MASSACHUSETTS
Department of Elementary
and Secondary Education

Release of Spring 2022 Sample Task Items

from the

Grade 5 Innovative Science Assessment Paper-Based Test

November 2022
Massachusetts Department of Elementary and Secondary Education

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Department of Elementary
and Secondary Education

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Overview of Grade 5 Innovative Science Assessment

The Department of Elementary and Secondary Education (DESE) is developing an innovative science assessment for grades 5 and 8 that uses a new type of performance task for students. Students engage with meaningful problems, conduct investigations, create and explore models, and solve science or engineering challenges. In Spring of 2022, DESE piloted the assessment with over 100 schools serving about 12,000 students in grades 5 and 8. The spring 2022 pilot was administered in two primary formats: a computer-based version and a paper-based version. The vast majority of students took the computer-based test. The paper-based test was offered as an accommodation for students who needed it. In places where a technology-enhanced item was used on the computer-based test, an adapted version of the item was created for use on the paper test. These adapted paper items were multiple-choice or multiple-select items that tested the same STE content and assessed the same standard as the technology-enhanced item. DESE is publishing one paper-based performance task per grade as a sample task.

Sample items from the pilot test are available online at ma-innov-sci.mypearsonsupport.com/practice-tests.

This document provides information about each item from the sample task, including the following:

- science content area (reporting category)
- standard covered
- practice category
- item type
- item description
- correct answer (for selected-response and technology-enhanced items)
- percentage of students in the pilot who answered the item correctly (percent correct)

Scoring rubrics are provided for constructed-response items.

Standards and Reporting Categories

The grade 5 innovative science assessment test was based on learning standards in the four major content strands in the April 2016 version of the *Massachusetts Science and Technology/Engineering Curriculum Framework*. The four content strands are listed below.

- Earth and Space Science
- Life Science
- Physical Science
- Technology/Engineering

The 2016 *Massachusetts Science and Technology/Engineering Curriculum Framework* is available on the Department website at www.doe.mass.edu/frameworks/current.html.

Most items on the grade 5 innovative science assessment are aligned to one of three MCAS Science and Engineering Practice Categories. The three practice categories are listed below.

- Practice Category A: Investigations and Questioning
- Practice Category B: Mathematics and Data
- Practice Category C: Evidence, Reasoning, and Modeling

More information about the practice categories is available on the Department website at www.doe.mass.edu/mcas/tdd/practice-categories.html.

The tables at the conclusion of this document provide the following information about each released and unreleased operational item: reporting category, standard covered, practice category covered (if any), item type, and item description. The correct answers for released selected-response questions are also displayed in the released item table.

Reference Materials

Each student taking the paper-based version of the grade 5 STE test was provided with a plastic ruler. An image of the ruler is not reproduced in this document. Each student also had sole access to a calculator.

During both STE test sessions, the use of bilingual word-to-word dictionaries was allowed for current and former English learner students.

Grade 5
Innovative Science Assessment
SESSION 2

Directions

Read each question carefully and then answer it as well as you can. You must record all answers in this Test & Answer Booklet.

For some questions, you will mark your answers by filling in the circles in your Test & Answer Booklet. Make sure you darken the circles completely. Do not make any marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely.

If a question asks you to show or explain your work, you must do so to receive full credit. Write your response in the space provided. Only responses written within the provided space will be scored.

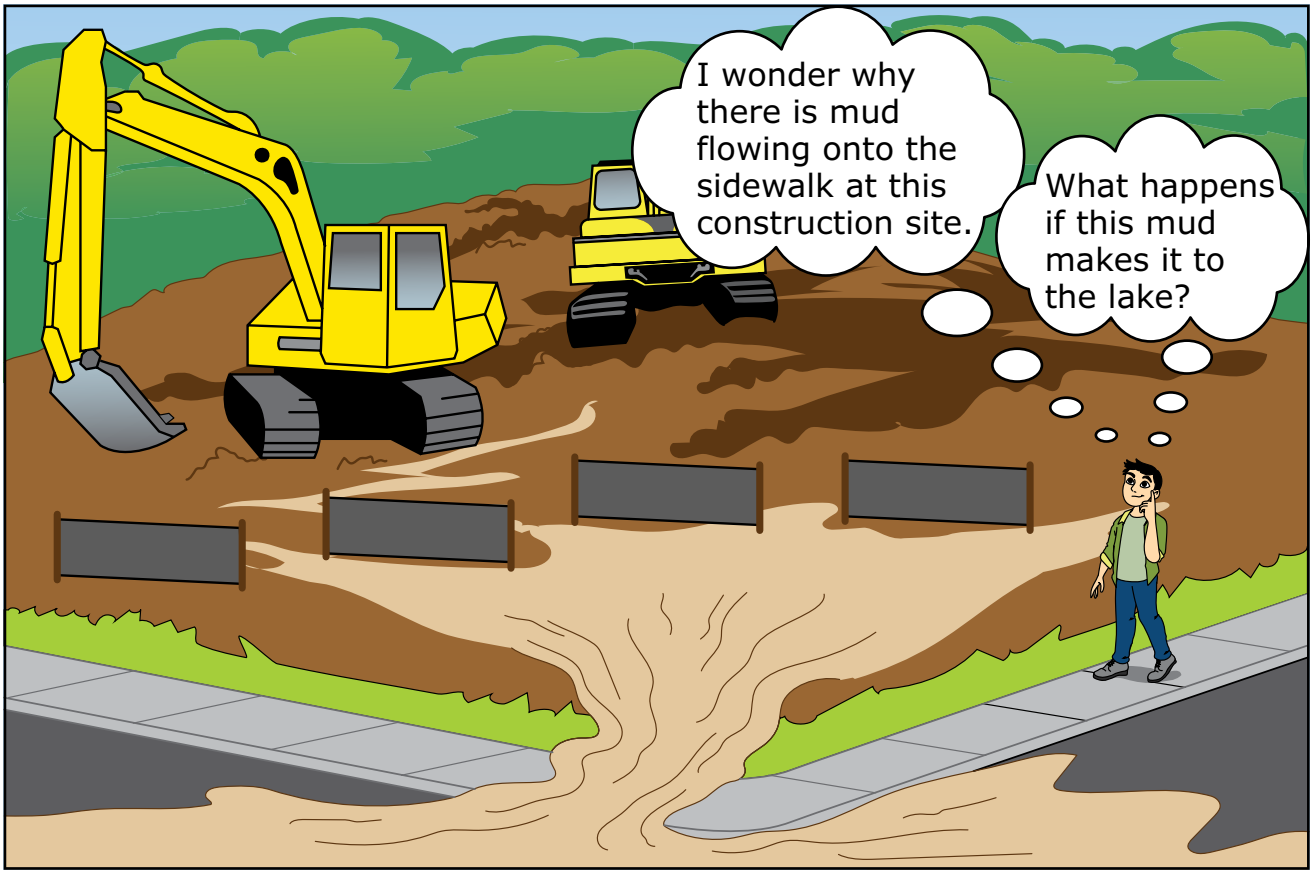
If you do not know the answer to a question, you may go on to the next question. When you are finished, you may review your answers and go back to any questions you did not answer in this session only.

