LOUISIANA DEPARTMENT OF EDUCATION

Office of Assessments, Analytics, and Accountability

LEAP Released Item Guide for Science Grade 8

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Purpose

The LEAP released item guide is intended to be used as an instructional tool and not to predict performance on the summative test. These items are meant to help teachers better understand how the achievement level descriptors are used in creating assessment questions.

How to Use and Not Use

The recommendations and cautions that follow are meant to help teachers better understand the achievement level descriptors and help administrators better understand what should and should not be done with the released items.

How to Use

- Learn how achievement level descriptors work with the dimensions in an item;
- Provide guidance when selecting assessment items in terms of rigor, content, and item types

How Not to Use

- Avoid prioritizing the PEs used in the released items because they do not represent all of the content eligible for the operational test;
- Avoid limiting instructional strategies to the released items (creating instructional sets using only the PEs found in the document);
- Do not use only the stimulus materials provided in the released items for classroom instruction;
- Avoid creating assessment items that mirror the released items;
- Avoid designing instructional tasks and sets based on only one PE.

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)

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)

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)

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 grade 8 tests include item sets, task sets, and standalone items.

Item Sets

Item sets consist of four items that have a common stimulus. There are two one-point items and two two-point items in each item set on the LEAP test. For three of the item sets, one of the two-point items will be a Constructed Response item. In the released item sets, there may be more than four items or fewer than four items with a common stimulus.

Task Sets

Task sets consist of five items that have a common stimulus. There are two one-point items, two two-point items, and one nine-point Extended Response item. In the released task sets, there may be more than five items or fewer than five items with a common stimulus.

Standalone Items

Standalone items are one-point or two-point items that do not share a stimulus with other items.

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 on the Assessment Resources Webpage for a breakdown of the knowledge, skills, and practices associated with each achievement level.

Released Items

This section includes released test items. With each item, item set, and task set, is a table containing alignment information and the answer key, where possible. Additionally, analyses of the multi-dimensional alignment, achievement level descriptor, rationales for answers, and rubrics for CRs and ERs are included with the items. An asterisk (*) denotes correct answer(s).

The achievement level descriptor provides information about how students who answer the item correctly are performing.

For example, an item is aligned to the SEP and DCI for 8-MS-LS4-2:

Performance Expectation	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
8-MS-LS4-2 Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. CCC: PAT SEP: 6	Evaluate an explanation based on scientific ideas for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.	Construct an explanation based on scientific ideas for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.	Support an explanation based on scientific ideas for the anatomical similarities or differences among modern organisms or between modern and fossil organisms to infer evolutionary relationships.	Identify an explanation based on scientific ideas for the anatomical similarities or differences among modern organisms or between modern and fossil organisms to infer evolutionary relationships.

Identifies the performance level of students who answer the question correctly.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 2 or higher. The student can identify an explanation based on scientific ideas for the anatomical similarities or differences among modern organisms or between modern and fossil organisms to infer evolutionary relationships.

Which statement explains why the bones have different lengths but the same number and pattern?

C. Mice and bats evolved from a common ancestor.*

Identifies how the item aligns to the dimensions.

Released Items:
Standalone Items
Item Set: Evolution of the Eye
Task Set: Gulf Oil

Standalone Items

Item Type	PE	DCI	SEP	CCC	Points	Achievement Level
TEI	8-MS-PS3-3	MS.PS3B.c	6. E/S	E/M	1	2
MC	8-MS-LS4-2	MS.LS4A.b	6. E/S	PAT	1	2
TEI	8-MS-ESS2-2	MS.ESS2C.e		SPQ	1	2
MC	8-MS-LS3-1	MS.LS3A.b	2. MOD	S/F	1	3

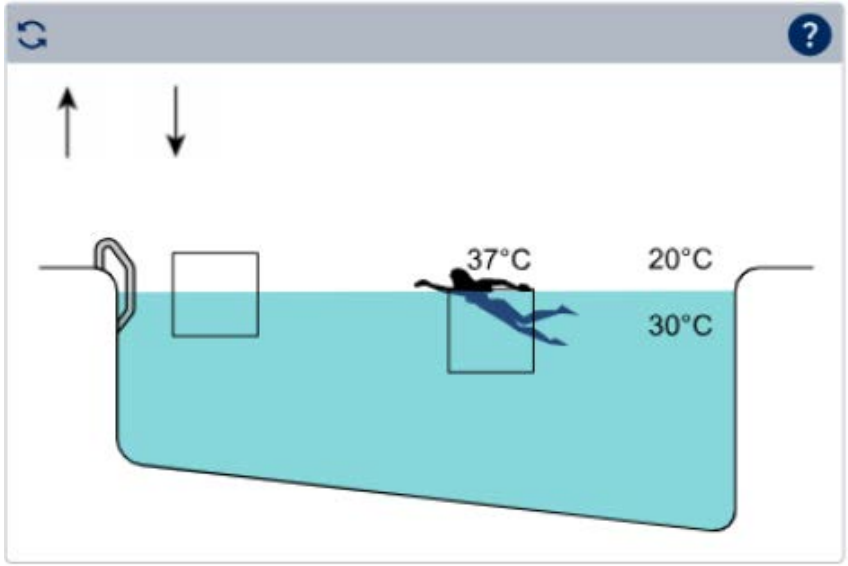
SEP = blue; DCI = orange; CCC = green An asterisk (*) denotes correct answer(s).

Technology-Enhanced Item
Performance Expectation
8-MS-PS3-3 Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

Use the information and your knowledge of science to answer the question.

Students are studying heat transfer in their school's heated swimming pool. The diagram shows the temperatures of the air and the water. The body temperature of the swimmer is 37°C.

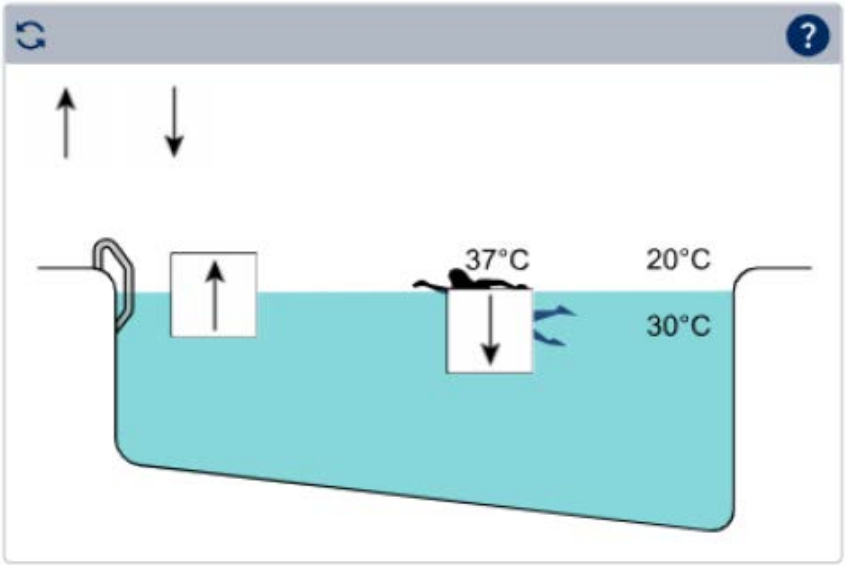
Drag the arrows into the correct boxes to show the direction of heat transfer between the water and the air and between the water and the swimmer.



Multi-Dimensional Alignment: This item requires the student to apply the science and engineering practice of constructing explanations and knowledge of minimizing or maximizing thermal transfer to demonstrate an understanding of energy and matter.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 2 or higher. The student can apply scientific ideas to describe a device that minimizes or maximizes thermal energy transfer.

