



Office of Assessments, Analytics, and Accountability

LEAP Assessment Guide for Grade 8 Science

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Purpose

This document is designed to assist Louisiana educators in understanding the LEAP Grade 8 Science assessment.

Introduction

All students in grades 3-8 and Biology will take the LEAP science assessments, which provide

- questions that have been [reviewed by Louisiana educators](#) to ensure their alignment to the [Louisiana Student Standards for Science](#) and appropriateness for all Louisiana students;
- measurement of the full range of student performance; and
- information for educators and parents about student readiness in science and whether students are “on track” for college and careers.

Vision for Science Standards and Assessment

The [Louisiana Student Standards for Science \(LSS for Science\)](#) provide appropriate content for all grades or courses, maintain high expectations, create a logical connection of content across and within grades, represent the knowledge and skills students need to successfully transition to postsecondary education and the workplace, and call for students to apply content knowledge; investigate, evaluate, and reason scientifically; and connect ideas across disciplines.

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Assessment Design

Supporting Science Instruction

The LEAP tests will assess students' understanding of the [LSS for Science](#), reflecting the multiple dimensions of the standards.

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 skills and knowledge students are expected to master by the end of the course.

On the LEAP test, students answer questions which require content knowledge and skills aligned to PE bundles (groupings of PEs) and the corresponding DCIs.

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

In the classroom, students do more than learn about science; they “do” science. 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). 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 LEAP test, students do more than answer recall questions about science; they apply the practices, or behaviors, of scientists and engineers to investigate each real-world phenomenon and design solutions to problems.

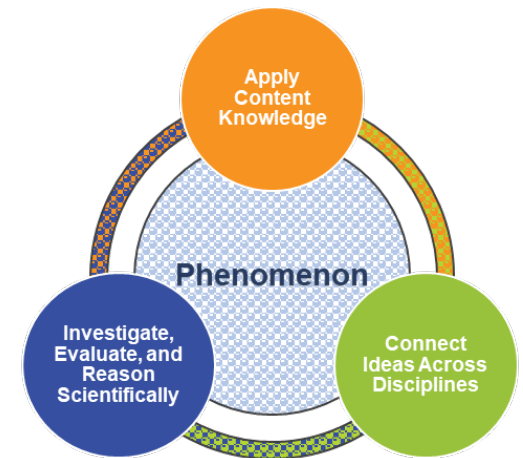
Connect ideas across disciplines (Crosscutting Concept, CCC)

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).

On the LEAP 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 tests include item sets, task sets, and standalone items. A scientific **phenomenon** provides the anchor for each set or standalone item. Stimulus materials, related to the scientific phenomenon, provide context and focus for sets. 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. In addition to the information presented in the stimulus



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materials, the questions require students to bring in content knowledge from the course to demonstrate their understanding of science. Some **item sets** culminate with a short constructed-response and the **task** culminates with an extended-response item. Each test includes a few **standalone items** which are not part of an item set or task.

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, unless it is part of a Two-part Dependent (TPD). In a TPD, the question in Part B will then be worded to “select all that apply.” All SR items are worth one point each.
- [Technology Enhanced \(TE\)](#): uses technology to capture student comprehension in authentic ways, previously difficult to score by machine for large-scale assessments. TE items are worth up to two points and may include item types such as, but not limited to, drag and drop, dropdown menus, and hot spots. The Online Tools Training allows students to experience TE items and practice answering them to prepare for the computer-based test.
- Two-part item: requires students to answer two related questions, worth two points. Two-part items may combine SR and TE item types.
 - [Two-part Dependent \(TPD\)](#): the first part must be correct in order to earn credit for the second part.
 - [Two-part Independent \(TPI\)](#): each part 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 a response that expresses the students’ ability to apply all three dimensions of the LSS for Science and will be scored using a 9-point rubric.

Test Design

Beginning with the 2024-2025 test administration for LEAP science grades 5-8, the Department will revert back to embedding field test items across three operational test sessions, similar to the original designs administered in 2018-2019 and 2020-2021. Having a separate field test session for grades 5-8 in 2021-2022 through 2023-2024 has had the following negative impacts:

- Due to population diversity, larger systems are carrying the full burden of the field testing and there is a lack of representation from smaller systems;
- Separating the session significantly lowers tester and administrator motivation to complete the items with full effort because the items “do not count” in the performance scores;
- Questionable reliability of field test data has resulted in unusable items and has significantly limited the growth of the science test item bank for grades 5-8.

The LEAP grade 8 science assessment contains 5 item sets, 1 task, and 12 standalone items. The test will contain embedded field-test questions (one item set or task set and four standalone items). The field-test questions do not count toward a student’s final score on the test and may be placed in any session; they provide information that will be used to develop future test forms. All LEAP tests are timed.

Test Session	Component	Points	Time Allowed
Session 1	3 Item Sets	18	65 minutes
	3 Standalone Items	4	
Session 2	1 Task	15	65 minutes
	1 Item Set	6	
	3 Standalone Items	4	
Session 3	1 Item Set	6	65 minutes
	6 Standalone Items	8	
Total Operational	5 Item Sets, 1 Task, 12 Standalones	61	195 minutes

Reporting Categories

All Louisiana Student Standards for Science are eligible for assessment. The LEAP science assessments examine students’ performance of scientific and engineering practices (SEPs) in the context of disciplinary core ideas (DCIs) and crosscutting concepts (CCCs). Although these SEPs are described separately, they generally function in concert. This overlap of SEPs means that assessment items must be designed around a bundle of related performance expectations (PEs) and not tested in isolation from one another. The task set, which contains the extended-response question, may assess any of the LSS for science from year to year. The extended-response question is reported in the overall score, but not as part of any reporting category.

The table below shows the reporting category titles and descriptions as well as the PEs associated with each reporting category.

Reporting Category	Description	Content
Investigate	Ask Questions, Define Problems, and Plan Investigations	8-MS-PS1-3, 8-MS-PS1-6, 8-MS-PS3-3, 8-MS-ESS3-2, 8-MS-ESS3-3, 8-MS-LS1-5

Reporting Category	Description	Content
Evaluate	Analyze and Interpret Data, Use Mathematics and Computational Thinking, and Engage in Argument from Evidence	8-MS-PS3-5, 8-MS-ESS2-3, 8-MS-LS1-4, 8-MS-LS4-1, 8-MS-LS4-3, 8-MS-LS4-6
Reason Scientifically	Develop and Use Models, Construct Explanations, and Design Solutions	8-MS-PS1-1, 8-MS-ESS1-4, 8-MS-ESS2-1, 8-MS-ESS2-2, 8-MS-ESS3-1, 8-MS-LS3-1, 8-MS-LS4-2

Achievement-Level Definitions

Achievement-level definitions briefly describe the expectations for student performance at each of Louisiana’s five achievement levels:

- **Advanced:** Students performing at this level have **exceeded** college and career readiness expectations and are well prepared for the next level of study in this content area.
- **Mastery:** Students performing at this level have **met** college and career readiness expectations and are prepared for the next level of study in this content area.
- **Basic:** Students performing at this level have **nearly met** college and career readiness expectations and may need additional support to be fully prepared for the next level of study in this content area.
- **Approaching Basic:** Students performing at this level have **partially met** college and career readiness expectations and will need much support to be prepared for the next level of study in this content area.
- **Unsatisfactory:** Students performing at this level have **not yet met** the college and career readiness expectations and will need extensive support to be prepared for the next level of study in this content area.