Go On ➡

The following section includes a new type of performance task.
Use the information provided in the performance task to answer the seven selected-response questions and one constructed-response question.

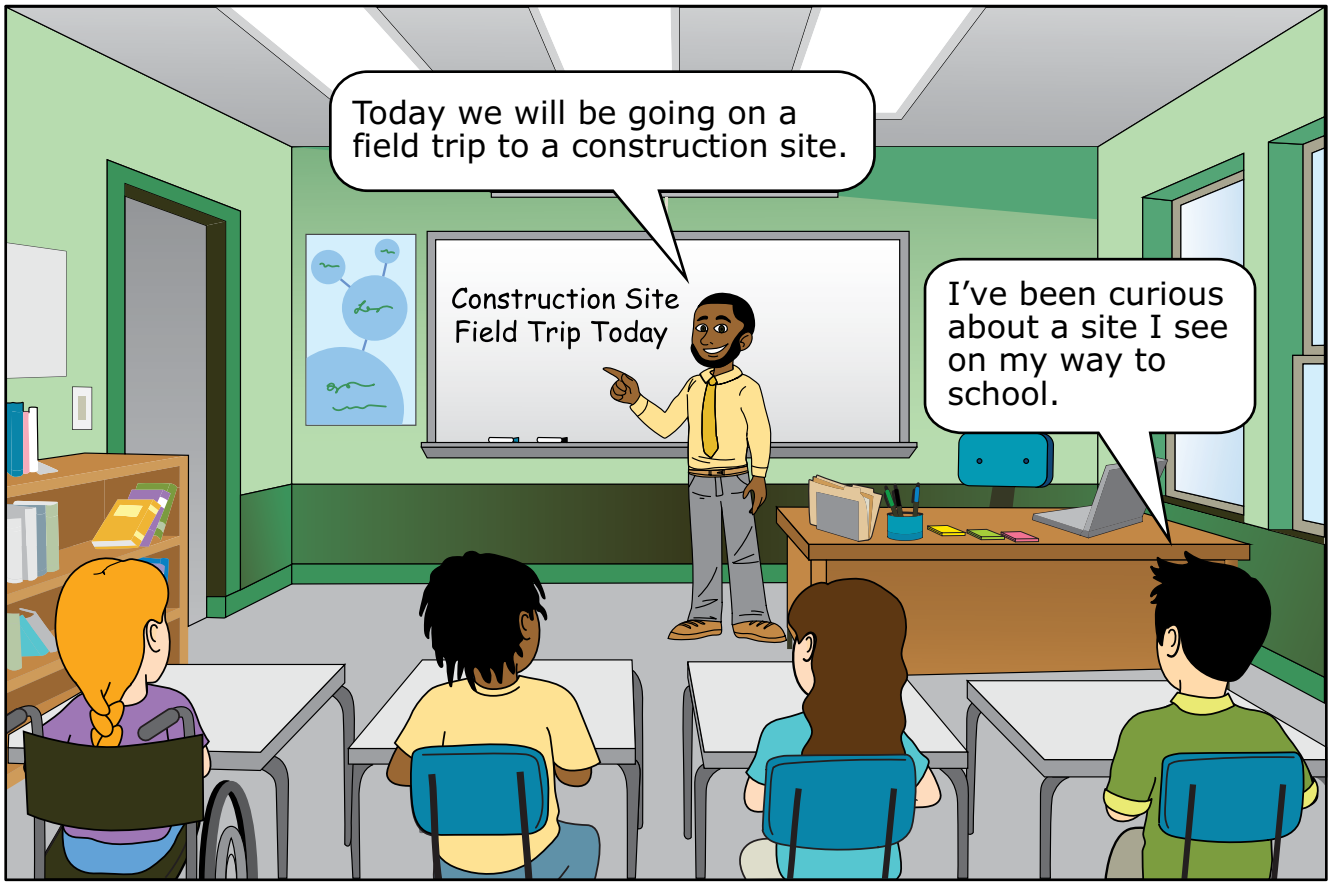
Go On ➡

Story Scene 1



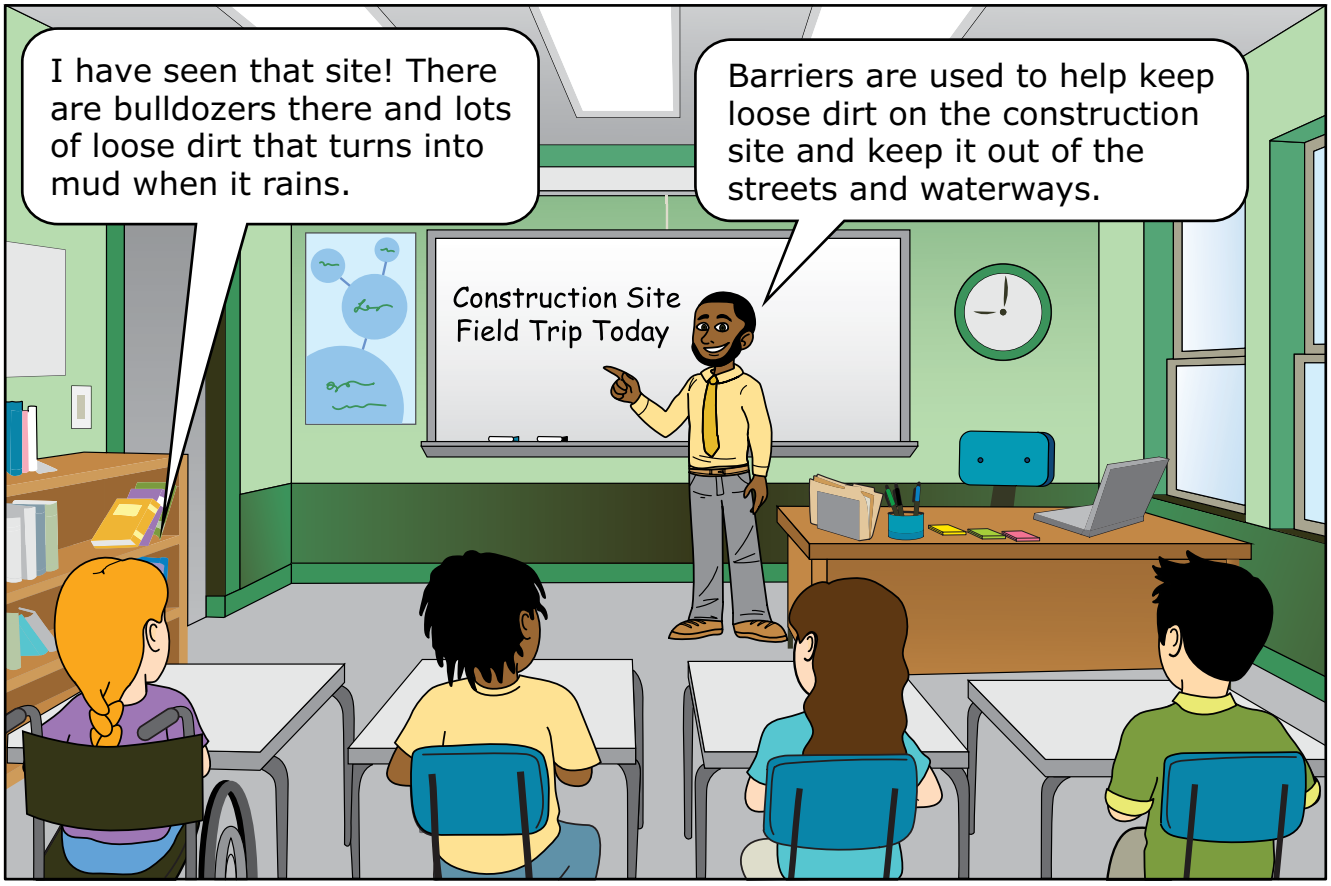
Go On ➡

Story Scene 2



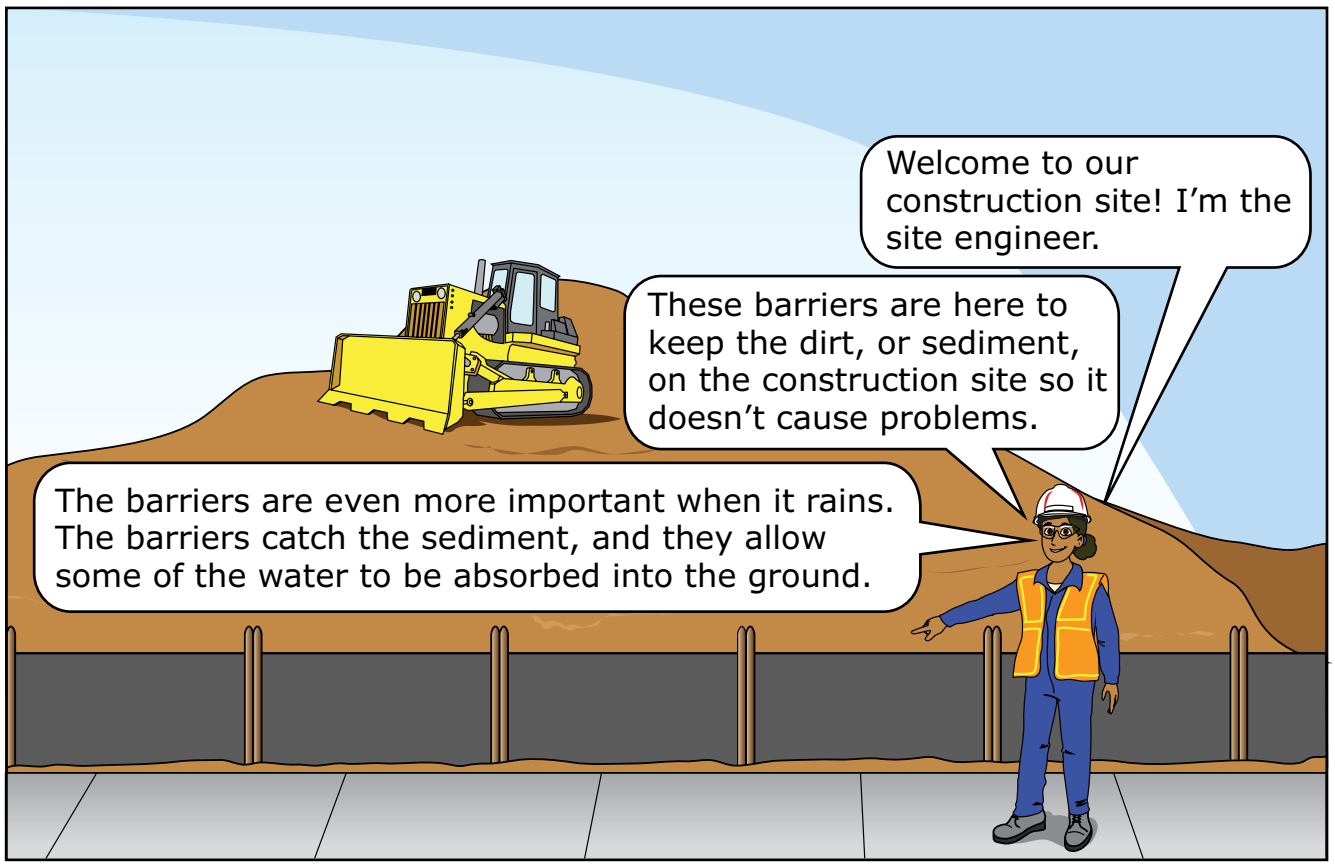
Go On

Story Scene 3



Go On ➡

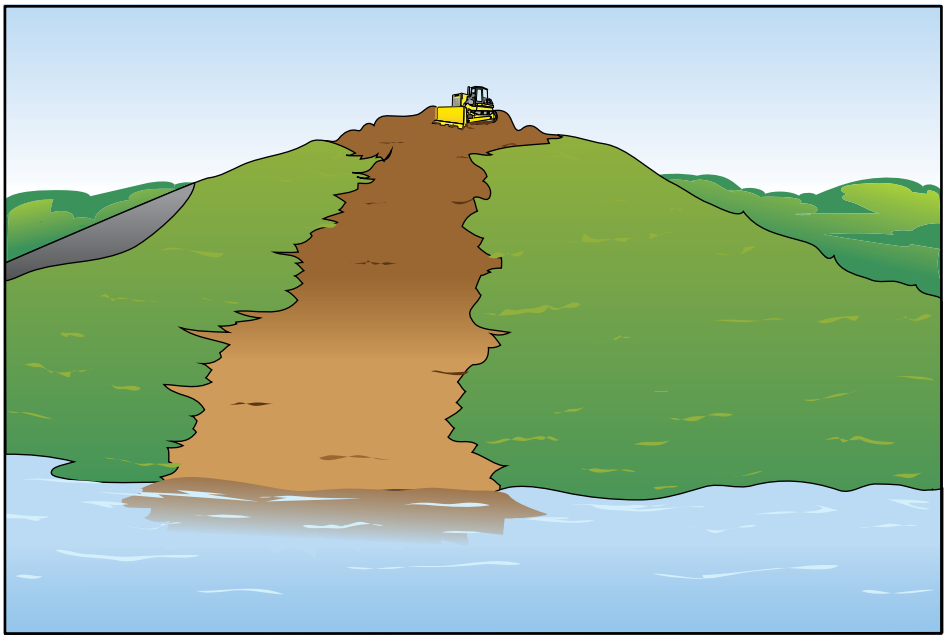
Story Scene 4



Go On ➡

1 The site engineer tells the students that there is a lake on the other side of the construction site.