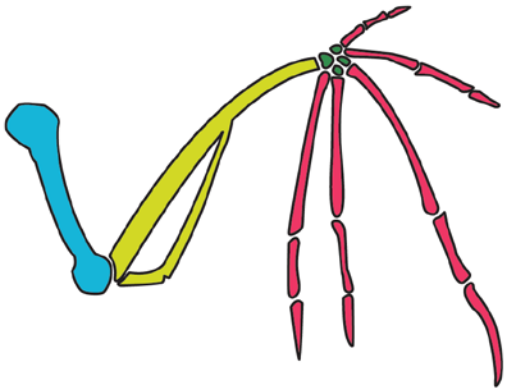
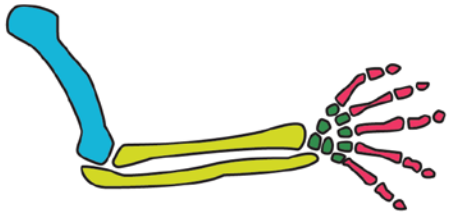
Scoring



Rationales

Response	Rationale
up arrow; down arrow	Correct.
down arrow; down arrow	The water is warmer than the air.
up arrow; up arrow	The person is warmer than the water.
down arrow; up arrow	The water is warmer than the air and the person is warmer than the water.

Multiple Choice
Performance Expectation
8-MS-LS4-2 Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

Use the information and your knowledge of science to answer the question. The bone structures of the front leg of a mouse and the wing of a bat are shown.  bat wing  mouse leg	Which statement explains why the bones have different lengths but the same number and pattern? A. Mice evolved from bats. B. All vertebrates have the same bone structure. C. Mice and bats evolved from a common ancestor.* D. Bats are slowly evolving into mice.

Multi-Dimensional Alignment: This item requires the student to apply the science and engineering practices of constructing explanations and knowledge of the anatomy of modern and fossil organisms to infer evolutionary relationships to demonstrate an understanding of patterns.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 2 or higher. The student can identify an explanation based on scientific ideas for the anatomical similarities or differences among modern organisms or between modern and fossil organisms to infer evolutionary relationships.

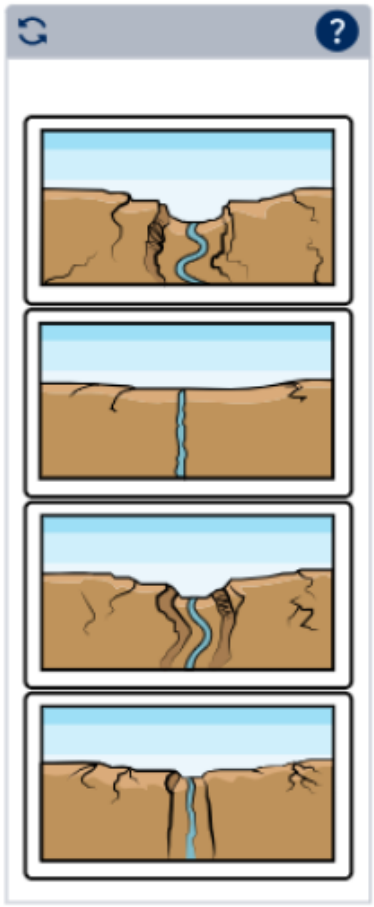
Which statement explains why the bones have different lengths but the same number and pattern?

C. Mice and bats evolved from a common ancestor.*

Rationales

A. Mice and bats have a common ancestor.
B. Some vertebrates have different bone structures.
C. Correct.
D. Bats and mice are in different orders.

Technology-Enhanced Item
Performance Expectation
8-MS-ESS2-2 Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

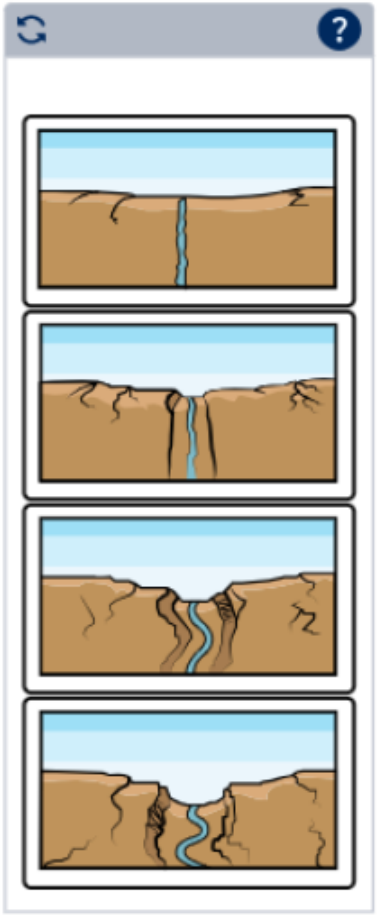
Use the information and your knowledge of science to answer the question. Earth's systems interact over distance scales that range from microscopic to global in size, and they operate over timescales that range from fractions of a second to billions of years. Water erosion takes place in many observable forms. Drag the frames into the correct order to show the evolution of a river, from oldest (top) to most recent (bottom).	

Multi-Dimensional Alignment: This item requires the student to apply knowledge of how geoscience processes have changed Earth's surface to demonstrate an understanding of scale, proportion, and quantity.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 2 or higher. The student can describe how geoscience processes have changed Earth's surface at varying time and spatial scales.

Scoring

Drag the frames into the correct order to show the evolution of a river, from oldest (top) to most recent (bottom).



Rationales

Response	Rationale
river on surface river cutting through surface river deepening newly formed canyon deep canyon with meandering river	Correct.
river cutting through surface river on surface river deepening newly formed canyon deep canyon with meandering river	Structures like canyons are younger than the rock they cut through.
river on surface river cutting through surface deep canyon with meandering river river deepening newly formed canyon	Erosional processes will deepen canyons.
river deepening newly formed canyon deep canyon with meandering river river on surface river cutting through surface	Rock layers are continuous until they are acted upon by forces that appear after rock deposition took place, like erosion.

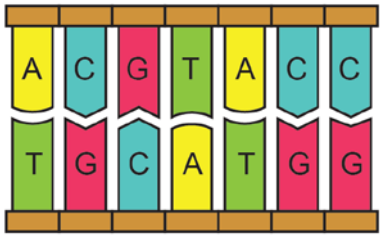
Multiple Choice
Performance Expectation
8-MS-LS3-1 Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

Use your knowledge of science to answer the question.

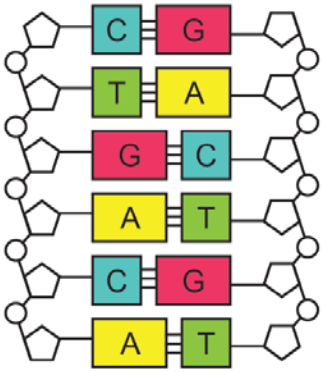
Which DNA sequence is **most likely** to lead to a change in a protein?

A.

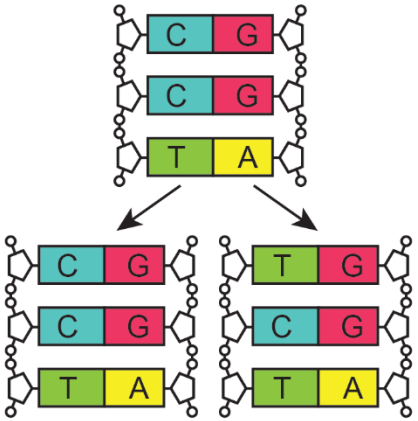
B.



C.



D. *



Multi-Dimensional Alignment: The item requires the student to apply the science and engineering practice of developing and using models and knowledge of why changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the organism to demonstrate an understanding of structure and function.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 3 or higher. The student can use a model to describe how structural changes to genes may affect proteins and may result in harmful, beneficial, or neutral effects on the structure and function of the organism.

Which DNA sequence is **most likely** to lead to a change in a protein?