Achievement Level Descriptors

[Achievement Level Descriptors \(ALDs\)](#) indicate what a typical student at each level should be able to demonstrate based on his or her command of grade-level standards. ALDs are written for the three assessment reporting categories. Access the ALDs in the [Assessment](#) library for a breakdown of the knowledge, skills, and practices associated with each achievement level.

Test Administration

Administration Information

The testing window opens **April 2, 2025**, and runs through **May 14, 2025** for all computer-based tests. The school or district test coordinator will communicate each school's testing schedule. For updates to the testing schedule, refer to the [2024-2025 Louisiana Assessment Calendar](#). All LEAP assessments are timed. No additional time is permitted, except for students who have a documented extended time accommodation (e.g., an IEP).

Scheduling Requirements for Computer-Based Testing

Computer-based testing allows school systems some flexibility in scheduling. However, to reduce incidences of testing irregularities, school systems **must** adhere to the following scheduling and administration practices:

- Testing students in the same grade level across the school at or very close to the same time
- Completing makeup testing for students immediately upon their return
- Limiting student interaction during breaks between test sessions
- Isolating students who have not completed testing for the day (e.g., students with extended time accommodation)
- Preventing interaction between groups of students taking the same tests at different times within a testing day
- Requiring the completion of a session once it is opened (i.e., limiting the reopening of test sessions)
- Taking the sessions within a content area in the correct order (e.g., Math Session 1 taken before Math Session 2)

The following is also recommended:

- Limiting sessions to no more than three in one day for a student.

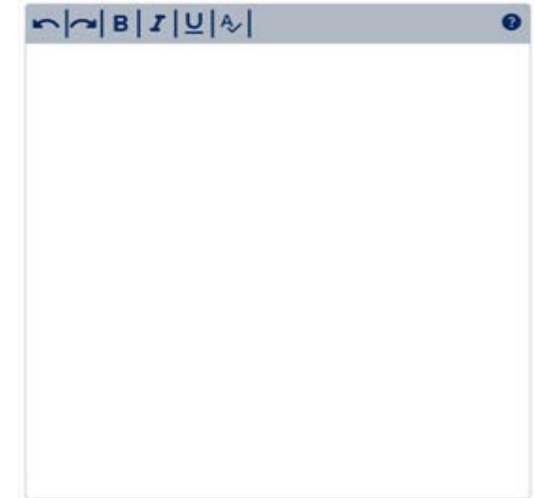
For more information about scheduling and administration policies, refer to the [Online Assessment Scheduling Guidance](#), found in the LDOE [Assessment](#) library.

Testing Materials

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

Testing Platform

Students will enter their answers into the online testing system. When composing their written responses, 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 an 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 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, highlight text, take notes, enlarge the item, apply a mask to cover a part of the screen, and guide the reading of a text or an item line by line. A help tool is also featured to assist students as they use the online system.

- Pointer



- Highlighter



- Sticky note



- Masking



- Cross-off



- Magnifier



- Line guide



- Help



All students taking the computer-based test should work through the [Online Tools Training](#), using the online tools so students are well prepared to navigate the online testing system.

Sample Test Items

Standalone Items

This section includes sample test items. With each item, item set, and task is a table containing alignment information and the answer key, where possible. Additionally, analyses of the multi-dimensional alignment for the item set and the task are included. Rubrics for CRs and ERs are included with the items.

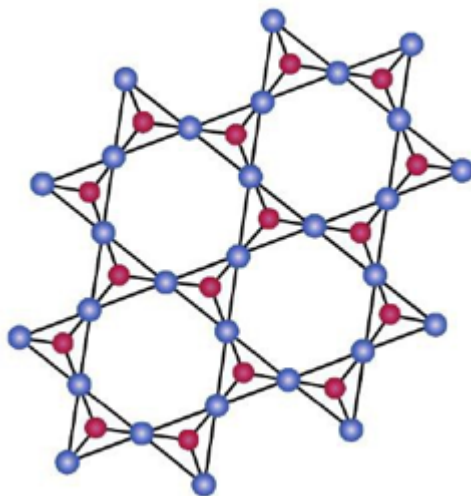
Item Type	PE	DCI	SEP	CCC	Points
MC	8-MS-PS1-1	MS.PS1A.e	2. MOD		1
MS	8-MS-PS1-3	MS.PS1B.a		S/F	1
TEI	8-MS-ESS2-1	MS.ESS2A.a	2. MOD		2
TPI	8-MS-LS4-1	MS.LS4A.a	4. DATA		2
TEI	8-MS-LS4-6	MS.LS4C.a	5. MCT	C/E	2

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

Multiple-Choice Item

Performance Expectation: **8-MS-PS1-1** Develop models to describe the atomic composition of simple molecules and extended structures.

Quartz, or silicon dioxide (SiO_2), is one of the most abundant (found in large quantities) minerals on Earth. The diagram shows the atomic arrangement of quartz.



Based on the diagram, which statement **best** describes the atomic arrangement of quartz?

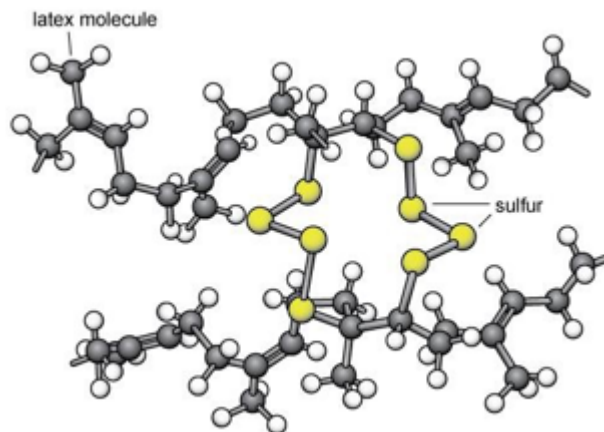
- A. an extended structure that is made of repeating patterns of atoms*
- B. many different kinds of atoms that can move freely past each other
- C. a repeating pattern of small molecules that can move freely past each other
- D. many different kinds of molecules that combine to form an extended structure

Multi-Dimensional Alignment: While effectively applying the science practice of **developing and using models** by **using the model to describe a phenomenon** the student demonstrates knowledge of **how solids are formed from extended structures of repeating subunits**.

Multiple-Select Item

Performance Expectation: 8-MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

Some tires are made from vulcanized rubber, a compound that is produced from natural latex and sulfur. Latex is a natural resource that comes from plants. Sulfur is a natural element that is mined from Earth. The process of vulcanization requires that latex be heated, breaking some of the bonds between molecules and allowing sulfur to form new bonds with the latex molecules. Adding sulfur atoms makes the resulting compound stronger and less likely to break down over time. The diagram shows the structure of vulcanized rubber.



Which statements are supported by evidence from the information about vulcanized rubber and the diagram? Select the **three** correct answers.

- A. Synthetic materials are produced from natural resources.*
- B. Changing the structure of a material affects its function.*
- C. Natural resources are destroyed to create new synthetic ones.
- D. Chemical processes are used to form new materials from existing ones.*
- E. Changes at the molecular level have little effect on a material.
- F. Heat can affect the function of a material while keeping its structure intact.

