, SEP)

In the classroom, students do more than learn about science; they "do" science. Science instruction must integrate the practices, or behaviors, of scientists and engineers as students investigate real-world phenomena and design solutions to problems.
On the field test, students do more than answer recall questions about science; they apply the practices, or behaviors, of scientists and engineers as students investigate each real-world phenomenon and design solutions to problems.

Shift: Connect ideas across disciplines (Crosscutting Concept, CCC)

In the classroom, students 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). These connections are identified as crosscutting concepts (CCC). The crosscutting concepts have applications across all domains.
On the field test, sets of questions assess student application of knowledge across the domains of science for a comprehensive picture of student readiness for their next grade or course in science.

Set-Based Design

The field tests include item sets, task sets, and discrete items. A scientific **phenomenon** provides the focus for the sets. Stimulus materials, related to the scientific phenomenon, provide context for and anchor both item sets and task sets comprised of four to five questions. In addition to the information presented in the stimulus materials, the questions require students to bring in content knowledge from the course to demonstrate their understanding of science. The questions include selected-response (multiple-choice and/or multiple-select) and two-part questions. Some **item sets** culminate with a short constructed-response item, and the **task set** culminates with an extended-response task. Each field test includes a few **discrete items** made of selected-response and two-part questions.

The Phenomenon and Stimulus Materials

A variety of stimulus materials provide context for each described phenomenon. Art is used to help convey information in a simplified form, examples include maps, charts, data tables, bar or line graphs, diagrams, pictures, photographs, or artist's renderings.

Item Types

- Selected Response (SR): includes traditional multiple-choice (MC) questions with four answer options and only one correct answer, as well as multiple-select (MS) questions with five answer options and more than one correct answer. For MS items, the question identifies the number of correct answers. All SR items are worth one point each.
- Two-part SR: requires students to answer two related questions, worth two points. Two-part items may combine SR item types.
    - Two-part Dependent (TPD): the first SR must be correct in order to earn credit for the second SR item.
    - Two-part Independent (TPI): each SR is scored independently.
- Constructed Response (CR): requires a brief response provided by the student and will be scored using a 2-point rubric. These items may require a brief paragraph, a few sentences, and/or completion of a chart.
- Extended Response (ER): asks students to write an in-depth response that expresses the students' ability to apply all three dimensions of the LSS for Science and will be scored using a 6-point rubric.

Field Test Design

The following table identifies the design of the field tests to be administered in grade 4.

2018 Field Test Design

Session	Component	Numbers and Types of Questions	Time Allowed
1	Item Set	4 Items (Selected Response or Two Part)	60 minutes
	Item Set	4 Items (Selected Response or Two Part) 1 Constructed Response	
	Discrete Items	3 Items (Selected Response or Two Part)	
2	Task Set	4 Items (2 Selected Response and 2 Two Part) 1 Extended Response	45 minutes
Total Field Test Form		**15 Selected Response or Two-Part 1 Constructed Response 1 Extended Response**	**105 minutes**

NOTE: The spring 2019 operational assessment design will differ from the field test design, as it will be a full-length assessment.

All LEAP 2025 assessments, including the science field test, are **timed**. No additional time is permitted, except for students who have a documented extended time accommodation (e.g., an IEP).

FIELD TEST ADMINISTRATION POLICIES

The LEAP 2025 ELA, mathematics, and social studies assessments, and the science field test will be available to districts as paper-based tests (PBT) or computer-based tests (CBT) for grade 4. School and district test coordinators will provide information on the delivery method selected by their district. The table below lists the PBT administration schedule for the grade 4 LEAP 2025 tests, including the science field test.

Paper-Based Test Administration Schedule: Grade 4

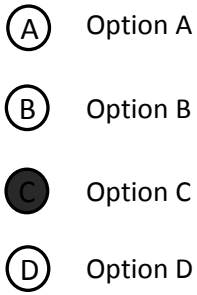
Testing Window: April 30, 2018 – May 4, 2018			Session Time (minutes)
Day 1 April 30	English Language Arts Session 1:	Literary Analysis Task **OR** Research Simulation Task	90
	Mathematics Session 1		75
Day 2 May 1	English Language Arts Session 2:	Research Simulation Task **OR** Narrative Writing Task + 1 passage set	90
	Mathematics Session 2		85
Day 3 May 2	English Language Arts Session 3: Reading Literary and Informational Texts		60
	Mathematics Session 3		75
Day 4 May 3	Social Studies Session 1: Item Sets		85
	Social Studies Session 2: Task Set		45
	Social Studies Session 3: Item Sets and Discrete Items		85
Day 5 May 4	Science Field Test Session 1: Item Sets and Discrete Items		60
	Science Field Test Session 2: Task Set		45

The **computer-based testing window opens April 9, 2018 and runs through May 4, 2018**. If your school is participating in computer-based testing, the school or district test coordinator will communicate the testing schedule. For more information about the scheduling of the CBT and online administration policies, refer to the CBT Guidance document, found in the LDOE assessment library.