Rationales

A. There is no change to the DNA when the polymerase reads the DNA strand.
B. There is no change to the DNA prior to replication.
C. There is no change to the DNA structure of the nucleic acid.
D. Correct.

Item Set: Evolution of the Eye

Item Type	PE	DCI	SEP	CCC	Points	Achievement Level
TPD	8-MS-LS4-2	MS.LS4A.b	6. E/S		2	3
MC	8-MS-LS4-1	MS.LS4A.a	4. DATA	PAT	1	3
TEI	8-MS-LS4-1	MS.LS4A.a	4. DATA		1	3
CR	8-MS-LS4-2	MS.LS4A.b	6. E/S	PAT	2	4

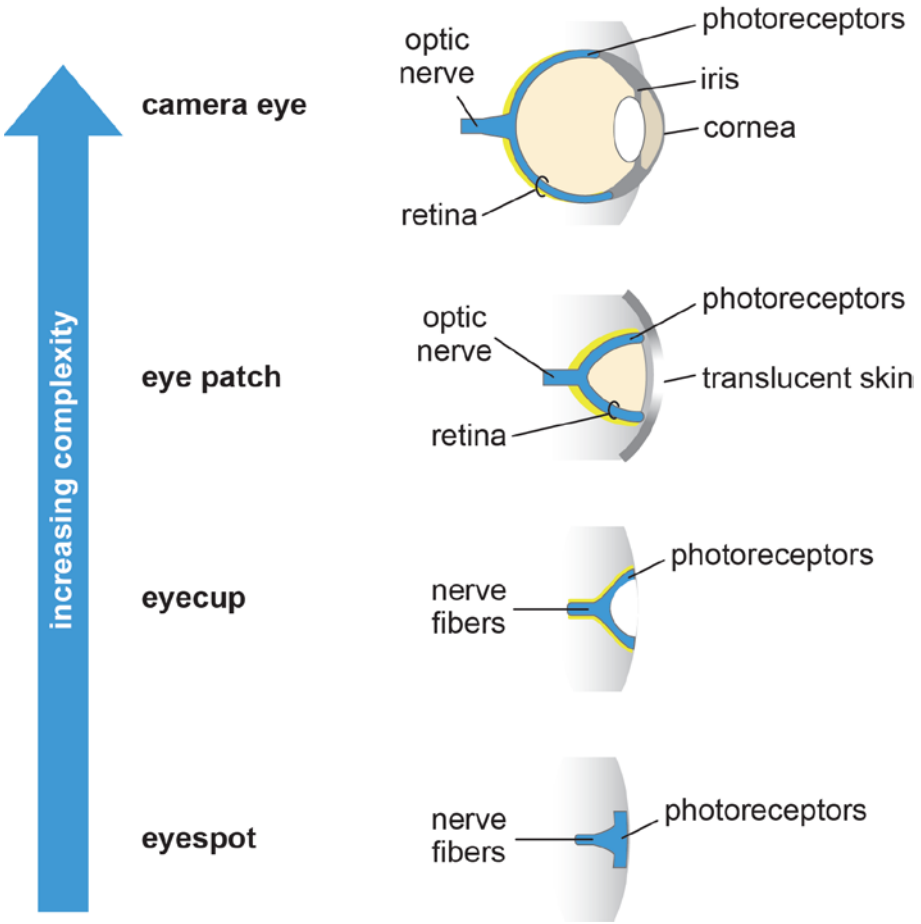
SEP = blue; DCI = orange; CCC = green An asterisk (*) denotes correct answer(s).

Use the information about the evolution of the eye and your knowledge of science to answer the questions.

Evolution of the Eye

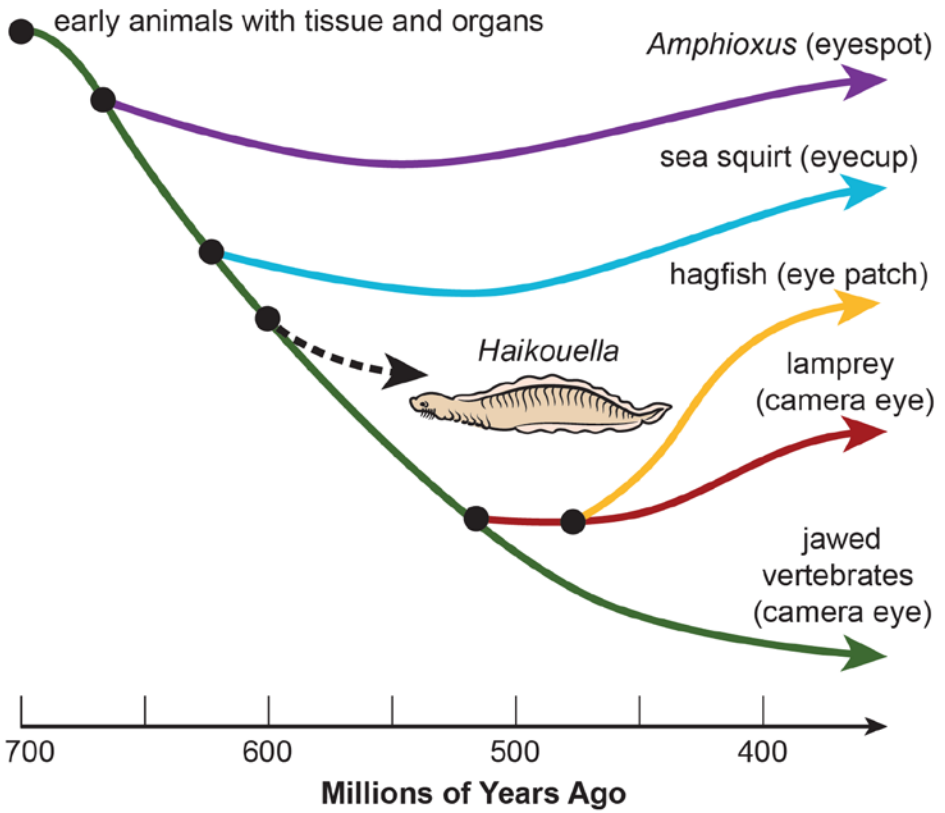
Most animals living on Earth today have eyes. Among different types of animals, there are different types of eyes. These eyes have different structures that have specific roles. Eyes vary from simple to complex, but all eyes contain pigment molecules and cells called photoreceptors. The simplest eye is a cluster of photoreceptors, known as an eyespot, that detects the presence of light. In more advanced eyes, photoreceptors form a curved layer that allows the eye to determine which direction the light is coming from. This curved layer is called the retina. More advanced eyes may also have a transparent, protective layer, such as a cornea, and a lens to focus light into an image that can be perceived by the brain. Figure 1 shows the increasing complexity of eyes.

Figure 1. Increasing Complexity of Eyes



Scientists examine fossils to determine how eyes have developed over time. They have learned that eyes first appeared in the fossil record more than 600 million years ago (mya). However, in some cases, fossils are not preserved well enough for scientists to examine eye structures. From fossil evidence, scientists know that one extinct organism, *Haikouella*, had eyes that were 0.3 cm long. However, scientists do not know whether these eyes contained lenses. Figure 2 shows the time of the first appearance of *Haikouella* in the fossil record, as well as the first appearances of vertebrates and their relatives in the fossil record.

Figure 2. Appearance of Different Eye Types in the Fossil Record



Source: Trevor D. Lamb, Progress in Retinal and Eye Research, 2013.