Lake Near Construction Site



Which part of the water cycle moves sediment from the construction site to the lake?

Ⓐ condensation

Ⓑ evaporation

Ⓒ precipitation

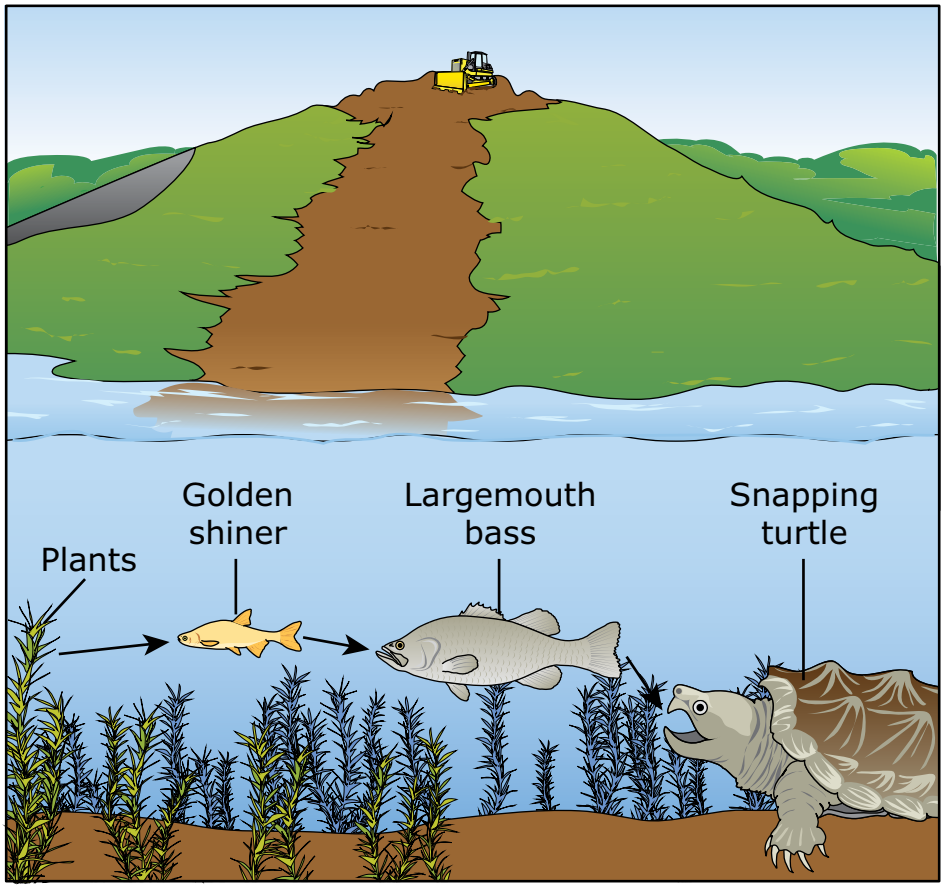
Ⓓ runoff

Go On ➡

This question has two parts. Use the following information to answer the questions.

2 The diagram shows a food chain in the lake.

Lake Food Chain



Part A

Which statement describes how heavy rain would **most likely** affect the plants in the lake if there were no barriers at the construction site?

Ⓐ The plants would get energy from the mud that enters the water.

Ⓑ The plants would use the mud that enters the water to grow taller.

Ⓒ The mud that enters the water would block sunlight from reaching the plants.

Ⓓ The mud that enters the water would help hold the plants in place at the bottom of the lake.

Part B

Based on your answer to Part A and the food chain diagram, what would happen to the amount of matter available to the snapping turtles?

Ⓐ The amount of matter would decrease.

Ⓑ The amount of matter would increase.

Which of the following **best** explains the change in the amount of matter available to the turtles?