Multi-Dimensional Alignment: The item requires the student to apply knowledge that in chemical processes, atoms are regrouped into different molecules and these new substances have different properties than those of the reactants to demonstrate an understanding of structure and function.

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Technology-Enhanced Item

Performance Expectation: **8-MS-ESS2-1** Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

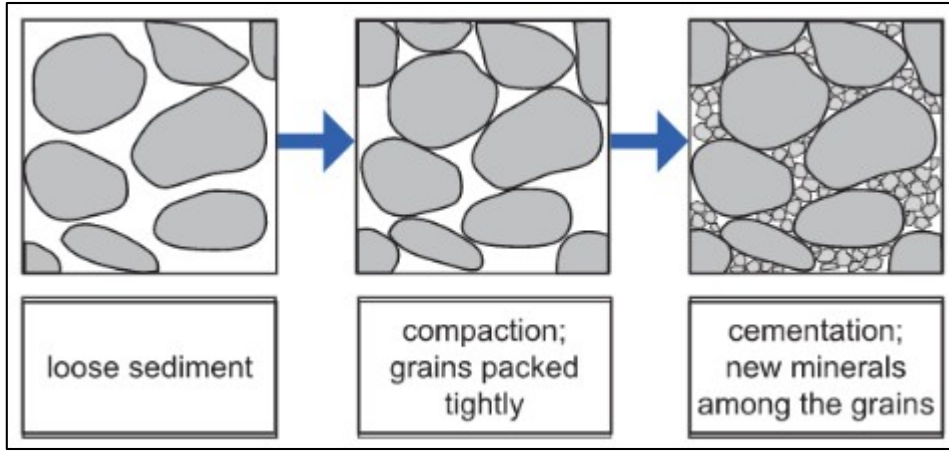
A model can be used to show the processes that cause sedimentary rock to form.

Complete the model by dragging the images of the processes into the top row of boxes. Then, drag **each** label into the box under the image that it describes.

The interface shows three stages of sedimentary rock formation from left to right. The first stage shows loose sediment. The second stage shows compaction where grains are packed tightly. The third stage shows cementation where new minerals form between the grains. Labels for these processes are provided to be dragged into the corresponding boxes in the model below.

Multi-Dimensional Alignment: While effectively applying the science practice of developing and using models by describing a phenomenon, the student demonstrates knowledge of how Earth's processes that result from the cycling of matter produces chemical and physical changes in Earth's materials.

Scoring Information



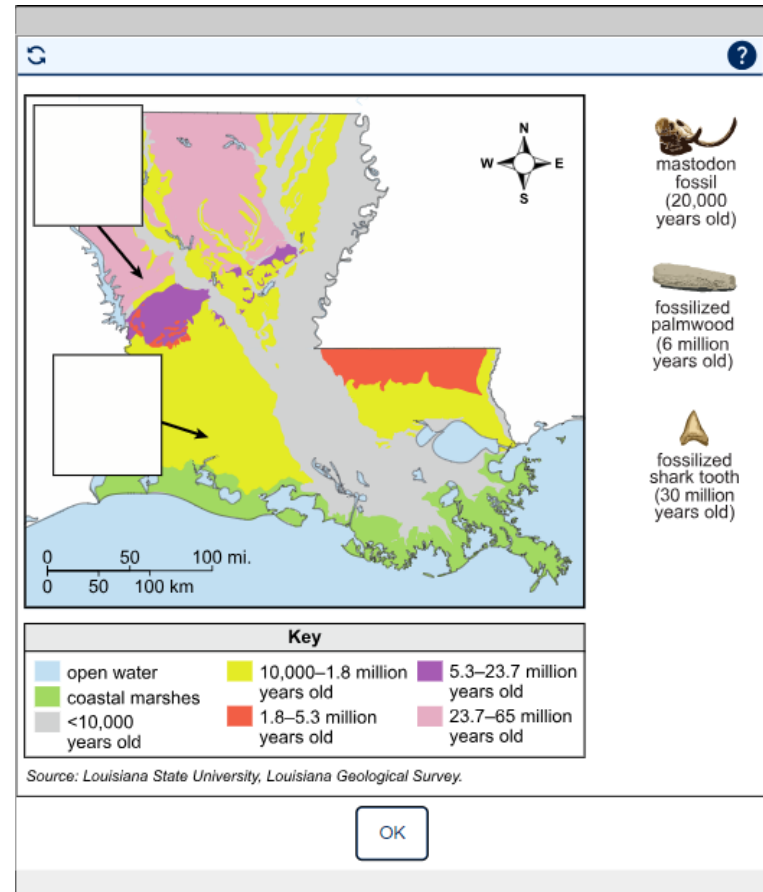
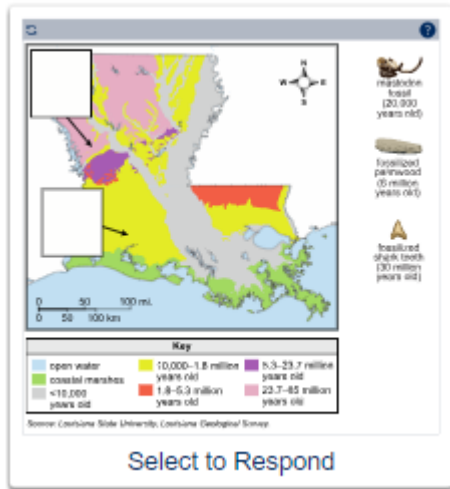
Two-Part Independent Item (Part A: Technology-Enhanced Item, Part B: Multiple-Choice Item)

Performance Expectation: 8-MS-LS4-1 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

Part A

The map shows the approximate ages of the sedimentary rock found near Earth’s surface in Louisiana.

Based on these data, drag the correct fossils into the boxes on the map to show where the fossils would most likely be found. Not all fossils will be used.



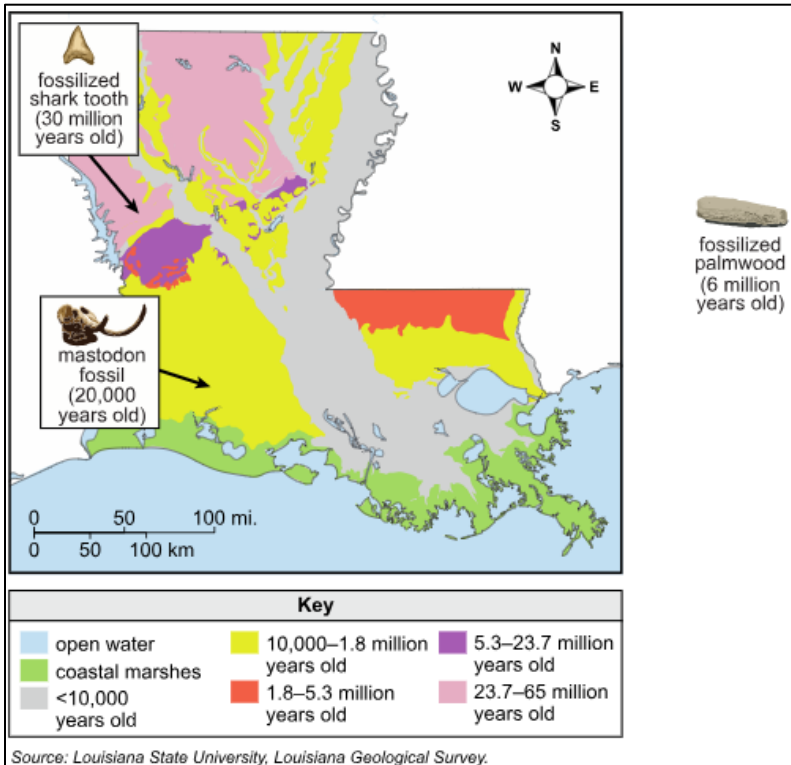
Part B

Scientists dig in an area of land that contains many different rock layers. How can an understanding of patterns be used to predict the ages of the rock layers in the area?