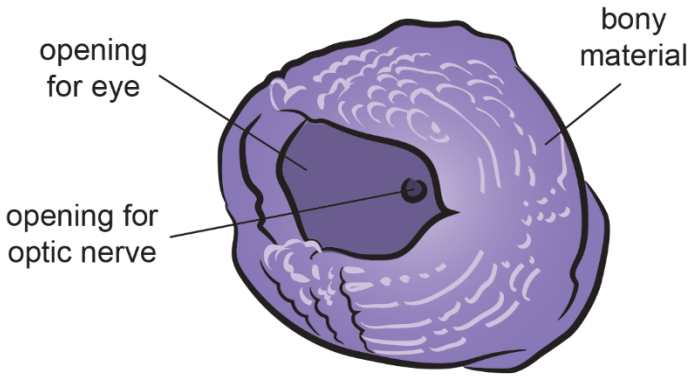
Table 1 describes characteristics of the eyes found in modern relatives of these fossils.

Table 1. Characteristics of Eyes Seen in Some Modern Organisms

Animal	Type of Vision	Does Eye Form an Image?	Does Eye Contain a Lens?	Does Eye Contain a Cornea?	Number of Layers in Retina
 *Amphioxus*	eyespot has only a few cells	no	no	no	0
 sea squirt	eyecup	no	no	no	0
 hagfish	eye patch	no	no	no	2
 lamprey	camera eye	yes	yes	yes	3
 bony fish	camera eye	yes	yes	yes	3

In recent years, scientists have found fossils of intermediate eye forms. These are fossils that appear to be hybrids or intermediates of the known types. One intermediate form comes from a placoderm, an ancient relative of jawed fish. Placoderms are found in the fossil record between 416 mya and 359 mya. The eye of a placoderm was surrounded by a thin, bony shell, called an eye casing. The eye casing gives clues about the type of eye found in placoderms. Figure 3 shows a fossil of a placoderm eye casing.

Figure 3. Placoderm Eye Casing



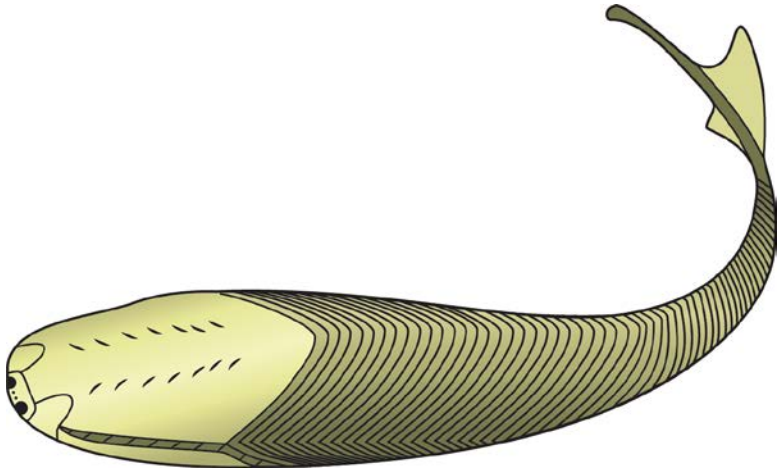
Source: Australian National University.

To determine the possible structure of eye fossils, scientists compared the placoderm fossilized structures to the eye structures of modern animals. Scientists have noticed that the placoderm eye casing is similar in shape to the casing surrounding the camera eye of modern vertebrates, such as fish. It is also similar to the eye casing of some modern invertebrates, such as octopuses.

Two-Part Dependent
Performance Expectation
6-MS-LS4-2 Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

Use Figure 1, Figure 2, Table 1, and Figure 3 to answer the questions.

The figure shows a fossil of an extinct species, *Sacabambaspis*.



Part A

Which feature of the fossil would indicate that the species **most likely** had some type of eye for vision?

A. It has a body shaped like many living animals found in the ocean.
B. It has a body shape that will allow it to move quickly.
C. It has two round, bony structures at the end of its head.*
D. It has many grooves from its midsection to the end of its tail.

Part B

Which claim is **best** supported by the answer to Part A?

A. *Sacabambaspis* is more closely related to lampreys than to sea squirts.*
B. *Sacabambaspis* is more closely related to *Haikouella* than to hagfish.
C. *Sacabambaspis* is more closely related to sea squirts than to *Haikouella.*
D. *Sacabambaspis* is more closely related to hagfish than to lampreys.

Multi-Dimensional Alignment: While effectively applying the science practice of constructing explanations, the student demonstrates knowledge of how the anatomies of modern and fossil organisms infer evolutionary relationships.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 3 or higher. The student can support an explanation based on scientific ideas for how the anatomies of modern and fossil organisms infer evolutionary relationships.

Part A
Which feature of the fossil would indicate that the species most likely had some type of eye for vision?

C. It has two round, bony structures at the end of its head.*

Part B
Which claim is best supported by the answer to Part A?

A. *Sacabambaspis* is more closely related to lampreys than to sea squirts.*

Rationales
Part A
A. Body shape is unrelated to the type of eye for vision.
B. Movement is unrelated to the type of eye for vision.
C. Correct.
D. Body texture is unrelated to the type of eye for vision.

Part B
A. Correct.
B. There is a lack of evidence to determine the relationship of *Sacabambaspis* to *Haikouella*.
C. Evidence suggests that *Sacabambaspis* is more closely related to *Haikouella* than to sea squirts.
D. There is a lack of evidence to determine the relationship of *Sacabambaspis* to hagfish and lampreys.

Multiple Choice
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.

Use Figure 2 to answer the question.

Although scientists have found more than 300 well-preserved fossils of *Haikouella,* the fossilized eye structures in these fossils are missing many details. Scientists have, however, found many fossils with fossilized eye structures for trilobites and other insect-like organisms with exoskeletons.

Which statement **best** explains why eye fossil evidence is more difficult to find for vertebrates and their relatives, compared to fossil evidence for other body parts?

A. The eyes of vertebrates and their relatives were soft body parts that usually decayed before fossilizing.*
B. Vertebrates and their relatives often had hard internal body parts that protected the eyes.
C. The eyes of vertebrates and their relatives were too small to be able to form fossils.
D. Few vertebrates and their relatives had eyes until 400 million years ago.

Multi-Dimensional Alignment: The item requires the student to apply knowledge of analyzing and interpreting data and knowledge of the fossil record that documents 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 to demonstrate an understanding of patterns.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 3 or higher. The student can analyze and interpret qualitative data for patterns in the fossil record that document the existence, diversity, extinction, and/or change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

Which statement **best** explains why eye fossil evidence is more difficult to find for vertebrates and their relatives, compared to fossil evidence for other body parts?

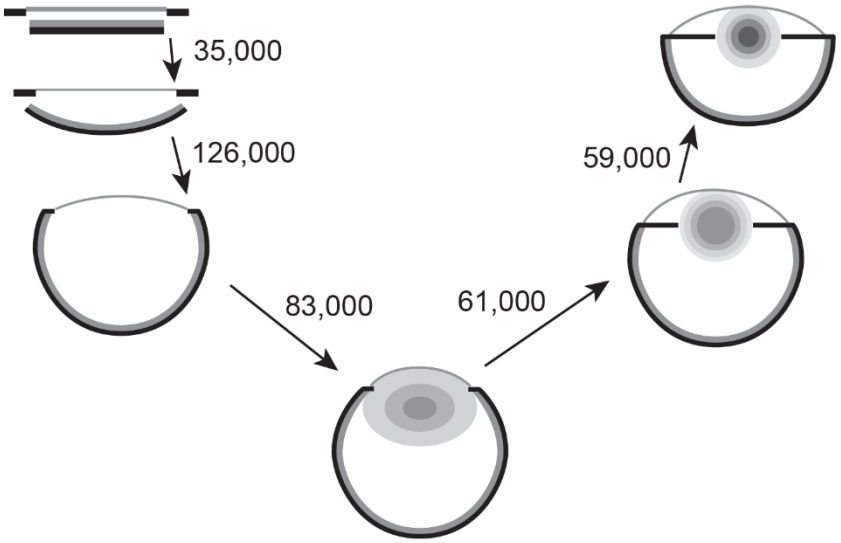
A. The eyes of vertebrates and their relatives were soft body parts that usually decayed before fossilizing.*

Rationales
A. Correct.
B. Hard internal body parts would be preserved.
C. Structures that are bony would be preserved regardless of size.
D. Eye-like structures are present in fossils that predate 400 million years.