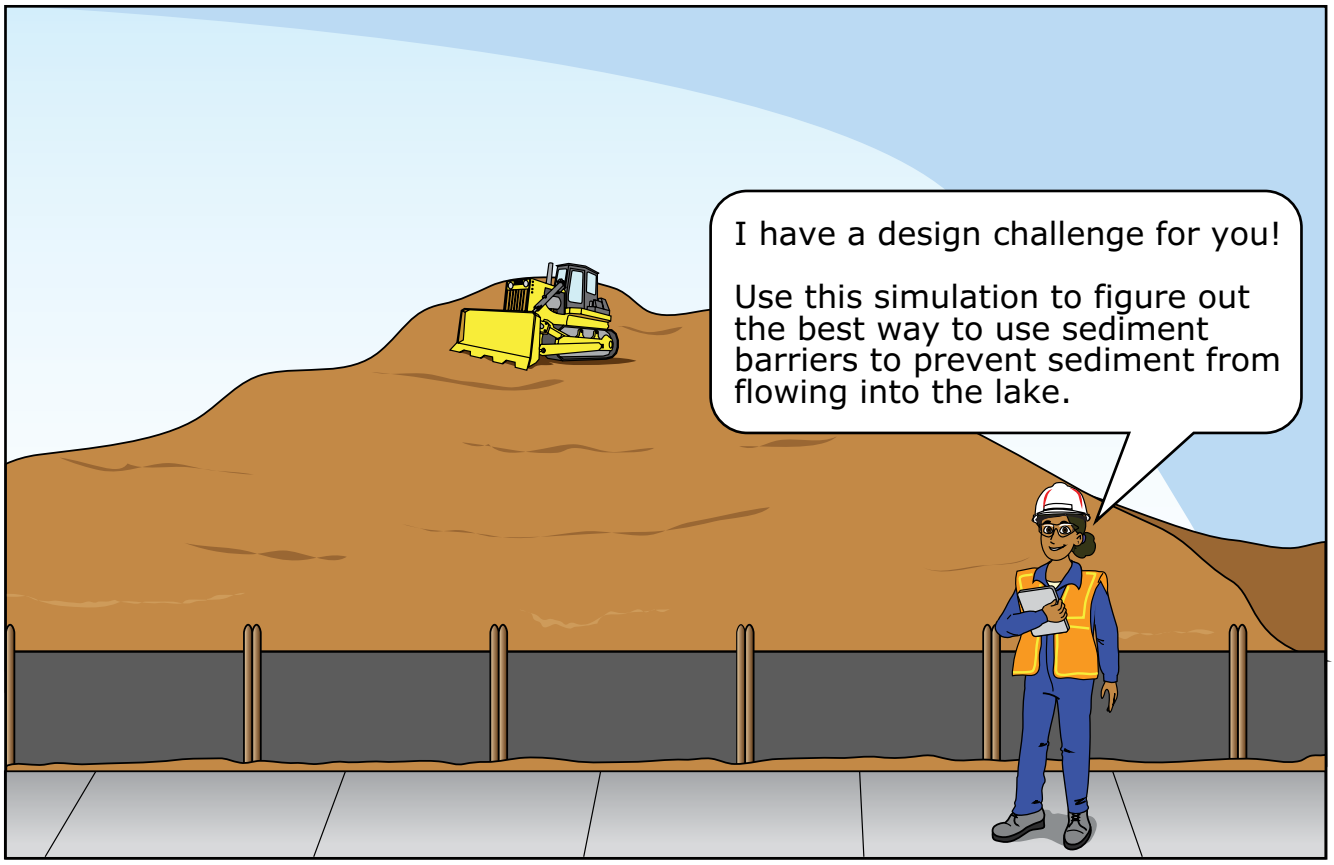
Ⓐ The plants would make less plant matter.

Ⓑ The plants would increase matter for golden shiners.

Ⓒ The plants would be eaten by fewer largemouth bass.

Go On ➡

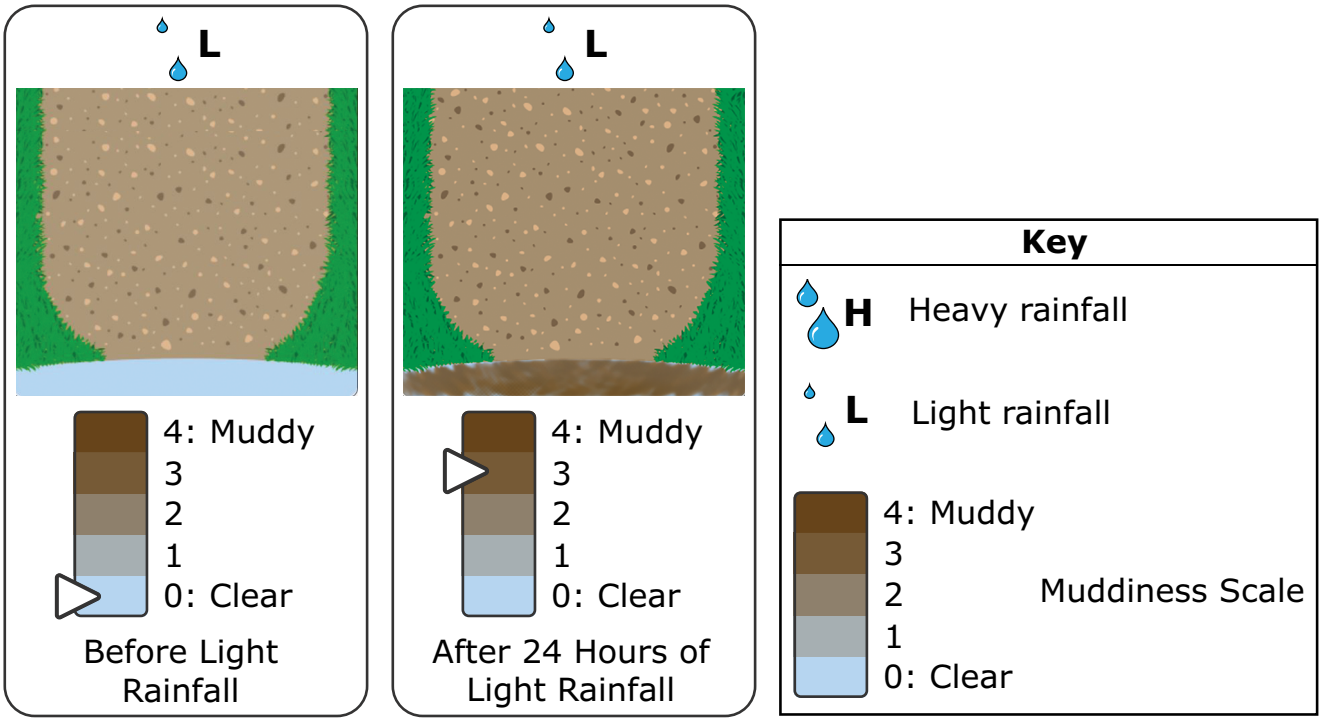
Story Scene 5



Go On ➡

3 The simulation models how rain flows from the construction site, down the hill, and into the lake after 24 hours. Use the Construction Site with No Barriers diagram to observe how the muddiness of the lake water changes when there are no barriers present after 24 hours of a light rainfall.