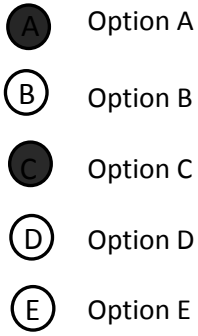
Paper-Based Tests

Students taking the paper-based tests will enter all answers in their test booklets. There will be no separate answer documents. Instructions for how to manage the test booklets will be outlined in the Test Administration Manual.

Multiple-choice questions for grade 4 have four answer options. Students will shade the bubble of the **one** correct answer.



Multiple-select questions for grade 4 have five options. Students will fill in the number of correct answers identified in the stem of the question. **The number of correct answers will vary from task to task.** The sample asks for two correct answers.

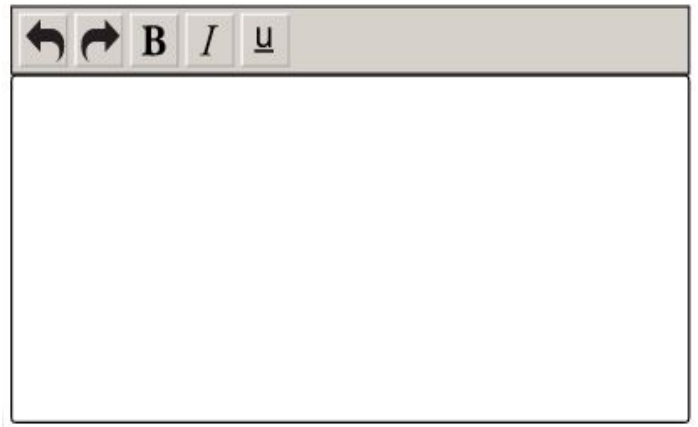


The following information presents guidelines for marking/writing in the LEAP 2025 Science Field Test booklet.

- Students are encouraged to mark the stimulus and questions in the field-test booklet (e.g., highlight or underline evidence, annotate the stimulus document(s), circle key words in the questions, etc.), especially as part of their preparation in responding to the extended-response portion of the task.
- Students may use yellow highlighters to highlight text in the field-test booklet.
- Highlighting text in options and placing an X to the right of the text in an option are recommended ways for students to eliminate options. However, crossing out options could create scoring issues if students mark through answer circles.
- When students are answering items requiring written responses, they should make sure to write their responses in the space(s) provided. Any information written outside the space or which has been scratched out in the printed field-test booklet will not be scored.

Computer-Based Tests

Students will enter their answers into the online testing system. When composing their written responses for science constructed- or extended-response items, students will type their responses into an answer box, like the one shown.



The toolbar at the top of the response box allows students to undo or redo and action; and add boldface, italics, or underlining to their response. There is a limit to the amount of characters that can be typed into the response box; however, it is set well beyond what a student might produce given the LEAP 2025 expectations for written responses and timing. The character count is not included on the response box so students focus on the quality of their responses rather than the amount of writing.

The computer-based tests include the following online tools, which allow a student to select answer choices, "mark" items, eliminate answer options, take notes, enlarge the item, and guide the reading of a text or an item line by line (similar to what a student can do on the paper-based tests). A help tool is also featured to assist students as they use the online system.

- Pointer tool 
- Highlighter tool 
- Cross-Off tool 
- Sticky Note tool 
- Magnifying tool 
- Line Guide 

- Help Tool 

All students taking the computer-based field test should work through the Online Tools Training, available through INSIGHT in Winter 2017-2018, to practice using the online tools so students are well prepared to navigate the online testing system.

Testing Materials

All students should receive scratch paper and two pencils from their test administrator.

SAMPLE FIELD TEST ITEMS

Before the discrete items, the item set, and the task set, included in this section, is a table containing item types, alignment information, and point values. Additionally, analyses of the multi-dimensional alignment for each discrete item, each item in the item set, and each item in the task set, as well as rubrics for CRs and ERs are included.