- A. Older fossils are found in the rock layers that are closest to the surface.
- B. Rock layers are always found in the order in which they are formed.
- C. Younger rock layers are formed on top of older rock layers.*
- D. Fossils are always found in every rock layer.

Multi-Dimensional Alignment: While effectively applying the science practice of **analyzing and interpreting data** by **determining similarities and differences in data**, the student demonstrates knowledge of **how the fossil record documents the existence, diversity, and changes of many life forms throughout the history of life on Earth.**

Scoring Information for Part A



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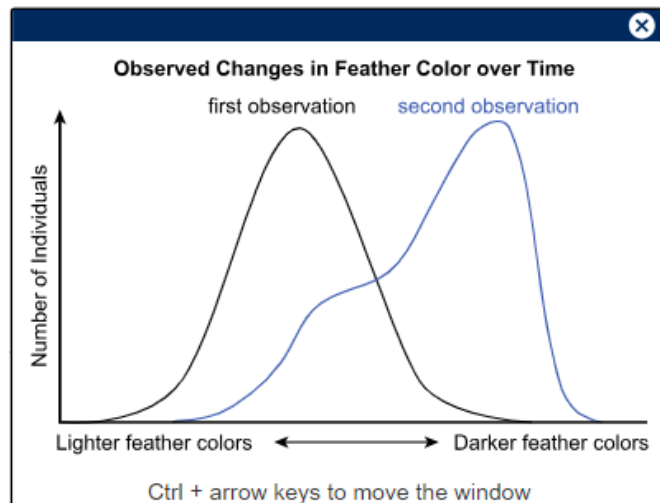
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Technology-Enhanced Item

Performance Expectation: 8-MS-LS4-6 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations of species over time.

Scientists observed a species of bird and the environment in which it lives. Many years later, the scientists returned to make a second observation of the species of bird and the environment in which it lives. The scientists discovered a change in the distribution of feather colors within the bird species between the first and second observations, as shown in the graph.



The scientists noted some differences in the environment between the first and second observations, which may have caused the shift in the distribution of feather colors.

Drag **each** statement into the correct box to show which changes are probable causes, and which changes are unlikely causes, for the shift in feather color distribution over time. Each statement will be used once.

↻?

A new predator was introduced to the environment.

A new food supply was introduced to the environment.

The competition for nesting areas increased.

The bird population increased.

Females selected males with certain traits more often.

Probable Causes	Unlikely Causes

Multi-Dimensional Alignment: The item requires the student to apply the science practice of **using mathematics and computational thinking** by **using mathematical representations to support scientific conclusions** and knowledge of **how natural selection results in traits that support successful survival and reproduction becoming more common, changing the distribution of traits in a population** to demonstrate an understanding of **cause and effect relationships**.

Scoring Information

Probable Causes	Unlikely Causes
<p>A new predator was introduced to the environment.</p> <p>Females selected males with certain traits more often.</p>	<p>The bird population increased.</p> <p>A new food supply was introduced to the environment.</p> <p>The competition for nesting areas increased.</p>

Item Set: Brown Pelicans

Performance Expectations:

8-MS-PS3-5 Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

8-MS-LS1-4 Construct and use argument(s) based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of survival and successful reproduction of animals and plants respectively.

Item Type	PE	DCI	SEP	CCC	Points
MC	8-MS-PS3-5	MS.PS3B.a		E/M	1
MC	8-MS-LS1-4	MS.LS2D.a	7. ARG	C/E	1
TPD	8-MS-PS3-5	MS.PS3B.a		E/M	2
CR	8-MS-LS1-4	MS.LS1B.c; MS.LS2D.a	7. ARG	C/E	2

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

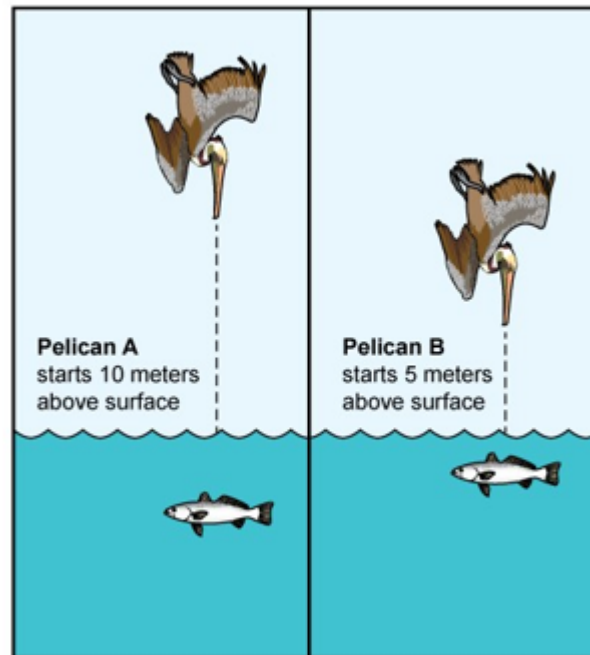
Stimulus Materials

Use the information about brown pelicans and your knowledge of science to answer the questions.

Brown Pelicans

Brown pelicans are large seabirds that live along the coast of the Gulf of Mexico. Brown pelicans are often seen gliding in groups above the ocean surface, or flying up and “plunge-diving” into the water below. During a plunge-dive, pelicans fly as high as 60 feet (18.3 meters) into the air, tuck in their wings, and then dive, beak first, into the ocean. The force of the impact stuns fish in the water. The pelican picks up the stunned fish with its large bill, tilts its bill to drain the seawater, and then swallows the fish. Figure 1 shows two brown pelicans plunge-diving from different starting heights.

Figure 1. Brown Pelicans



Note: Not to scale

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Multiple-Choice Item

Based on evidence from Figure 1, which statement describes the **main** energy transformation that occurs when a brown pelican tucks its wings and plunge-dives into the ocean?

- A. Potential energy is transformed into kinetic energy.*
- B. Chemical energy is transformed into kinetic energy.
- C. Thermal energy is transformed into chemical energy.
- D. Radiant energy is transformed into mechanical energy.

Multi-Dimensional Alignment: The item requires the student to apply knowledge of when the kinetic energy of an object changes, there is inevitably some other change in energy at the same time to demonstrate an understanding of energy and matter.

Multiple-Choice Item

Which statement supports the claim that fish living in deep water are **more likely** to survive a plunge-dive than fish living in shallow water?