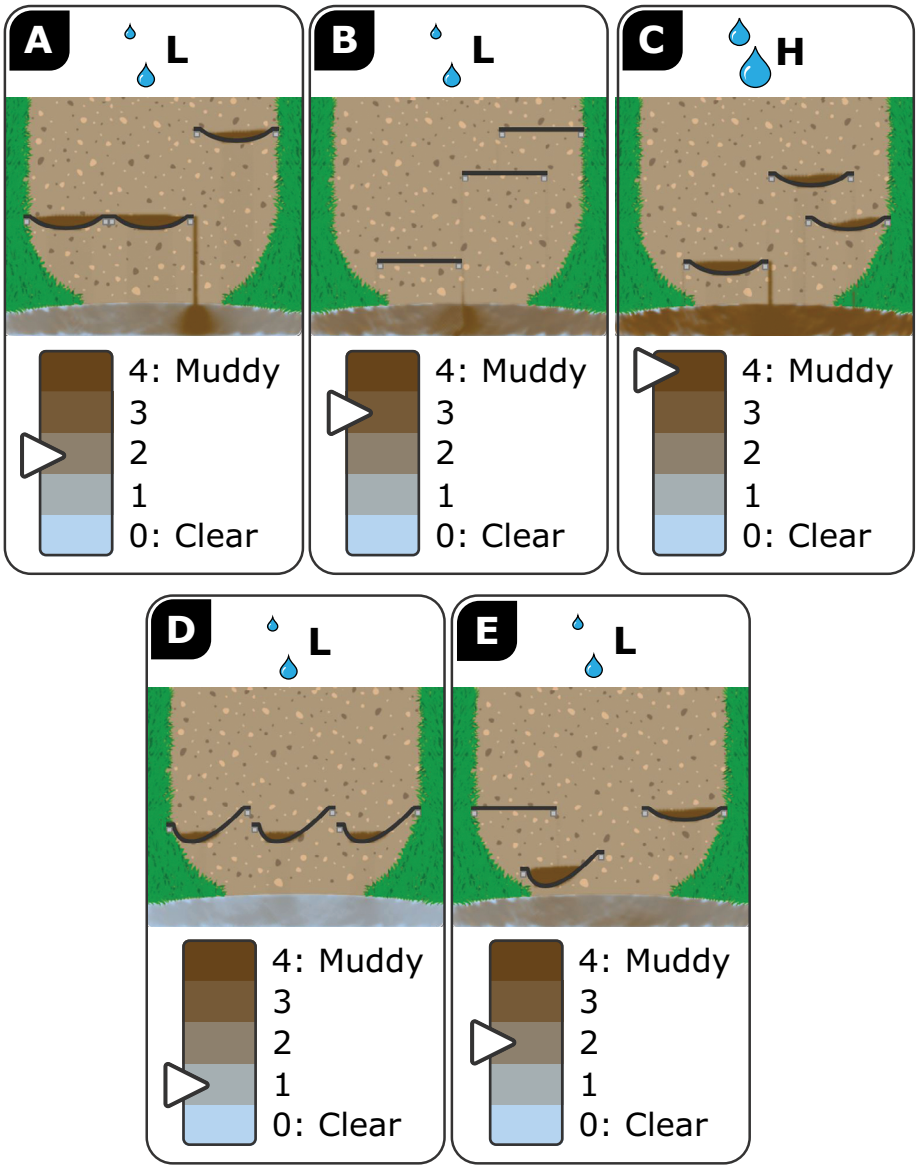
Construction Site with No Barriers



There are three barrier types available to be placed in different arrangements. Students can change the amount of rainfall on the construction site. The students need to compare how well each barrier type works to prevent sediment from entering the lake during a light rainfall. Use the Construction Site with Barriers diagram to answer the questions.

Go On ➡

Construction Site with Barriers



Key					
U Barrier	H	Heavy rainfall	4: Muddy		
J Barrier			3		
I Barrier	L	Light rainfall	2	Muddiness Scale	
			1		
			0: Clear		

Go On ➡

Select the **three** models that will **best** help the students compare the three barrier types.

Ⓐ Models A, B, and C

Ⓑ Models A, B, and D

Ⓒ Models A, C, and D

Ⓓ Models B, C, and D

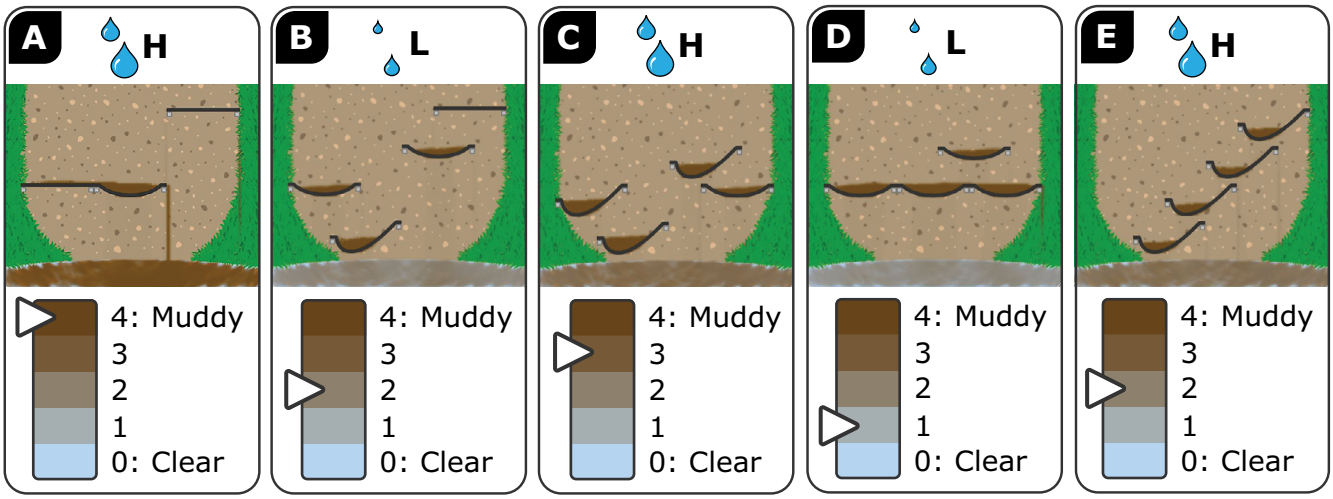
Ⓔ Models B, D, and E

Go On ➡

This question has two parts. Use the following information to answer the questions.