DISCRETE ITEMS

Item Type	PE	DCI	SEP	CCC	Points
MC	4-PS3-2	UE.PS3A.b; UE.PS3B.a; UE.PS3B.c		E/M	1
MC	4-PS3-3	UE.PS3B.a		E/M	1
TPI	4-LS1-2	UE.LS1D.a	6. E/S		2
MC	4-ESS2-1	UE.ESS2A.a	3. INV	C/E	1

SEP = blue; DCI = orange; CCC = green An asterisk (*) denotes correct answer(s).

Multiple-Choice Item

Performance Expectation

4-PS3-2 Make observations to provide evidence that energy can be transferred in many ways and between objects to explain the presence of different types of energy when the blender is running.

A student uses a blender to make a milk shake. He plugs the blender into a wall outlet. He adds ice cream and milk and turns the blender on. While the student is running the blender, the phone rings. He does not hear the ring over the noise of the blender. After he turns the blender off, he pours his drink into a glass. He observes that the base of the blender is warm.

Which statement describes a way that energy is transferred in the blender?

A. The blender's kinetic energy changes directly into light energy.

B. The blender's electrical energy changes directly into sound energy.

C. The blender's heat energy changes into both mechanical and sound energy.

D. The blender's mechanical energy changes into both heat and sound energy.*

Multi-Dimensional Alignment

The item requires the student to apply knowledge that **energy can be moved from place to place by moving objects or through sound and light energy** to demonstrate an understanding that energy **can be transferred in various ways**.

Multiple-Choice Item

Performance Expectation

4-PS3-3 Ask questions and predict outcomes about the changes in energy that occur when objects collide.

Students are practicing softball on a windy day. The pitcher throws the softball toward the batter. The students notice that the softball moves faster after it is hit by the bat than when it is thrown by the pitcher. Which statement **best** explains what happens to the energy of the softball when it is hit by the bat?

A. When the bat hits the ball, energy transfers from the softball to the bat.

B. The softball is still moving, so there is no transfer of energy to or from the softball.

C. There is a transfer of energy from the softball to the bat, increasing the energy of the bat's movement.

D. There is a transfer of energy from the bat to the softball, increasing the energy of the softball's movement.*

Multi-Dimensional Alignment

The item requires the student to apply knowledge that **when objects collide, energy can be transferred from one object to another, changing their motion** to demonstrate an understanding that **energy can be transferred in various ways**.

Two-Part Independent Item (Part A: Multiple Choice, Part B: Multiple Choice)

Performance Expectation

4-LS1-2 Construct an explanation to describe how animals receive different types of information through their senses, process the information in their brains, and respond to the information in different ways.

Nine-banded armadillos are usually active at night. They have very small eyes and cannot see objects that are far away. They use their noses to find food that is as deep as 20 centimeters underground. Armadillos also use their noses to loosen soil and use their claws to dig in the soil. They use their good hearing to listen for predators.

Part A

Which claim is supported by the information about armadillos?

A. Armadillos use their sense of smell to find food.*

B. Armadillos use their sense of touch to hide from predators.

C. Armadillos use their sense of hearing to find food that is far away.

D. Armadillos use their sense of sight to see predators that are nearby.

Part B

An armadillo is looking for food at night and finds a new object in its environment. Which statement describes how the armadillo will **most likely** use its senses to take in information about the new object to determine if the new object is food?

A. The armadillo will use its ears and compare the sound the object makes to known sounds.

B. The armadillo will use its nose and compare the smell of the object with known smells.*

C. The armadillo will use its eyes and compare the look of the object with the look of known objects.

D. The armadillo will use its claws and compare the feel of the object with the feel of known objects.

Multi-Dimensional Alignment

While effectively applying the science practice of **constructing explanations** by **explaining observed relationships**, the student demonstrates knowledge that **different sense receptors are specialized to allow an animal's brain to process particular kinds of information**.

Multiple-Choice Item

Performance Expectation

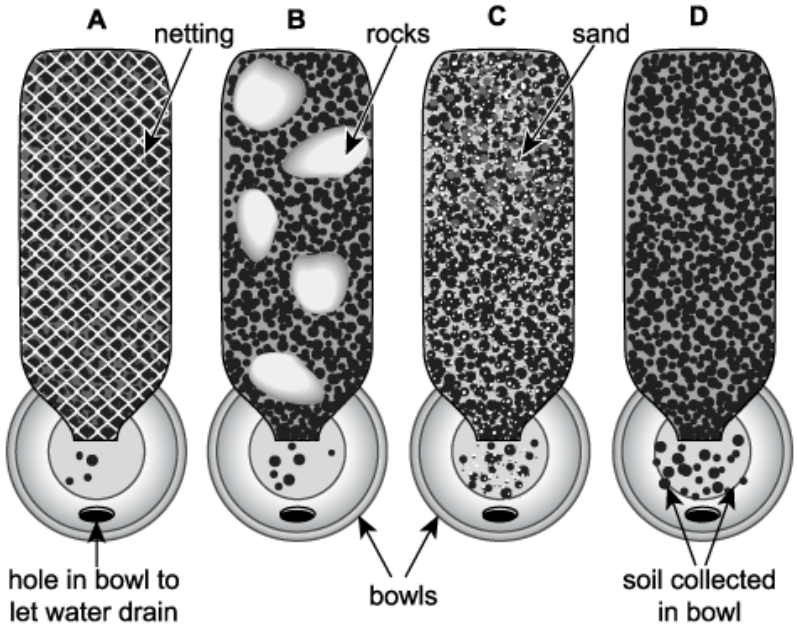
4-ESS2-1 Plan and conduct investigations on the effects of water, ice, wind, and vegetation on the relative rate of weathering and erosion.