- A. Pelicans can see fish more easily from higher elevations than from lower elevations.
- B. There are more pelicans flying over the ocean at lower elevations than at higher elevations.
- C. The fish that live close to the water's surface swim faster than fish living far below the water's surface.
- D. Pelicans reach fish close to the water's surface more easily than they reach fish living far below the water's surface.*

Multi-Dimensional Alignment: The item requires the student to apply the science practice of engaging in argument by selecting evidence to support an explanation and knowledge of how group behavior can increase the chances of survival for individuals to demonstrate an understanding of cause and effect relationships.

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

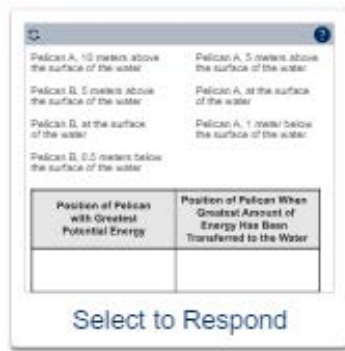
Part A

The success of a plunge-dive depends on the point at which the pelican has the greatest amount of potential energy and on the total amount of energy that is transferred to the water to stun the fish.

Based on figure 1, drag the correct statement into each box to show:

- the pelican and the position with the greatest potential energy, and
- the pelican and the position when the greatest amount of energy has been transferred to the water.

Not all statements will be used.



<p>Pelican A, 10 meters above the surface of the water</p> <p>Pelican B, 5 meters above the surface of the water</p> <p>Pelican B, at the surface of the water</p> <p>Pelican B, 0.5 meters below the surface of the water</p>		<p>Pelican A, 5 meters above the surface of the water</p> <p>Pelican A, at the surface of the water</p> <p>Pelican A, 1 meter below the surface of the water</p>	
<p>Position of Pelican with Greatest Potential Energy</p>		<p>Position of Pelican When Greatest Amount of Energy Has Been Transferred to the Water</p>	
Empty box for response		Empty box for response	

Part B

Which statements support the answer to Part A?

Select **all** that apply.

- A. A pelican needs to start at a lower elevation to dive farther into the water.
- B. A pelican that starts at a higher elevation above the water transfers more energy to the air as it dives.
- C. A pelican that dives farther into the water transfers more energy to the water.*
- D. A pelican that starts with more potential energy has more energy when it reaches the water.*
- E. A pelican with greater speed creates more energy before it transfers the energy to the water.

Multi-Dimensional Alignment: The item requires the student to apply knowledge of **when the kinetic energy of an object changes, there is inevitably some other change in energy at the same time** to demonstrate an understanding of **energy and matter**.

Scoring Information for Part A

↻?

Pelican A, 5 meters above the surface of the water

Pelican B, 5 meters above the surface of the water

Pelican A, at the surface of the water

Pelican B, at the surface of the water

Pelican B, 0.5 meters below the surface of the water

Position of Pelican with Greatest Potential Energy	Position of Pelican When Greatest Amount of Energy Has Been Transferred to the Water
Pelican A, 10 meters above the surface of the water	Pelican A, 1 meter below the surface of the water

Constructed-Response Item

A student claims that, within a population of brown pelicans, those with better eyesight are **more likely** to survive and reproduce. Explain whether the student’s claim is valid. Use evidence from the information about brown pelicans and from Figure 1 to support your explanation.

Multi-Dimensional Alignment: The item requires the student to apply the science practices of [engaging in argument from evidence](#) by [constructing an argument supported by evidence and scientific reasoning to support or refute a claim](#) and knowledge that:

- **animals engage in characteristic behaviors that increase their odds of reproduction;** and
- **group behavior can increase the chances of survival for individuals and their genetic relatives**

to demonstrate an understanding of [cause and effect relationships](#).

Scoring Guide

Score	Description
2	Student’s response correctly explains whether the student’s claim is valid and uses evidence to support the explanation.
1	Student’s response correctly explains whether the student’s claim is valid, but does not use evidence to support the explanation.
0	Student’s response does not correctly explain whether the student’s claim is valid or provide evidence to support the explanation.

Sample Response:

The student’s claim is valid because pelicans with better eyesight can see fish from a higher elevation. Pelicans that can see fish from a higher elevation can catch fish in deeper water, as shown in the diagram. Catching fish in deeper water would allow pelicans to catch more fish overall, which will provide the pelicans with enough food to survive and reproduce.

Accept other reasonable answers.

Task Set: Aquifers in Louisiana

Performance Expectations:

8-MS-ESS3-1 Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

8-MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing human impact on the environment.

Item Type	PE	DCI	SEP	CCC	Points
MC	8-MS-ESS3-1	MS.ESS3A.a; MS.EVS1A.b	6. E/S	C/E	1
MS	8-MS-ESS3-1	MS.ESS3A.a; MS.EVS1A.b	6. E/S	C/E	1
TEI	8-MS-ESS3-3	MS.ESS3C.a; MS.ESS3C.b; ETS.MS1B.a	6. E/S		2
TEI	8-MS-ESS3-3	MS.ESS3C.a; MS.ESS3C.b; ETS.MS1B.a	6. E/S	C/E	2
ER	8-MS-ESS3-3; 8-MS-ESS3-1	ETS.MS1B.a; MS.ESS3A.a; MS.ESS3C.a; MS.ESS3C.b; MS.EVS1A.b	6. E/S	C/E	9

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

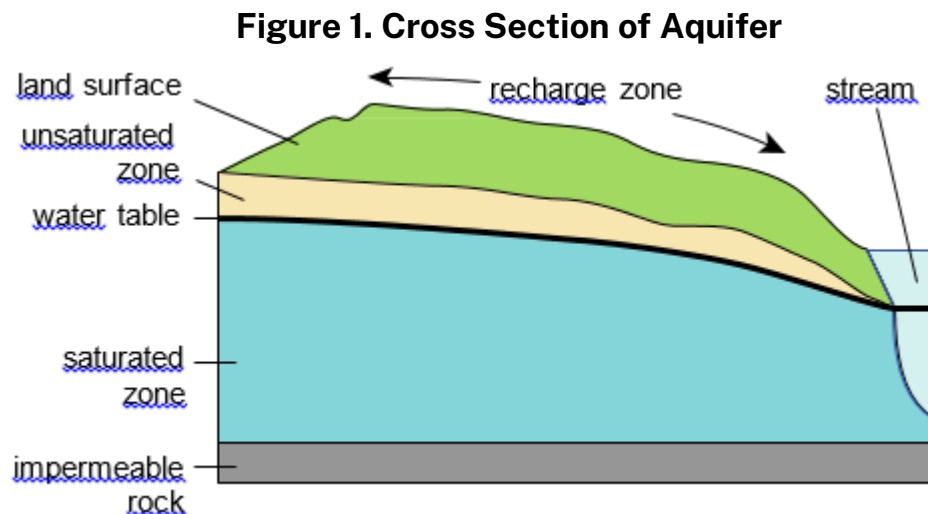
Stimulus Materials

Use the information about aquifers in Louisiana and your knowledge of science to answer the questions.

Aquifers in Louisiana

An aquifer is a layer of rock that contains empty spaces between rock particles. These spaces can fill with water. Aquifers can be made of gravel, sand, silt, or rock that is permeable (allows water to pass through small holes). At the bottom of an aquifer is a layer of impermeable rock. A water well (a structure or hole created by digging down in the ground to access water in an aquifer) can be drilled into an aquifer to access fresh water. This fresh water can then be used for household and agricultural purposes.