4 The students need to identify a design that will best reduce the amount of sediment that reaches the lake during the worst weather conditions. The diagram shows five models from the simulation that students can use to determine the best design.

Barrier Designs During Light and Heavy Rainfall



Key

U Barrier

J Barrier

I Barrier

H Heavy rainfall

L Light rainfall

4: Muddy
3
2
1
0: Clear

Muddiness Scale

Part A

Which factor should be the same in all the models that the students use to determine which barrier design is best at reducing the amount of sediment reaching the lake during the worst weather conditions?

Ⓐ amount of rainfall

Ⓑ barrier type

Ⓒ muddiness level

Which factor should the students compare to determine which barrier design is best at reducing the amount of sediment reaching the lake during the worst weather conditions?

Ⓐ amount of rainfall

Ⓑ barrier type

Ⓒ muddiness level

Part B

Which model represents the **best** design to reduce sediment in the lake during the worst weather conditions?

Ⓐ Model A

Ⓑ Model B

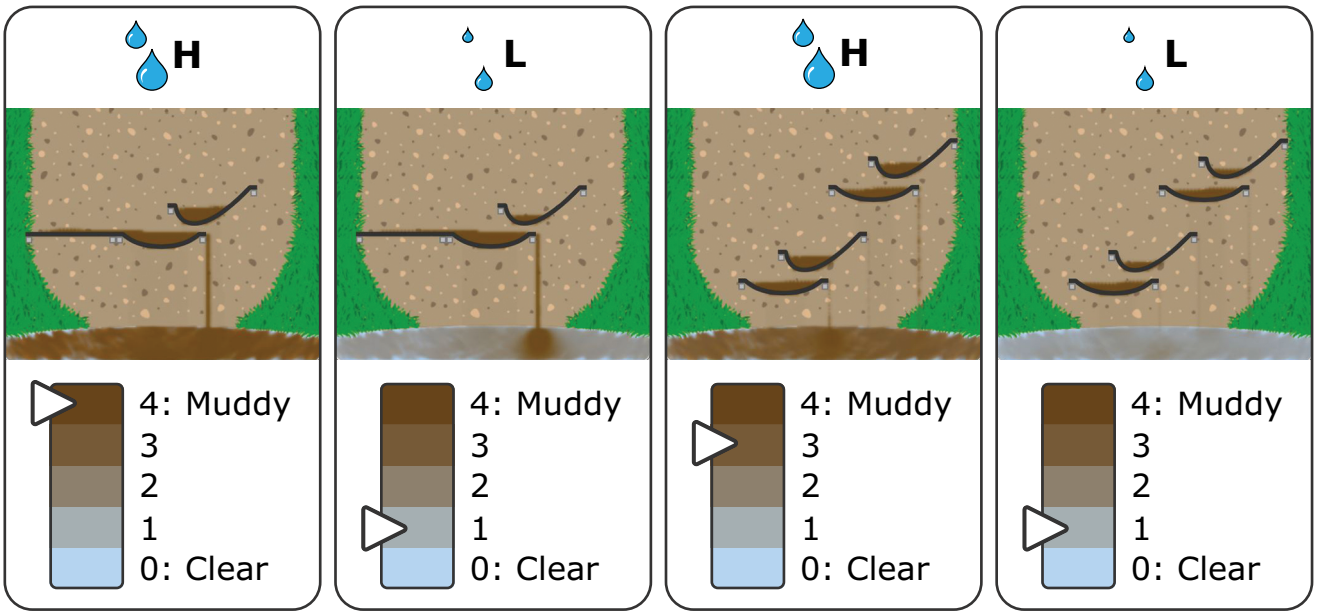
Ⓒ Model C

Ⓓ Model D

Ⓔ Model E

5 The students use the simulation to compare the amount of erosion that occurs when they change the rainfall settings. They create the following four models.

Barrier Designs for Comparing Erosion



Key

U Barrier
J Barrier
I Barrier

H Heavy rainfall
L Light rainfall

4: Muddy
3
2
1
0: Clear
Muddiness Scale

How does the amount of erosion during a heavy rainfall compare to the erosion during a light rainfall?

Ⓐ More erosion occurs in a heavy rainfall.

Ⓑ Less erosion occurs in a heavy rainfall.

Ⓒ The erosion is the same in light rainfall and heavy rainfall.

Which is the **best** evidence for this?

Ⓐ The lake water is muddier in heavy rainfall.

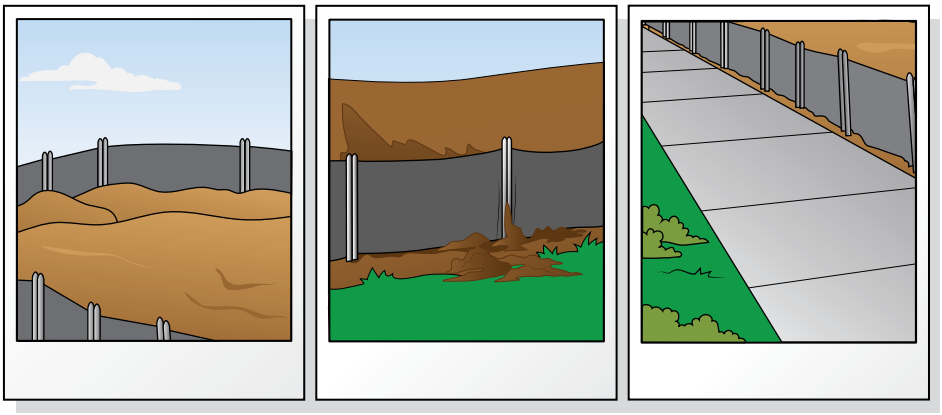
Ⓑ The lake water is muddier in light rainfall.

Ⓒ The lake water has the same muddiness in light rainfall and heavy rainfall.

Go On ➡

6 The site engineer says it rained at the site and shows the students some pictures of the site after the rain. The students want to determine whether the sediment barriers kept the sediment in the construction area when it rained.

Construction Site after Rain



The students make the following observations.

1. Sediment is piled up behind the barriers in the construction site.
2. Sediment appears on the grass near the construction site.
3. Sediment does not appear on the sidewalk where the students are walking.

Which of the observations provide evidence that the barriers are working at keeping sediment in the construction area?