Technology-Enhanced 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.

Use Figure 1 to answer the question.

Scientists used fossil data to show the stages in the development of a camera eye, as shown in the diagram. The diagram also includes estimates of the number of generations it took for the camera eye to evolve between each stage of development.



Source: Royal Society.

Select the correct answer from each drop-down menu to complete the sentences about the age and characteristics of an eye fossil.

An eye fossil that has a round shape and oval internal structures is found. This fossil was likely formed [ ] generations ago.

- 59,000
- 61,000
- 120,000
- 126,000

This fossil would be considered [ ] a fossil with a semicircular shape and no oval internal structures.

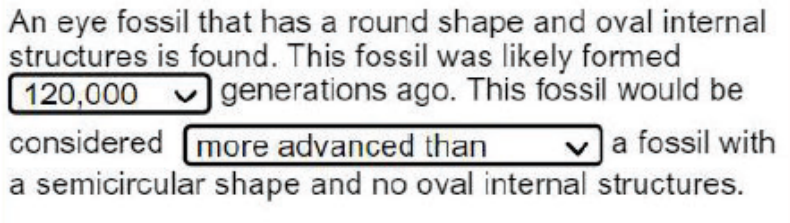
- more advanced than
- equally as advanced as
- less advanced than

Multi-Dimensional Alignment: While effectively applying the science practice of analyzing and interpreting data, the student demonstrates knowledge of the fossil record that documents 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.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 3 or higher. The student can analyze and interpret qualitative data from the fossil record that documents the existence, diversity, extinction, or change of life forms throughout the history of life on Earth.

Scoring

Select the correct answer from each drop-down menu to complete the sentences about the age and characteristics of an eye fossil.



Rationales

Response	Rationale
An eye fossil that has a round shape and oval internal structures is found. This fossil was likely formed 120,000 generations ago. This fossil would be considered more advanced than a fossil with a semicircular shape and no oval internal structures.	Correct.
An eye fossil that has a round shape and oval internal structures is found. This fossil was likely formed 61,000 generations ago. This fossil would be considered more advanced than a fossil with a semicircular shape and no oval internal structures.	A round shape and oval internal structures were already established 61,000 generations in the past.
An eye fossil that has a round shape and oval internal structures is found. This fossil was likely formed 59,000 generations ago. This fossil would be considered more advanced than a fossil with a semicircular shape and no oval internal structures.	Oval internal structures were already established 59,000 generations in the past.
An eye fossil that has a round shape and oval internal structures is found. This fossil was likely formed 126,000 generations ago This fossil would be considered less advanced than a fossil with a semicircular shape and no oval internal structures.	A round shape and oval internal structures are more advanced than a curved and flat shape without internal structures.

Constructed Response
Performance Expectation
8-MS-LS4-2 Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

Use Figure 2, Table 1, and Figure 3 to answer the question.

Scientists have identified the placoderm eye as an intermediate form with properties between those of the complex vertebrate eye and the simpler eyes that evolved 600 mya.

Explain how the eye casing shown in Figure 3 increased the likelihood that fossils of the placoderm eye would be preserved. Use evidence from the figures and the table to support your explanation.

Multi-Dimensional Alignment: The item requires the student to apply the science and engineering practices of constructing explanations and knowledge of the anatomies of modern and fossil organisms infer evolutionary relationships to demonstrate an understanding of patterns.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 4 or higher. The student can construct an explanation based on scientific ideas for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

Use Figure 2, Table 1, and Figure 3 to answer the question.

Scientists have identified the placoderm eye as an intermediate form with properties between those of the complex vertebrate eye and the simpler eyes that evolved 600 mya.

Explain how the eye casing shown in Figure 3 increased the likelihood that fossils of the placoderm eye would be preserved. Use evidence from the figures and the table to support your explanation.

Scoring Information	
Score	Description
2	Student's response correctly explains how the eye casing increased the likelihood that fossils of the placoderm eye would be preserved and correctly uses evidence to support the explanation.
1	Student's response correctly explains how the eye casing increased the likelihood that fossils of the placoderm eye would be preserved but does not use evidence to support the explanation.
0	Student's response does not correctly explain how the eye casing increased the likelihood that fossils of the placoderm eye would be preserved and does not use evidence to support the explanation.

Scoring Notes	Examples
Explanation of how the eye casing shown in Figure 3 increased the likelihood that fossils of the placoderm eye would be preserved (1 point)	• The outer eye casing of the placoderm is made of bone.
Evidence from the figures and table to support the explanation (1 point)	• Earlier forms of eyes contained soft materials only, which could be used as food by living organisms, so these eyes were likely to decay quickly after the death of the fish. OR • Bone is a hard material that is more likely to form fossils.

Accept other reasonable answers.

Scoring Responses (CR)

Explain how the eye casing shown in Figure 3 **increased** the likelihood that fossils of the placoderm eye would be preserved. Use evidence from the figures and the table to support your explanation.

Response 1

The casing shown in Figure three increased the likelihood that fossils of the placoderm eye would be preserved because of the bony material around the opening of the eye. We know that bones are what make up the fossils, so they would be one of the last things to decay, therefore the eye would be more protected from deterioration.

Score: 2

This response earns a 2. It accurately explains how the eye casing shown in Figure 3 increased the likelihood that fossils of the placoderm eye would be preserved "The casing shown in Figure three increased the likelihood that fossils of the placoderm eye would be preserved because of the bony material around the opening of the eye." The response accurately uses evidence to support the explanation: "We know that bones are what make up the fossils, so they would be one of the last things to decay, therefore the eye would be more protected from deterioration."

Response 2

Well, the eye casing is made up of a bony material, as shown in figure 3. This would cause the eye casing itself to not decompose And since the casing is not decomposing, it would take longer for the eye inside of it to decompose as well, and it might even preserve itself in the bone.

Score: 1

This response earns a 1. It accurately explains how the eye casing shown in Figure 3 increased the likelihood that fossils of the placoderm eye would be preserved: "Well, the eye casing is made up of a bony material, as shown in figure 3. This would cause the eye casing itself to not decompose." The response does not accurately use evidence to support the explanation.

Response 3

The eye casing shown in Figure 3 increased the likelihood that fossils of the placoderm eye would be preserved because they can compare animals then to now and see what are so different for example their eyes, bones, backs.

Score: 0

This response earns a 0. It does not accurately explain how the eye casing shown in Figure 3 increased the likelihood that fossils of the placoderm eye would be preserved and does not accurately use evidence from the figures and the table.

Task Set: Gulf Oil

Item Type	PE	DCI	SEP	CCC	Points	Achievement Level
MC	8-MS-ESS3-3	MS.ESS3C.a		C/E	1	2
TEI	8-MS-ESS3-1	MS.ESS3A.a		C/E	1	4
TEI	8-MS-ESS3-3	MS.ESS3C.b	6. E/S		2	4
TEI	8-MS-ESS3-3	MS.ESS3C.b	6. E/S		2	3
ER	8-MS-ESS3-1	MS.ESS3A.a	6. E/S	C/E	9	4

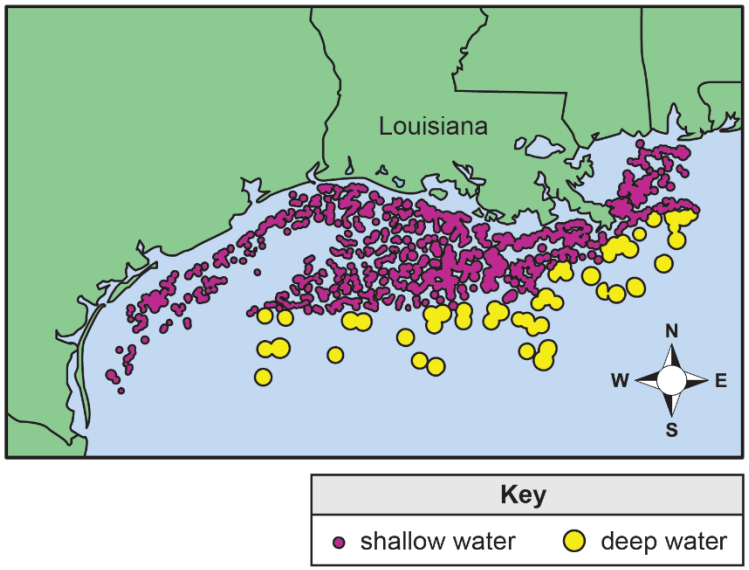
SEP = blue; DCI = orange; CCC = green An asterisk (*) denotes correct answer(s).