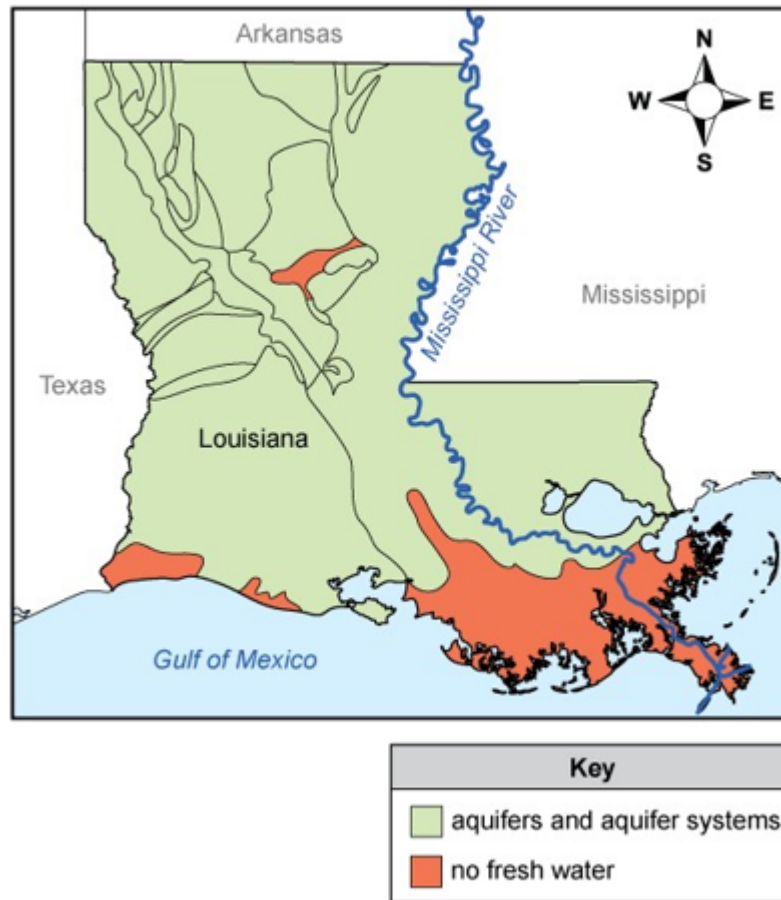
As an aquifer fills with water, the pull of gravity causes water to seep into tiny cracks and crevices in the rock. This causes empty spaces at the bottom of the aquifer to fill with water; this water-filled area is called the *saturated zone*. The area of the aquifer where the empty spaces are still filled with air is called the *unsaturated zone*. The boundary between the saturated zone and the unsaturated zone is called the *water table*. Figure 1 shows a cross section of an aquifer. Notice the location of the stream relative to the water table.



Sources of water for aquifers include rainfall, lakes, streams, and rivers. Water in the *recharge zone* on the surface can seep directly into the aquifer, or the aquifer can be filled by water that is flowing through cracks in the ground.

Aquifers are found all over Louisiana. Map 1 shows the locations of the major freshwater aquifers in the state.

Map 1. Freshwater Aquifers in Louisiana



Multiple-Choice Item

Map 1 shows that there is no fresh water in the southern part of Louisiana. Which statement explains a possible cause for the lack of freshwater aquifers in this part of Louisiana?

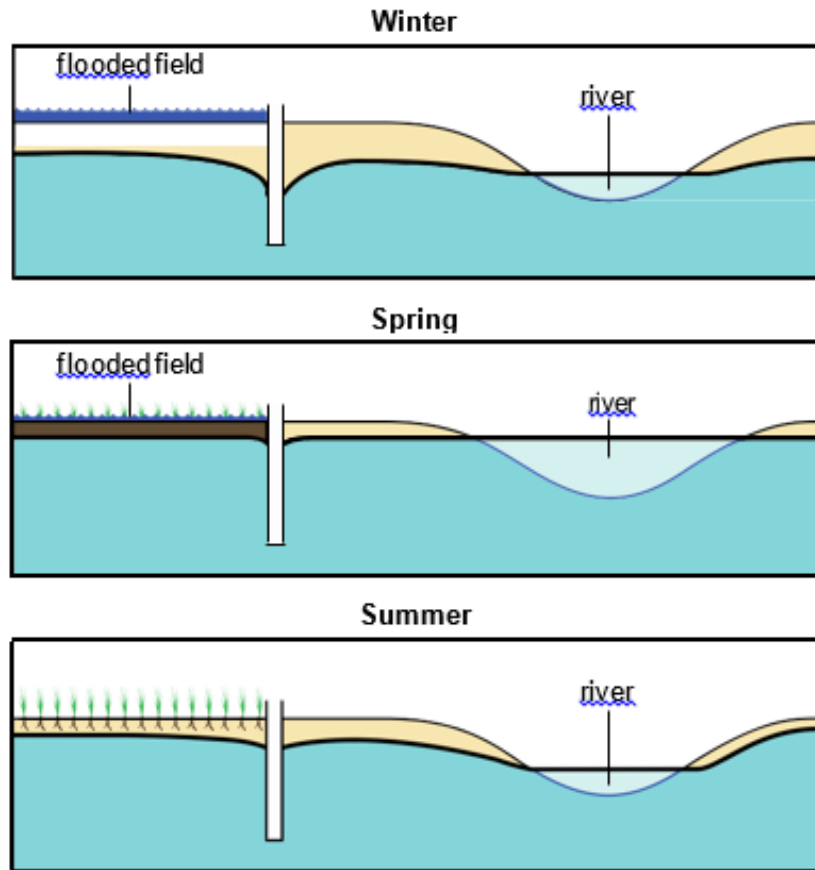
- A. There are too many water wells that have used all of the fresh water in the area.
- B. The aquifers in the area have been filled with salt water from the Gulf of Mexico.*
- C. The land is covered with permeable rock that prevents water from collecting underground.
- D. The land surface is covered with sediments that have been deposited from the Mississippi River.

Multi-Dimensional Alignment: The item requires the student to apply the science practice of constructing explanations by using valid and reliable evidence and knowledge of:

- humans depend on renewable and non-renewable resources that are distributed unevenly around the planet, and
 - how non-renewable resources are vast but limited
- to demonstrate an understanding of cause and effect relationships

Multiple-Select Item

Rice is a crop grown in Louisiana that requires large amounts of fresh water. Farmers typically use fresh water from wells to flood their fields in winter. The diagram shows how rice grows in flooded fields. The diagram also shows how the water table and a nearby river are affected by this practice in each of three seasons.



Note: Not to scale

The flooding of fields in winter can affect aquifers without having long-term impacts on the height of the water table. Which statements explain why this is possible?

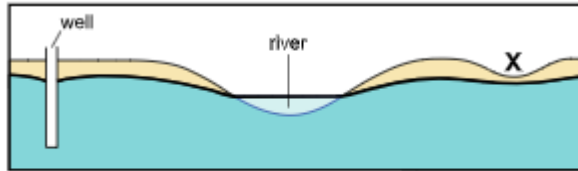
Select the **two** correct answers.