Students experiment to find out whether different materials could be used to slow down the erosion of the Louisiana coastline.

- They cut four 3-liter plastic bottles in half from top to bottom.
- They add the same amount of soil to each bottle.
- They add different kinds of materials to the soil in three of the bottles.
- They put a bowl at the end of each bottle.
- They pour 100 milliliters of water over the soil in each bottle.

The setup of their experiment is shown in the figure.

Erosion Experiment



The students dry and weigh the soil from the bowls. Their data are shown in the table.

Erosion Experiment Data

Bottle	Material Added to Soil	Soil Weight (grams)
A	netting	0.4
B	rocks	0.5
C	sand	1.8
D	no material added	2.5

Based on the students' data, which statement describes the material that will help prevent the **greatest** amount of erosion?

A. Add netting, because it kept the greatest amount of soil in the bottle.*

B. Add sand, because some of it moved into the bowl along with the soil.

C. Add rocks, because only a few were needed in order to keep a lot of soil in the bottle.

D. Add no material, because having only soil caused the greatest amount of soil to move into the bowl.

Multi-Dimensional Alignment

The item requires the student to apply the science practice of **planning and carrying out an investigation** and knowledge that **water helps shape the land and can break down and move soil around** to demonstrate an understanding of **cause and effect relationships**.

ITEM SET: How Bears See

Performance Expectations

4-PS4-2 Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.

4-LS1-2 Construct an explanation to describe how animals receive different types of information through their senses, process the information in their brains, and respond to the information in different ways.

Item Type	PE	DCI	SEP	CCC	Points
MC	4-PS4-2	UE.PS4B.a	2. MOD		1
MC	4-LS1-2		6. E/S	C/E	1
TPD	4-LS1-2	UE.LS1D.a	6. E/S	C/E	2
CR	4-PS4-2	UE.PS4B.a	2. MOD	C/E	2

SEP = blue; DCI = orange; CCC = green An (*) denotes correct answer(s).

Stimulus Materials

Use the information about how bears see and your knowledge of science to answer the questions.

How Bears See

Animals use their vision and other senses to help them find food. Comparing differences in animals' activities can help in understanding differences in their eyesight.

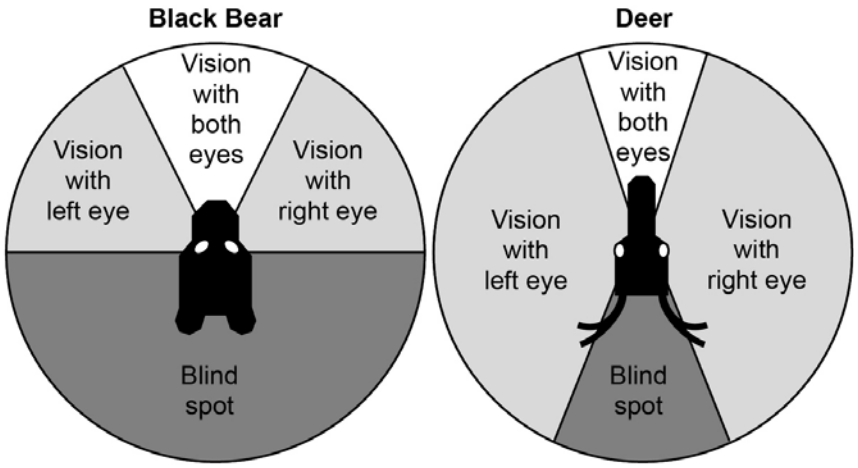
Table 1 shows some information about black bears and deer.