Use the information about gulf oil and your knowledge of science to answer the questions.

Gulf Oil

Map 1 shows the locations of oil wells in the Gulf of America, south of Louisiana.

Map 1. Offshore Oil Well Sites South of Louisiana

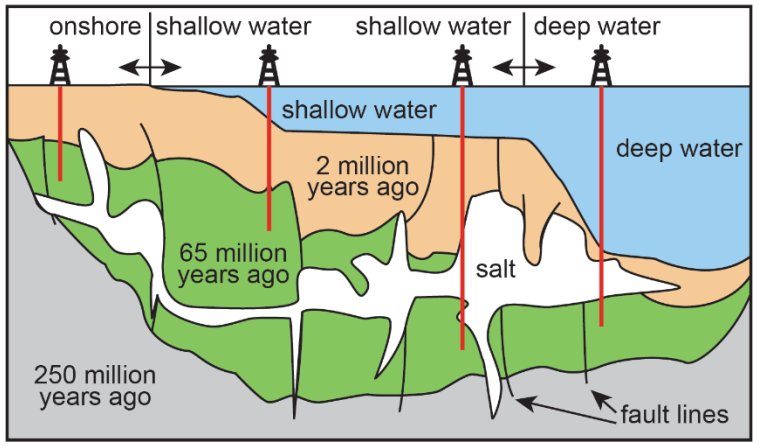


Source: American Oil & Gas Historical Society.

The trend has been to drill in deeper and deeper water. This adds to the problems and expense of extracting offshore oil. Drilling equipment must be designed to withstand very high pressures. An offshore well can cost more than $100 million, much more than drilling an onshore well. The reward is that much more oil can be pumped over a longer period of time because the volume of offshore deposits is much greater.

Figure 1 shows the layers of rock and salt under the Gulf of America. The figure also marks the divide between deepwater and shallow-water oil rigs and shows when the oldest part of each layer began to be deposited.

Figure 1. Rock Layers under the Gulf of America



Source: Baker Hughes.

Here are some interesting numbers related to offshore drilling: The dinosaurs disappeared about 65 million years ago, which is when some of the oil deposits were beginning to form. Some oil is pumped up from more than 11 kilometers (7 miles) deep. Pressure at that depth is about 1,800 times the atmospheric pressure experienced at the surface. Under such extreme conditions, one small mistake can lead to an oil well blowout and an oil spill that can seriously damage a whole ecosystem. Such an event is extremely rare, but it can happen. All offshore oil wells are rigged with blowout preventers (BOPs) that are designed to stop a blowout before it gets out of control.

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

Human use of fossil fuels can have a sudden impact or a gradual impact on the environment. Each potential impact due to fossil fuel use must be identified and planned for.

Which occurrence could **most likely** have a sudden impact on the environment?

A. burning of gasoline in vehicle engines
B. damage to an offshore oil well*
C. generating electricity in coal-burning power plants
D. discarding used motor oil in landfills

Multi-Dimensional Alignment: The item requires the student to apply knowledge of methods for monitoring and minimizing human impact on the environment to demonstrate an understanding of cause and effect.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 2 or higher. The student can identify a method for monitoring and minimizing human impact on the environment.

Human use of fossil fuels can have a sudden impact or a gradual impact on the environment. Each potential impact due to fossil fuel use must be identified and planned for.

Which occurrence could **most likely** have a sudden impact on the environment?

B. damage to an offshore oil well*

Rationales
A. The burning of gasoline in vehicle engines has gradual impacts on the environment.
B. Correct.
C. Generating electricity in coal-burning power plants has gradual impacts on the environment.
D. Discarding used motor oil in landfills has gradual impacts on the environment.

Technology-Enhanced Item
Performance Expectation
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.

Select from the drop-down menus to correctly complete the sentence.

There is [ ] oil in the ground today than there was 100 years ago because oil is consumed [ ] than it is being formed.

- more
- less

- faster
- more slowly

Multi-Dimensional Alignment: The item requires the student to apply knowledge of the uneven distributions of Earth's mineral, energy, and groundwater resources to demonstrate an understanding of cause and effect.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 4 or higher. The student can describe how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

Scoring

There is [less] oil in the ground today than there was 100 years ago because oil is consumed [faster] than it is being formed.

Rationales

Response	Rationale
There is **less** oil in the ground today than there was 100 years ago because oil is consumed **faster** than it is being formed.	Correct.
There is **less** oil in the ground today than there was 100 years ago because oil is consumed **more slowly** than it is being formed.	Faster consumption of oil will cause less oil to be present in the ground.
There is **more oil** in the ground today than there was 100 years ago because oil is consumed **faster** than it is being formed.	Less oil in the ground is an effect of faster consumption.
There is **more** oil in the ground today than there was 100 years ago because oil is consumed **more slowly** than it is being formed.	The formation of oil deposits takes millions of years.

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

Oil spills from damaged offshore oil rigs can cost up to tens of billions of dollars to clean up.

Select from the drop-down menus to correctly complete each sentence.

One long-term solution to the problem of oil spills is to use [ ] fossil fuel and extract it from [ ] places.

- [ ]: less / more
- [ ]: more remote / less hazardous / deeper

Another long-term solution would be to generate more electricity using [ ] power.

- [ ]: coal-based / natural gas-based / wind- and solar-based

Multi-Dimensional Alignment: While effectively applying the science practice of designing solutions, the student demonstrates knowledge of monitoring and minimizing human activities on the environment.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 4 or higher. The student can apply scientific ideas to evaluate a method for monitoring and minimizing human activities on the environment.

Scoring

One long-term solution to the problem of oil spills is to use [less] fossil fuel and extract it from [less hazardous] places. Another long-term solution would be to generate more electricity using [wind- and solar-based] power.

Rationales

Response	Rationale
One long-term solution to the problem of oil spills is to use less fossil fuel and extract it from less hazardous places. Another long-term solution would be to generate more electricity using wind- and solar-based power.	Correct.
One long-term solution to the problem of oil spills is to use more fossil fuel and extract it from less hazardous places. Another long-term solution would be to generate more electricity using wind- and solar-based power.	More fossil fuel extraction would increase the risk of oil spills.
One long-term solution to the problem of oil spills is to use less fossil fuel and extract if from more remote places. Another long-term solution would be to generate more electricity using wind- and solar-based power.	The risk of oil spills would remain the same regardless of how remote the extraction location is.
One long-term solution to the problem of oil spills is to use less fossil fuel and extract if from deeper places. Another long-term solution would be to generate more electricity using wind- and solar-based power.	The risk of oil spills would remain the same regardless of how deep the extraction of the oil is.

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

Select from the drop-down menus to correctly complete each sentence.

[ ] oil deposits are being exploited because [ ] deposits have become increasingly depleted. A long-term solution to meet some energy needs would be to use more [ ] as an energy source because it is [ ].