- A. In winter, using groundwater to flood fields causes the water table to drop because water is withdrawn from the aquifer.*
- B. In winter, removing water from the aquifer causes the water table to rise because water covers the areas where rice is grown.
- C. In spring, changes in the level of the river cause the water table to rise because water flows from the river into the aquifer.*
- D. In spring, removing water from the aquifer causes the water table to drop because water flows from the aquifer to the river.
- E. In summer, changes in the level of the river cause the water table to rise because water flows from the river to the aquifer.

Multi-Dimensional Alignment: The item requires the student to apply the science practice of **constructing explanations** by **selecting valid and reliable evidence** and knowledge of **humans depend on renewable and non-renewable resources that are distributed unevenly around the planet**, and **non-renewable resources are vast but limited** to demonstrate an understanding of **cause and effect relationships**.

Technology-Enhanced Item

A river, an aquifer, and the location of a well are shown in the diagram. The X shows the location of pollution on the land's surface. The pollution is in a depression on the opposite side of the river from the well.

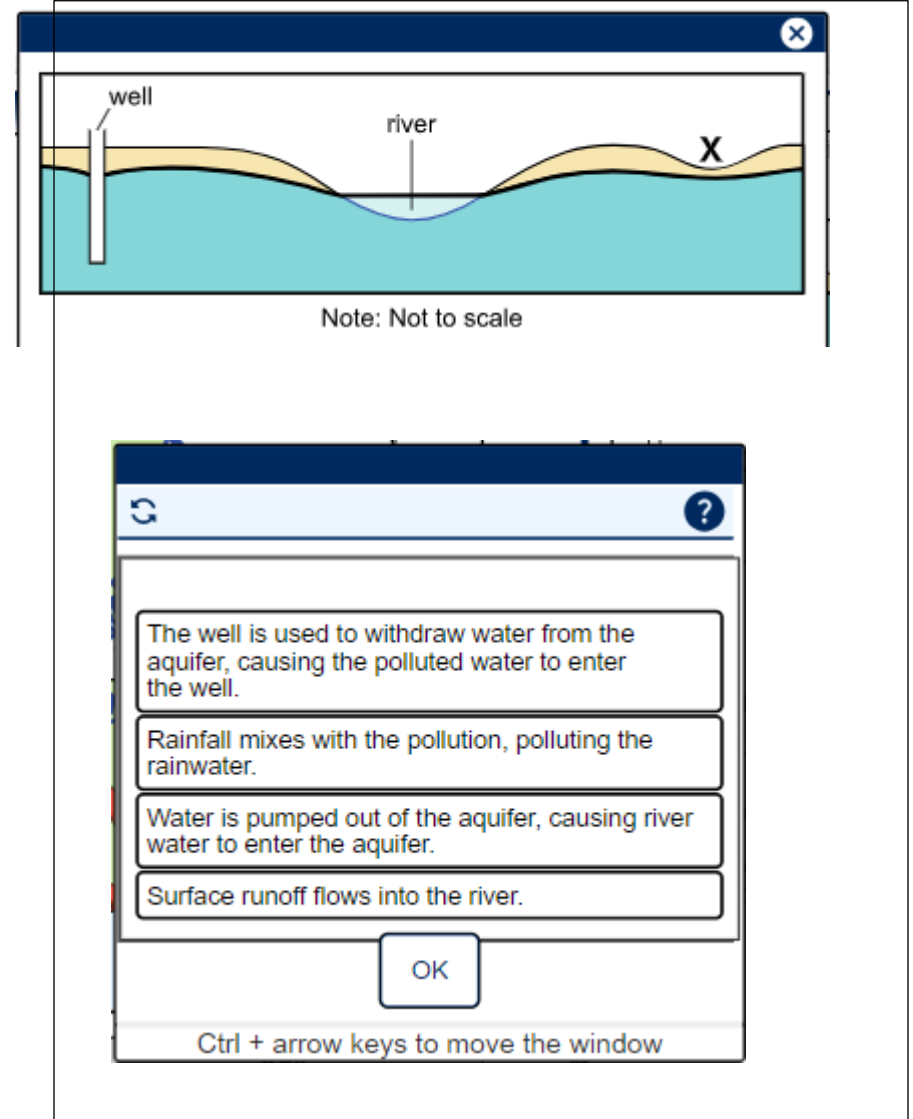
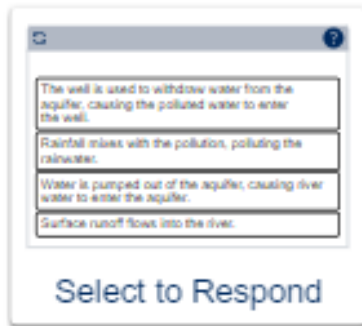


Note: Not to scale

Select to Enlarge

A company claims that the pollution will not spread because it will stay in the depression. The four statements shown can be used to explain how pollution can contaminate the river and the well. The statements are shown in an incorrect order.

Drag the statements into the correct order to explain the process by which pollution can contaminate the river and the well.



well

river

X

Note: Not to scale

The well is used to withdraw water from the aquifer, causing the polluted water to enter the well.

Rainfall mixes with the pollution, polluting the rainwater.

Water is pumped out of the aquifer, causing river water to enter the aquifer.

Surface runoff flows into the river.

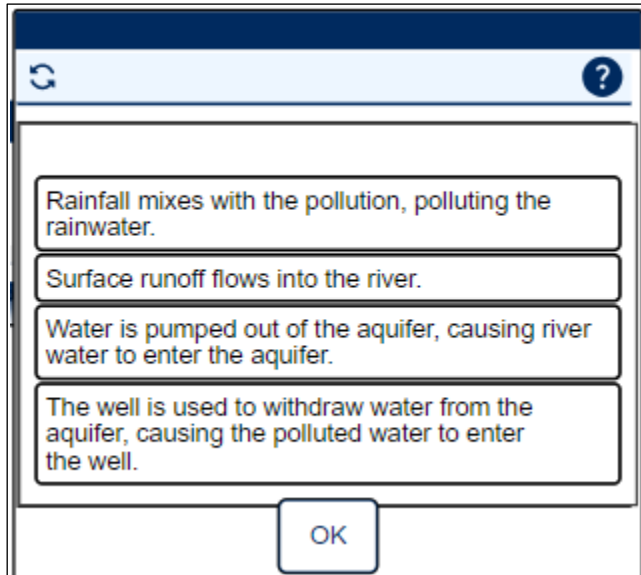
OK

Ctrl + arrow keys to move the window

Multi-Dimensional Alignment: While effectively applying the science practice of constructing explanations by applying scientific ideas, the student demonstrates knowledge of

- how human activities have sometimes damaged natural habitats and that changes to the environment can have different (negative) impacts;
- typically, as human populations increase, so do the negative impacts on Earth; and
- possible solutions that need to be tested.

Scoring Information



Technology-Enhanced Item

Farm A and Farm B are in two different locations in Louisiana. Both farms are using fresh water from an aquifer. The water used at Farm A can seep into the ground. The water used at Farm B cannot.

Use the table to compare the cause and effect of **each** farm's water use on the water table in the area.

Drag **each** sentence into the correct box to show the causes and effects.