Table 1. Black Bear and Deer Facts

	Black Bear	Deer
Diet	plants, fruits, nuts, insects, fish, mammals	grasses, leaves, twigs, fruit, nuts
Behavior	mostly active at night; some activity during the day	active at dawn and at dusk
Predators	no natural predators	wolves, coyotes, mountain lions, bobcats

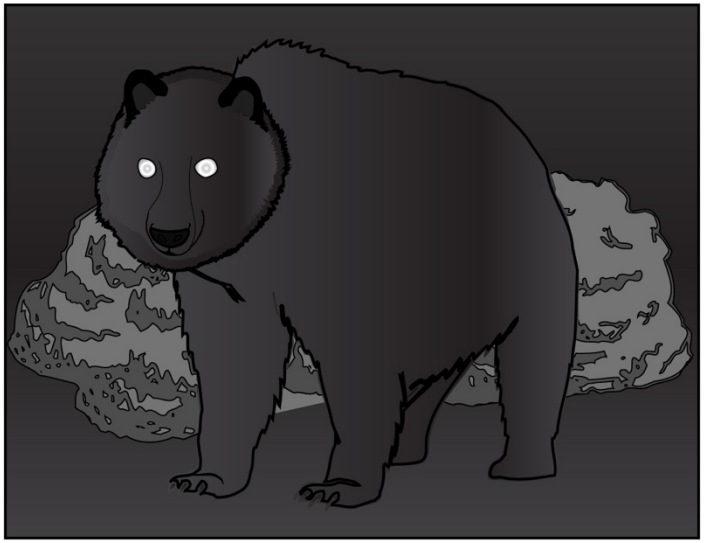
A blind spot is a place where an animal cannot see. Figure 1 shows the blind spots of a black bear and a deer.

Figure 1. Black Bear and Deer Vision



Black bears can see well at night. This is because there is a thin layer of shiny material on the insides of their eyes. This helps their eyes capture more light and makes their eyes appear to glow at night, as shown in Figure 2.

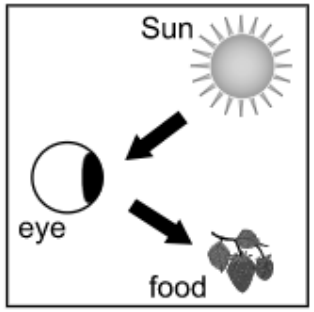
Figure 2. Black Bear at Night



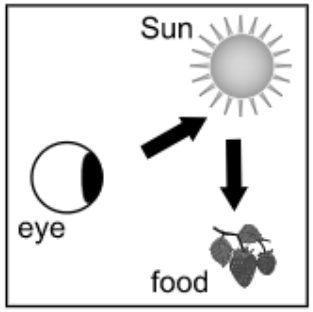
Multiple-Choice Item

Which model shows the path of light that allows a bear to see its food during the day?

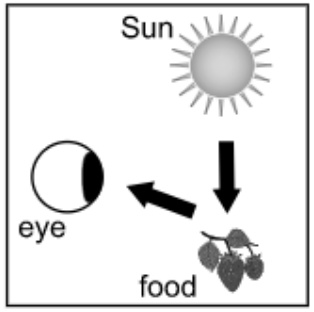
A.



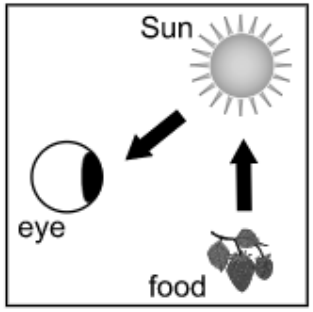
B.



C.



D.



Multi-Dimensional Alignment

While effectively applying the science practice of using models by **using a model to describe the path of light that allows a bear to see**, the student demonstrates knowledge that **an object can be seen when light reflected from its surface enters the eyes**.

Multiple-Choice Item

Which sentence **best** explains what causes a bear's eyes to appear to glow at night, as shown in Figure 2?

A. Light is transmitted from objects to the bear's eyes.

B. Light is produced by the bear's eyes at night.

C. Extra light is stored in the bear's eyes during the daytime.

D. Extra light captured by the bear's eyes is reflected back out of the eyes.*

Multi-Dimensional Alignment

While effectively applying the science practice of **constructing explanations** by **explaining observed relationships between light and the bear's eye**, the student demonstrates an understanding of **cause and effect relationships**.

Two-Part Dependent Item (Part A: Multiple Select, Part B: Multiple Choice)

Part A

Which statements explain why bears and deer need different information to help them survive?

Select the **two** correct answers.

A. Deer need to find food at night.

B. Bears need to find food that they cannot see.

C. Deer need to know if there are predators nearby.*

D. Deer need to travel long distances to find enough food.

E. Bears need to see prey such as fish so that they can catch them.*

Part B

Which statement supports the answer to Part A?