- [ ]: Offshore, Onshore
- [ ]: offshore, onshore
- [ ]: coal, solar energy, natural gas
- [ ]: cheaper, inexhaustible

Multi-Dimensional Alignment: While effectively applying the science practice of designing solutions, the student demonstrates knowledge of monitoring and minimizing human activities on the environment.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 3 or higher. The student can apply scientific ideas to describe a method for monitoring and minimizing human activities on the environment.

Scoring

[Offshore] oil deposits are being exploited because [onshore] deposits have become increasingly depleted. A long-term solution to meet some energy needs would be to use more [solar energy] as an energy source because it is [inexhaustible].

Rationales

Response	Rationale
Offshore oil deposits are being exploited because onshore deposits have become increasingly depleted. A long-term solution to meet some energy needs would be to use more solar energy as an energy source because it is inexhaustible.	Correct.
Onshore oil deposits are being exploited because offshore deposits have become increasingly depleted. A long-term solution to meet some energy needs would be to use more solar energy as an energy source because it is inexhaustible.	Onshore drilling occurred prior to offshore drilling.
Offshore oil deposits are being exploited because onshore deposits have become increasingly depleted. A long-term solution to meet some energy needs would be to use more coal as an energy source because it is inexhaustible.	Coal is a fossil fuel and is exhaustible.
Offshore oil deposits are being exploited because onshore; deposits have become increasingly depleted. A long-term solution to meet some energy needs would be to use more natural gas as an energy source because it is inexhaustible.	Natural gas is a fossil fuel and is exhaustible.

Extended Response
Performance Expectation
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.

Increasing global population has led to greater demand for unevenly distributed fossil fuel resources. This demand has increased the challenges of drilling for oil in a cost-effective and environmentally safe way.

Both natural and synthetic materials have economic value to humans.

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 increased demand for energy sources has led oil producers to seek petroleum deposits in new places.
- Explain two ways in which this increased demand has increased the costs and dangers involved in offshore oil drilling.

Part B

- Identify three risk factors in building oil platforms in deep water.
- Propose three ways in which safety can be increased and risk reduced on deepwater oil platforms.

Multi-Dimensional Alignment: The item requires the student to apply the science and engineering practices of constructing explanations and knowledge of how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes to demonstrate an understanding of cause and effect.

Achievement Level Descriptor: Students who answer this item correctly are performing at a level of 4 or higher. The student can construct a science 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.

Increasing global population has led to greater demand for unevenly distributed fossil fuel resources. This demand has increased the challenges of drilling for oil in a cost-effective and environmentally safe way.

Both natural and synthetic materials have economic value to humans.

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 increased demand for energy sources has led oil producers to seek petroleum deposits in new places.
- Explain **two** ways in which this increased demand has increased the costs and dangers involved in offshore oil drilling.

Part B

- Identify **three** risk factors in building oil platforms in deep water.
- Propose **three** ways in which safety can be increased and risk reduced on deepwater oil platforms.

Score Points

PART A (0–3 points maximum)

- 1 point for correct explanation of how increased demand for energy sources has led oil producers to seek petroleum deposits in new places
- 1 point for each correct explanation of a way in which this increased demand has increased the costs and dangers involved in oil drilling (up to 2 points)

PART B (0–6 points maximum)

- 1 point for each correct identification of a risk factor in building oil platforms in deep water (up to 3 points)
- 1 point for each correct proposal of a way in which safety can be increased and risk reduced on deepwater oil platforms (up to 3 points)

Score Information

Sample Response:

Scoring Notes	Examples
Part A	
Explanation of how increased demand for energy sources has led oil producers to seek petroleum deposits in new places (1 point)	• Increased demand for fossil fuels eventually depleted many early oil reserves, so that new large oil deposits were often found in remote land regions or under the ocean surface.
Explanation of **two** ways in which this increased demand has increased the costs and dangers involved in offshore oil drilling (1 point each)	• Deepwater regions far offshore increase the risk of large, hard-to-control oil spills. • Servicing the oil platforms is more complex and costs more money than oil reserves closer to shore.

Scoring Notes	Examples
Part B	
Identification of three risk factors in building oil platforms in deep water (1 point each)	• The greater the water depth, the more difficult to stop an oil-well blowout. • Oil platforms are far from shore and therefore it is difficult to quickly send emergency teams and well-repair operations if a problem occurs. • The greater the pressures deeper in the ground, the more force of the oil and gas release in case of a blowout.
Proposal of three ways in which safety can be increased and risk reduced on deepwater oil platforms (1 point each)	• Make sure there are several backup safety systems in place in the event that a problem occurs in the well. • Have an emergency plan in place to quickly offload oil platform workers in the event of a well emergency or during strong ocean storms. • Use underwater cameras or remote deepwater vehicles to monitor well conditions.

Accept other reasonable answers.

Student Responses (ER)

Part A

- Explain how increased demand for energy sources has led oil producers to seek petroleum deposits in new places.
- Explain two ways in which this increased demand has increased the costs and dangers involved in offshore oil drilling.

Response 1

Two ways that the increase in need for petroleum has increased the cost and dangers when offshore oil drilling is through digging deeper, more expensive wells and increasing the risk for oil spills. The people that own and dig these wells are making the decision to dig the wells further offshore because of the depleting suply of the oil on land and in shallower water. But, the deeper the wells are dug into the ocean, the more it costs to curate them because they have to be able to withstand lots of pressure and harsher conditions. This means that the cost of the whole production of drilling oil will go up and eventually the cost will outweigh the profit. Also, the deeper you go to dig a well, the more pressure there is at the bottom of the ocean where you will be digging, but this pressure can cause the petroleum to spill out into the surrounding oceanic environments and that can be detrimental and even eventually cause extinction of some marine life.

Score: 3

This response earns a 3. It accurately explains how increased demand for energy sources has led oil producers to seek petroleum deposits in new places: “The people that own and dig these wells are making the decision to dig the wells further offshore because of the depleting supply of the oil on land and in shallow water.” The response accurately explains two ways in which this increased demand has increased the

costs and dangers involved in offshore oil drilling: “But, the deeper the wells are dug into the ocean, the more it costs to curate them because they have to be able to withstand lots of pressure and harsher conditions” and “Also, the deeper you go to dig a well, the more pressure there is at the bottom of the ocean where you will be digging, but this pressure can cause the petroleum to spill out into the surrounding oceanic environments and that can be detrimental and even eventually cause extinction of some marine life.”

Response 2

An increased demand for energy sources that led to oil producers to seek pertrolium deposets in new places because when they go offshore they are not dinging as much oil, and if the demand for it is high then they want to look in other places for oil. One way that the increased demand on oil has increased the cost and dangers involved is that if something goes wrong someone ar multiple people could be injured or harmed because of pressure of the ol in the ground.

Score: 2

This response earns a 2. It accurately explains how increased demand for energy sources has led oil producers to seek petroleum deposits in new places: “An increased demand for energy sources that led to oil producers to seek pertrolium deposets in new places because when they go offshore they are not dinging as much oil, and if the demand for it is high then they want to look in other places for oil.” The response explains one way in which this increased demand has increased the costs and dangers involved in offshore oil drilling: “One way that the increased demand on oil has increased the cost and dangers involved is that if something goes wrong someone ar multiple people could be injured or harmed because of pressure of the ol in the ground.” The response does not accurately explain a second way in which this increased demand has increased the costs and dangers involved in offshore oil drilling.

Response 3

One way that the increased demand for energy sources has led oil produers to seek pertroleum deposits in new places by because natural gas is a good source of energy, and they see that so they send more oil to these refinerys and they make the oil into natural gas. Another way that the increased demand for energy sources has led oil producers to seek pertoleum deposits in new places by using more offshore oil because there is a lot of oil offshore and is they use the oil that is offshore they can make more natural gas.