The water table drops over time. Water is constantly recycled in the system.

Water is lost to evaporation from the system. The water table stays at the same level over time.

	Farm A	Farm B
Cause		
Effect		

Select to Respond

The water table drops over time. Water is constantly recycled in the system.

Water is lost to evaporation from the system. The water table stays at the same level over time.

	Farm A	Farm B
Cause		
Effect		

OK

Ctrl + arrow keys to move the window

Multi-Dimensional Alignment: The item requires the student to apply the science practice of [constructing explanations](#) by [applying scientific ideas](#), and knowledge of how:

- [how human activities have sometimes damaged natural habitats and that changes to the environment can have different \(negative\) impacts;](#)
- [typically, as human populations increase, so do the negative impacts on Earth;](#) and
- [possible solutions need to be tested and evaluated](#)

to demonstrate an understanding of [cause and effect relationships](#).

Scoring Information

	Farm A	Farm B
Cause	Water is constantly recycled in the system.	Water is lost to evaporation from the system.
Effect	The water table stays at the same level over time.	The water table drops over time.

Extended-Response Item

In Louisiana, fresh water flows among rivers and streams on the surface and aquifers below the surface. Using too much groundwater from an aquifer can change these flows. This can lead to many problems, including:

- Pollution in rivers can enter into aquifers.
- Deep wells used by farms can dry up shallow wells used for homes.
- Aquifers that lose too much water can permanently collapse.

As you respond to Part A and Part B, follow the directions below.

- Address all of the instructions in each prompt.
- Use evidence from the information provided and your own knowledge of science to support your responses.

Part A

Explain how using too much groundwater from aquifers can cause **each** of the problems listed. Use evidence to support your answer.

Part B

Propose **three** strategies (one for **each** problem) for monitoring or minimizing the impacts of the problems associated with using too much groundwater from aquifers. Explain how **each** strategy will help solve the problem to which it corresponds.

Multi-Dimensional Alignment: The item requires the student to apply the science practice of **constructing explanation** and the engineering practice of **designing solutions** by **applying scientific ideas and principles to design a process** and knowledge of how:

- **how human activities have sometimes damaged natural habitats and that changes to the environment can have different (negative) impacts;**
- **typically, as human populations increase, so do the negative impacts on Earth;**
- **possible solutions need to be tested and evaluated;**
- **humans depend on renewable and non-renewable resources that are distributed unevenly around the planet;** and
- **non-renewable resources are vast but limited**

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

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Score Points

An ER item may contain a single part or multiple parts. For multiple-part items: The student’s score is the sum total of all the points earned across all parts (up to an item-maximum of 9 points) of the item. No response (blank) or a response that does not address the prompt earns 0 points.

Part A (6 points maximum)

- 6 points: 2 points for each explanation for a total of THREE explanations
 - Score 2 points: Each correct explanation with evidence to support the answer

OR

- Score 1 point: Each correct explanation with no evidence to support the answer

Part B (3 points maximum)

- 3 points: 1 point for each strategy with explanation; each strategy must include an explanation to receive a point for a total of **three** strategies

Sample Response:

Part A

Using too much groundwater can increase the amount of water flowing from a river to an aquifer. Pollution in the river can flow into the aquifer and become concentrated over time as polluted water in the recharge zone flows through cracks in the ground into the aquifer. Using too much groundwater from deep wells can drop the water table below the lowest level of shallow wells,

so that no water from the aquifer can flow into the shallow wells. Removing groundwater from aquifers more quickly than water can enter into the aquifer causes the water table to drop. Eventually, the water table may drop below the level of the aquifer, which causes the empty spaces in the aquifer to collapse. This collapse permanently reduces the aquifer’s ability to hold and store water since often the unsaturated zone is comprised of large amount of rock and soil.

Accept any other plausible explanation of how using too much groundwater from aquifers can cause the problem identified with evidence to support the answer.

Part B

Monitor the height of the water table in wells to be sure it does not drop below nearby rivers. This will help ensure that pollution contained within river water does not collect in aquifers. Monitor the pollution in rivers upstream of the aquifers to detect pollution levels before water enters aquifers. This will help identify sources of pollution and develop additional solutions to keep the pollution from entering the river. Monitor the height of the water table in deep wells to be sure it doesn’t drop below nearby shallow wells. Limit the depth of wells for farms that are near homes with shallow wells. This will prevent the removal of water found deep within the aquifer and prevent shallow wells from going dry.

Accept any other plausible strategy and an explanation of how the strategy will help solve the problem to which it corresponds.

Resources

[Assessment Guidance](#) Library

- [Assessment Development Educator Review Committees](#): describes the item development process and the associated committees, includes information on applying for participation

[Practice Test](#) Library

- [LEAP Science Grade 8 Practice Test Answer Key](#): helps prepare students for the spring assessment, includes answer keys, scoring rubrics, and alignment information
- [LEAP Science Practice Test Guidance](#): provides guidance on how teachers might better use the practice tests to support their instructional goals
- [Practice Test Quick Start Guide](#): provides information regarding the administration and scoring process needed for the online practice tests

[Assessment](#) Library

- [2024-2025 Louisiana Assessment Calendar](#): includes information on testing windows for test administrations
- [Grade 8 Science Achievement Level Descriptors](#): contains descriptions of the knowledge, skills, and processes that students demonstrate with relative consistency and accuracy at each level of achievement
- [LEAP Accessibility and Accommodations Manual](#): provides information about accessibility and accommodations
- [LEAP Technology Enhanced Item Types](#): provides a summary of technology enhanced items students may encounter

EAGLE: instructional resources in grade-level documents that teachers can download and incorporate into their daily instruction; contact school test coordinator for instructions on accessing the files

[DRC INSIGHT Portal](#):

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- includes access to tutorials, manuals, and user guides
- LEAP Science Grade 8 Practice Test: helps prepare students for the spring assessment
- Online Tools Training: allows students to become familiar with the online testing platform and its available tools; also available through this [link](#) using the Chrome browser

[K-12 Science Planning Resources](#) Library

- [K-12 Louisiana Student Standards for Science \(2017\)](#): provides the performance expectations and three-dimensional learning for all grades
- [Planning Guide for Science Instruction](#): assists educators in planning with high quality curriculum
- [Grade 8 Louisiana Guide to Implementing IQWST](#): assists teachers with the implementation of IQWST
- [Louisiana Guide to Piloting OpenSciEd](#): assists teachers with the implementation of OpenSciEd
- [Grade 8 Louisiana Guide to Implementing Activate Learning](#): assists teachers with the implementation of Activate Learning
- [Grade 8 Louisiana Guide to Implementing Amplify](#): assists teachers with the implementation of Amplify

[Contact the LDOE](#)

- assessment@la.gov for assessment questions
- classroomsupporttoolbox@la.gov for curriculum and instruction questions
- [AskLDOE](#) for general questions
- ldoecommunications@la.gov to subscribe to newsletters; include the newsletter(s) you want to subscribe to in your email

Newsroom: archived copies of newsletters including LDOE Weekly School System Newsletters and Teacher Leader Newsletters

Updates Log

The table below lists any updates made to this document after the original post date.

Available	Description of Updates
October 2024	Document original posting for 2024-2025

Email assessment@la.gov with any questions or comments about this assessment guide.