A. Bears have paws that can identify textures, but deer do not.

B. Deer have tongues that detect sweetness, but bears do not.

C. Deer have eyes that see almost all around them, but bears have eyes that see mostly in front of them.*

D. Bears have small ears that can turn in different directions, but deer must turn their heads to hear sounds.

Multi-Dimensional Alignment

The item requires the student to apply the science practice of **constructing explanations** and knowledge that **different sense receptors are specialized to allow animals to process particular kinds of information** to demonstrate an understanding of **cause and effect relationships**.

Constructed-Response Item

A bear is hunting during a night when the Moon is full. A large cloud moves in front of the Moon and blocks the Moon's light. Explain whether the bear can see better before the cloud covers the Moon or after the light is blocked. Support your answer with evidence about how a bear is able to see and how a change in the amount of light affects the bear's vision.

Multi-Dimensional Alignment

The item requires the student to apply the science practice of **using models** and knowledge that **an object can be seen when light reflected from its surface enters the eyes** to demonstrate an understanding of **cause and effect relationships**.

Scoring Guide

Scoring Information	
Score	**Description**
2	Student's response correctly explains whether the bear can see better before the cloud covers the Moon or after the light is blocked AND uses evidence to support the explanation.
1	Student's response correctly explains whether the bear can see better before the cloud covers the Moon or after the light is blocked, but does not use evidence to support the explanation.
0	Student's response does **not** correctly explain whether the bear can see better before the cloud covers the Moon or after the light is blocked or use evidence to support the explanation.

Scoring Notes:

- Explanation of whether the bear can see better before the cloud covers the Moon or after the light is blocked (1 point)
- Providing evidence to support the explanation (1 point)

Examples include:

- A bear can see better before the cloud covers the Moon than when the light is blocked. When there is light, the bear can see. When the light is blocked, the bear cannot see. When the Moon is not blocked by the cloud, the Moon's light can reflect off food and go into the bear's eyes. When the Moon's light is blocked, the light cannot reflect off the food and go into the bear's eyes.

- The bear cannot see after the light is blocked because light has to reflect off food and go into a bear's eye. If there is no light from the moon, then light cannot go into the bear's eye.

Accept other reasonable answers.

TASK: The Ages of Louisiana Soil and Fossils

Performance Expectations

4-ESS1-1 Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in landforms over time.

4-ESS2-1 Plan and conduct investigations on the effects of water, ice, wind, and vegetation on the relative rate of weathering and erosion.

Item Type	PE	DCI	SEP	CCC	Points
MC	4-ESS1-1	UE.ESS1C.a	6. E/S		1
TPD	4-ESS1-1	UE.ESS1C.a	6. E/S	PAT	2
MC	4-ESS1-1	UE.ESS1C.a	6. E/S		1
TPD	4-ESS2-1	UE.ESS2A.a	3. INV	PAT	2
ER	4-ESS2-1; 4-ESS1-1	UE.ESS2A.a; UE.ESS1C.a	6.E/S	C/E	6

SEP = blue; DCI = orange; CCC = green An (*) denotes correct answer(s).

Stimulus Materials

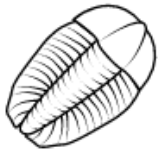
Use the information about the ages of Louisiana soil and fossils and your knowledge of science to answer the questions.

The Ages of Louisiana Soil and Fossils

Most of the fossils in Louisiana are found in gravel at the bottom of rivers. These fossils are from plants and animals that lived more than 250 million years ago (mya). Other fossils in Louisiana are found in rock cliffs. These fossils are usually younger than the ones in river gravel.