Score: 1

This response earns a 1. It accurately explains how increased demand for energy sources has led oil producers to seek petroleum deposits in new places: “Another way that the increased demand for energy sources has led oil producers to seek pertoleum deposits in new places by using more offshore oil because there is a lot of oil offshore and is they use the oil that is offshore they can make more natural gas.” The response does not accurately explain two ways in which this increased demand has increased the costs and dangers involved in offshore oil drilling.

Response 4

Offshore oil drilling was always a risk because at anytime something bad could happen and a lot of people could die but also if you were to do it safely and prosistant i would say just to make them onshore so there is not as much risk as making them offshore.

Score: 0
This response earns a 0. It does not accurately explain how increased demand for energy sources has led oil producers to seek petroleum deposits in new places. The response does not accurately explain two ways in which this increased demand has increased the costs and dangers involved in offshore oil drilling.

Part B
- Identify three risk factors in building oil platforms in deep water.
- Propose three ways in which safety can be increased and risk reduced on deepwater oil platforms.

Response 1

The risk factors in building oil platforms in deep water coukd include the high cost of construction, the potential for equipment failure due to the harsh deep water environment, and the risk of oil spills which can cause severe environmental damage. To increase safety and reduce risk, measures could include the use of advanced technology to monitor and control equipment, regular maintenace and inspections to prevent equipment failure, and contingency plans for the event of an oil spill.

Score: 6
This response earns a 6. It accurately identifies three risk factors in building oil platforms in deep water: “The risk factors in building oil platforms in deep water coukd include the high cost of construction, the potential for equipment failure due to the harsh deep water environment, and the risk of oil spills which can cause severe environmental damage.” The response accurately proposes three ways in which safety can be increased and risk reduced on deepwater oil platforms: “To increase safety and reduce risk, measures could include the use of advanced technology to monitor and control equipment, regular maintenace and inspections to prevent equipment failure, and contingency plans for the event of an oil spill.”

Response 2

there are multiple risk to building offshore oil platforms and there could be multiple ways that you could make the platform safer. one risk of the platforms being in the deep water is the pressure of the water when you get farther down so you would need very string pipes in order for it not to blow up. another risk of the deep water platforms is the salt te waves are so powerful that they could erode the patform away realy fast. the last risk is that if the pipe does blow up the oil will go every where and the water will be polluted killoing ecosystems and animals. three ways you can prevent these things from happining is the more BOP's the better bcause they can potetially stop the blowouts from happening you could also put another pipe one the outside of that pipe making it even more secure whith the erosion thers nothing to do but put more layers to make it take longer to erode.

Score: 5
This response earns a 5. It accurately identifies three risk factors in building oil platforms in deep water: “one risk of the platforms being in the deep water is the pressure of the water when you get farther down”; “another risk of the deep water platforms is the salt te waves are so powerful that they could erode the patform away realy fast”; and “the last risk is that if the pipe does blow up the oil will go every where and the water will be polluted killoing ecosystems and animals.” The response accurately proposes two ways in which safety can be increased

and risk reduced on deepwater oil platforms: “the more BOP's the better bcause they can potetially stop the blowouts from happening you could also put another pipe one the outside of that pipe making it even more secure whith the erosion thers nothing to do but put more layers to make it take longer to erode.” The response does not propose a third way in which safety can be increased and risk reduced on deepwater oil platforms.

Response 3

One risk factor in building oil platforms in deep water is risk of natural disasters like hurricanes or earthquakes destroying or damaging the platform. One way safety can be increased on the platform is by having an emergency plan and reinforcing the supports so they can withstand hurricanes and earthquakes. Another risk factor of building oil platforms in deep water is worker causalities, If a worker gets seriously injured offshore it may take a while to get them back on land and to a hospital, by then it might be too late to save them. To prevent this, they should have a medical team on the platform at all times to increase the safety factor and help injured workers. Another risk they face working offshore is that they may not know what to do in the event of a natural disaster. To increase their safety, an evacuation plan should be put in place so that they know what to do in the event of a disaster. As you can see, these are three risk factors and three safety plans that increase and decrease the risk of working offshore.

Score: 4

This response earns a 4. It accurately identifies two risk factors in building oil platforms in deep water: “One risk factor in building oil platforms in deep water is risk of natural disasters like hurricanes or earthquakes destroying or damaging the platform” and “Another risk factor of building oil platforms in deep water is worker causalities, If a worker gets seriously injured offshore it may take a while to get them back on land and to a hospital, by then it might be too late to save them.” Though the response identifies a third risk factor in building oil platforms in deepwater, the risk factor is a combination of the first risk and second risk. The response accurately proposes two ways in which safety can be increased and risk reduced on deepwater oil platforms: “One way safety can be increased on the platform is by having an emergency plan and reinforcing the supports so they can withstand hurricanes and earthquakes” and “To prevent this, they should have a medical team on the platform at all times to increase the safety factor and help injured workers.” Though the response proposes a third way in which safety can be increased and risk reduced on deepwater oil platforms, the proposal is the same as the first proposal and second proposal given.

Response 4

On an oil platform in deep water you can fall off and drown, the platform get cought on fire, or get eaten by a shark. Every body can wear a life jacket 24/7, and they can carry a knife.

Score: 3

This response earns a 3. It accurately identifies two risk factors in building oil platforms in deep water — “On an oil platform in deep water you can fall off and drown” and “the platform get cought on fire” — but does not accurately identify a third risk factor in building oil platforms in deep water. The response proposes one way in which safety can be increased and risk reduced on deepwater oil platforms — “Every body can wear a life jacket 24/7” — but does not accurately propose two additional ways in which safety can be increased and risk reduced on deepwater oil platforms.

Response 5

Some oil is pumped up from more than 11 kilometers 2 miles deep the pressure at that depth is about 1800 times the atmospheric pressure experienced at the surface. All offshore oil wells should be rigged with more blowout preventers that are designed to stop a blowout before it gets out of control. Which is when some of the oil deposits were beginning to form one small mistake can lead to an oil well blowout and an oil spill that can seriously damage a whole ecosystem.

Score: 2

This response earns a 2. It accurately identifies one risk factor in building oil platforms in deep water: "when some of the oil deposits were beginning to form one small mistake can lead to an oil well blowout and an oil spill that can seriously damage a whole ecosystem." It does not accurately identify two additional risk factors in building oil platforms in deep water. The response proposes one way in which safety can be increased and risk reduced on deepwater oil platforms: "All offshore oil wells should be rigged with more blowout preventers that are designed to stop a blowout before it gets out of control." It does not accurately propose two additional ways in which safety can be increased and risk reduced on deepwater oil platforms.

Response 6

Three risk factors in building oil platforms in deep water is that someone could lose oygen or not have enough oxygen and die, the oil platform could be build but it don't work in some type of way and also, the oil platform could have a blowout. Three ways safety can be increased and risk reduced on deepwater oil platforms is to be under serious conditions for any small mistakes, have the oil platform protected and make sure the oil platform is in the right area and things like that.

Score: 1

This response earns a 1. It accurately identifies one risk factor in building oil platforms in deep water — "the oil platform could have a blowout" — but does not accurately identify two additional risk factors. The response does not accurately propose three ways in which safety can be increased and risk reduced on deepwater oil platforms.

Response 7

Shallow water, Deep water,Fault lines. Safety can be increased if you know how to swim, if you don't than you should just get a life vest because some of the oil is deep, some of the oil is not deep.

Score: 0

This response earns a 0. It does not accurately identify three risk factors in building oil platforms in deep water. The response does not propose three ways in which safety can be increased and risk reduced on deepwater oil platforms.

Resources

Contact the LDOE

- assessment@la.gov for assessment questions
- STEM@la.gov for instructional or curriculum implementation support
- AskLDOE for general questions
- ldoecommunications@la.gov to subscribe to newsletters; include the newsletter(s) you want to subscribe to in your email

Updates Log

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

Available	Description of Updates
July 2025	Document original posting.

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