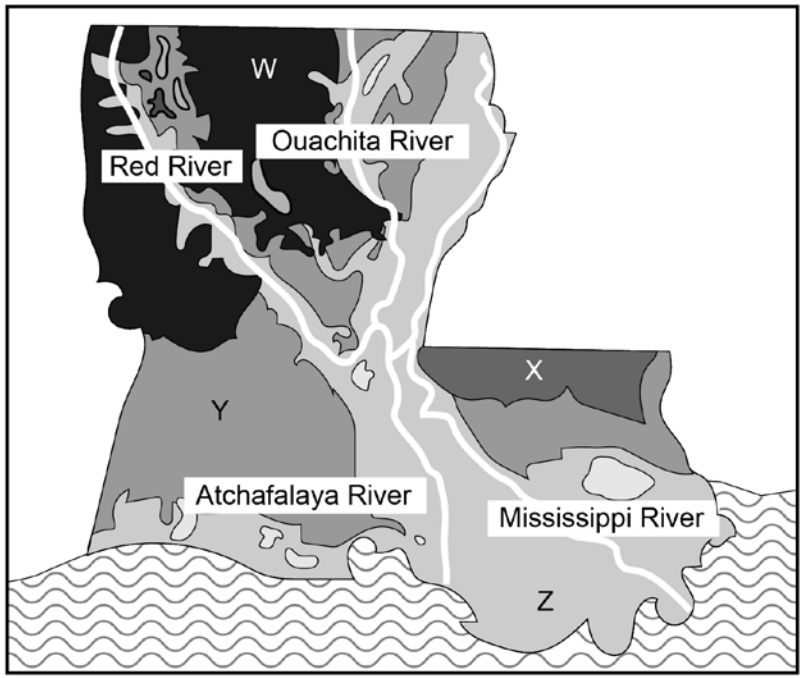
Some of the fossils found in Louisiana are shown in Table 1.

Table 1. Fossils Found in Louisiana

Fossil Type	When the Animal Lived (millions of years ago)	Where the Animal Lived
trilobite 	540 mya to 300 mya	ocean
coral 	440 mya to 300 mya	ocean
whale 	56 mya to 34 mya	ocean
camel 	23 mya to 5.3 mya	land

Soil in some areas of Louisiana is older than soil in other areas of the state. Map 1 shows the ages of the top layers of soil in each part of Louisiana.

Map 1. Ages of Top Layers of Soil in Louisiana



Key	
W 66 mya to 5.3 mya	Z 12,000 years ago to present
X 5.3 mya to 2.6 mya	open water
Y 2.6 mya to 12,000 years ago	

Table 2 shows time periods of different eras in Earth's history.

Table 2. Geologic Time Scale

Era	Period of Time (millions of years ago)
Cenozoic	66 mya to present
Mesozoic	250 mya to 66 mya
Paleozoic	540 mya to 250 mya
Precambrian	4,600 mya to 540 mya

Multiple-Choice Item

Use the information in Map 1 and Table 2 to answer the question.

Camel fossils are not found in the top layers of soil near Louisiana's rivers, but they are found in areas away from rivers. Which statement **best** explains why camel fossils are **not** found near rivers in Louisiana?

A. The soil around the rivers does not have any fossils in it.

B. The soil around the rivers was brought there from other places.

C. The soil around the rivers is not old enough to have camel fossils.*

D. The soil around the rivers has been washed away, and the fossils are missing.

Multi-Dimensional Alignment

While effectively applying the science practice of **constructing explanations** by **identifying evidence that supports an explanation**, the student demonstrates knowledge that **patterns of rock layers change over time due to Earth's forces**.

Two-Part Dependent Item (Part A: Multiple Choice, Part B: Multiple Select)

Use the information in Map 1 and Table 2 to answer the questions.

Part A
A fossil is found in the top layer of soil in Region Y. To which era does this fossil **most likely** belong?

A. Cenozoic*

B. Mesozoic

C. Paleozoic

D. Precambrian

Part B
Which statements are evidence to support the answer to Part A?

Select the **two** correct answers.

A. The soil in Region Y covers older rock layers.

B. The top layer of soil in Region Y is from no more than 2.6 mya.*

C. Some of the fossils found in Louisiana are from the Paleozoic era.

D. The oldest top layer of soil in Louisiana is from between 66 mya and 5.3 mya.*

E. Fossils found in gravel from rivers are older than other fossils in Louisiana.

Multi-Dimensional Alignment

The item requires the student to apply the science practice of **identifying evidence that supports an explanation** and knowledge that **the presence and location of certain fossil types indicate the order in which rock layers were formed** to demonstrate an understanding of **patterns**.

Multiple-Choice Item

A student claims that the top layer of soil in Louisiana is young compared with the land in other states. Which statement **best** supports this claim?

A. Earthquakes cause land to shift and make new soil.

B. Most of the soil found in Louisiana is from the Mesozoic era.

C. Rivers deposit younger soil on top of older soil as they move.*

D. Fossils from the Paleozoic era are found in gravel near rivers.

Multi-Dimensional Alignment

While effectively applying the science practice of **constructing explanations** by **identifying evidence that supports an explanation**, the student demonstrates knowledge that **patterns of rock layers change over time due to Earth's forces**.

Two-Part Dependent Item (Part A: Multiple Choice, Part B: Multiple Choice)

A student sees a whale bone fossil in the rock layers on the side of a river in Louisiana. The fossil was not visible in the rock layers one year ago.

Part A

The student wants to investigate what caused the whale bone fossil to become visible. She places a piece of bone in a pile of soil and packs the soil down. Which action is **most** appropriate for the student to take in order to investigate what caused the whale bone fossil to become visible?

A. Shake the pile of soil until the bone becomes visible.

B. Freeze and thaw the soil until the bone becomes visible.

C. Place a heat lamp over the pile of soil until the bone becomes visible.

D. Sprinkle water over the top of the soil until the bone becomes visible.*

Part B

Which statement best explains the answer to Part A?

A. Rain eroded the rock layer beside the river and made the fossil visible.*

B. Heat energy caused the lighter layers of rock to break off and fall away.

C. Earthquakes shook the rock around the fossil loose and made the fossil visible.

D. Changes in seasonal temperatures caused the rock around the bone to fall away.

Multi-Dimensional Alignment

The item requires the student to apply the science practice of **identifying evidence that supports an explanation** and knowledge that **rock layers change over time due to Earth's forces** to demonstrate an understanding of **patterns**.

Extended-Response Item

Use Map 1 and Table 2 to answer the question.

A scientist finds a trilobite fossil on the ground in Region Z. He claims that the trilobite fossil did not form in Louisiana. Using evidence from the information about the ages of Louisiana soil and fossils, write an explanation that supports the scientist's claim. In your response, be sure to explain:

- why the fossil did not form in the area that is now Louisiana
- where the fossil most likely came from
- what happened to cause the fossil to move from its starting place to Region Z

As you write, be sure to:

- Address all parts of the prompt.
- Use evidence from the information provided and your own knowledge of science to support your response.

Multi-Dimensional Alignment

The item requires the student to apply the science practice of **identifying evidence that supports an explanation** and knowledge that:

- **rock layers change over time due to Earth's forces,** and
- **water and weathering help shape the land by breaking down rocks, soil, and sediments and moving them around**

to demonstrate an understanding of **cause and effect relationships**.

Score Points

- The student's score is the sum total of all points earned (up to a maximum of 6 points) in the item.
- No response (blank) or a response that does not address the prompt earns 0 points.
- 2 points for explaining why the fossil did not form in the area that is now Louisiana.
    - Score 2 points: Correct explanation that is supported with evidence.

    OR
    - Score 1 point: Correct explanation, but no evidence is given.
- 1 point for explaining where the fossil most likely came from.
- 3 points for explaining what happened to cause the fossil to move from its starting place to Region Z.
    - Score 3 points: Correctly identifies erosion, describes the process, and explains how the fossil was transported.

    OR
    - Score 2 points: Correctly identifies erosion and explains how the fossil was transported.

    OR
    - Score 1 point: Correctly explains how the fossil was transported.

Score Information

1. Why the fossil formed in another place:

- The soil in Region Z was formed at a different time than the fossil, so the fossil could not have formed in Region Z.
- Trilobites are from 540 mya to 300 mya (Paleozoic era). The soil in Region Z is from 12,000 years ago to present (Cenozoic era).

2. Where the fossil came from:

- The fossil probably came from a place that has very old rock that is the same age as the fossil.

3. Why the fossil moved to Region Z:

- The fossil moved from its starting place because of erosion.
- Wind or rain wore away the rock that covered the fossil until the fossil became separated from the rock.
- The fossil moved downward into a river, and the river brought the fossil to Region Z.

NOTE: Also accept other correct descriptions of weathering and erosion, such as freezing water in spaces between the fossil and the rock and pushing the fossil and rock apart.

RESOURCES

- K-12 Louisiana Student Standards for Science (2017): provides the performance expectations and three-dimensional learning for all grades
- Science Standards - Shifts In Science: supports teachers in understanding how the three-dimensional learning impacts instruction
    - Appendix A - Learning Progressions: describes the development of SEPs, DCIs, and CCCs as appropriate for grade spans across K-2, 3-5, middle school, and high school
    - Appendix B - Connections to ELA and Math K-12: details the connections between the Louisiana Student Standards for Science and the Louisiana Student Standards for Math and ELA
- Grade 4 Sample Scope and Sequence: includes sample units to assist educators in transitioning to the new science standards.
- Grade 4 Science Library: contains resources and supporting instructional material, including sample tasks
- Online Tools Training (OTT): provides students and teachers opportunities to become familiar with the tools available in the online testing platform; available in INSIGHT or here using the Chrome browser in Winter 2017-2018
- LEAP Accessibility and Accommodations Manual: provides information about Louisiana's accessibility features and accommodations for testing
- 2017-2018 Louisiana Assessment Calendar: includes information on testing windows for test administrations