Ⓐ observations 1 and 2 only

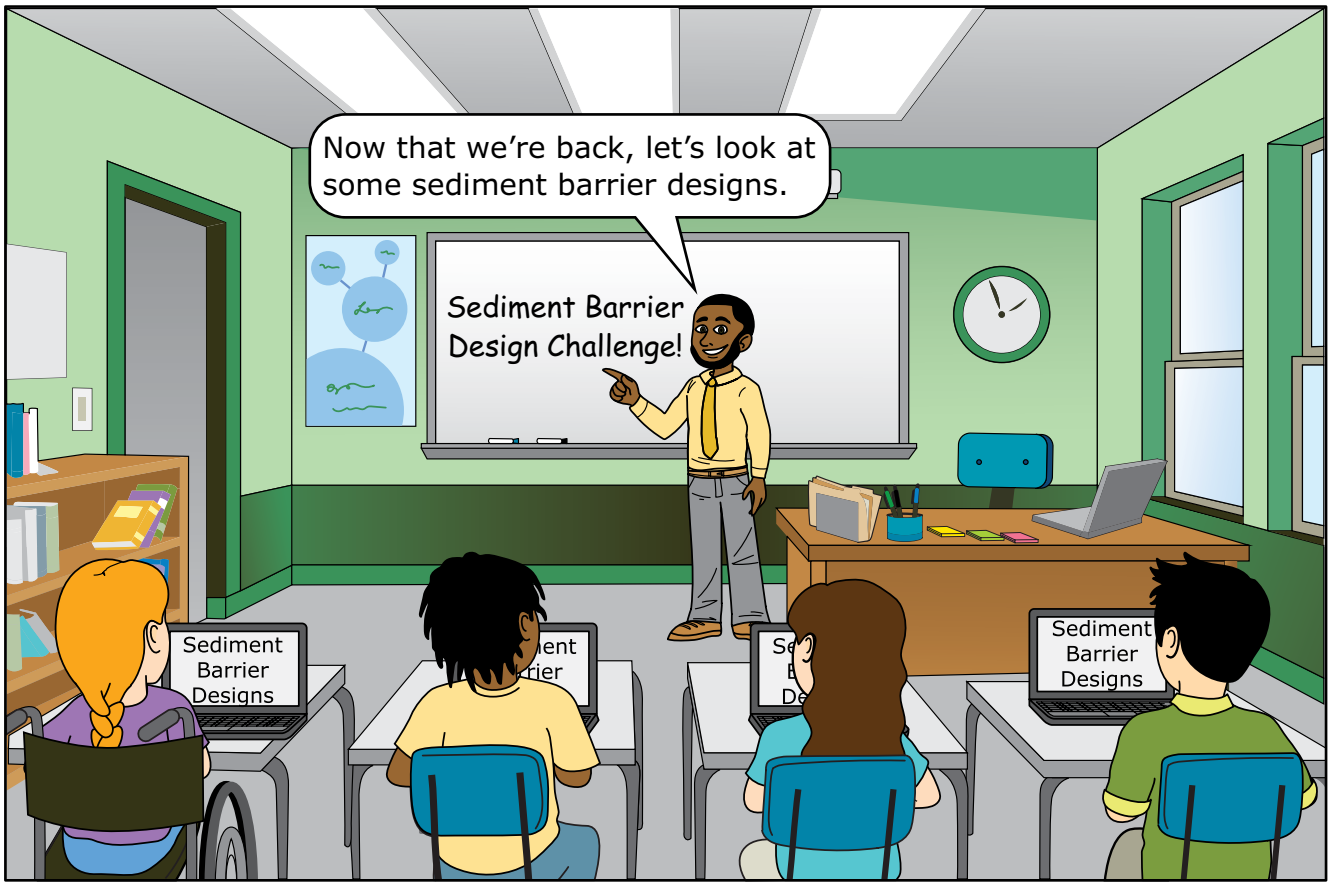
Ⓑ observations 1 and 3 only

Ⓒ observations 2 and 3 only

Ⓓ observations 1, 2, and 3

Go On ➡

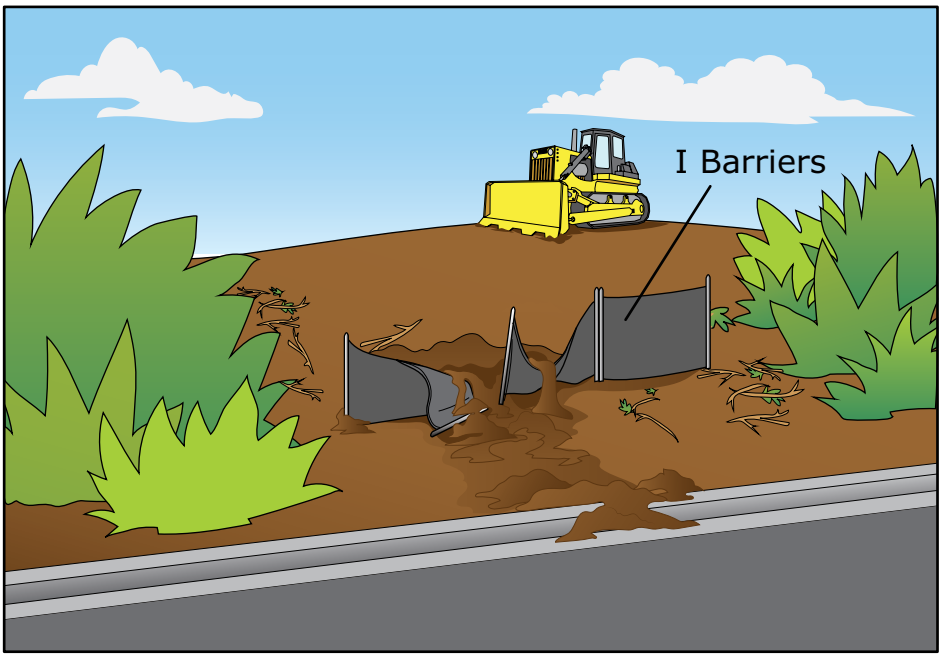
Story Scene 6



Go On ➡

7 The teacher shows the students a picture of how sediment barriers failed at a construction site where heavy rain occurred over several days.

Sediment Barrier Failure after Heavy Rain



Based on what you have learned from the models the students created in the simulation, which is the **best** improvement that can be made to the sediment barrier design at this site?

Ⓐ Remove one of the I barriers from the site.

Ⓑ Add a row of J barriers near the top of the hill.

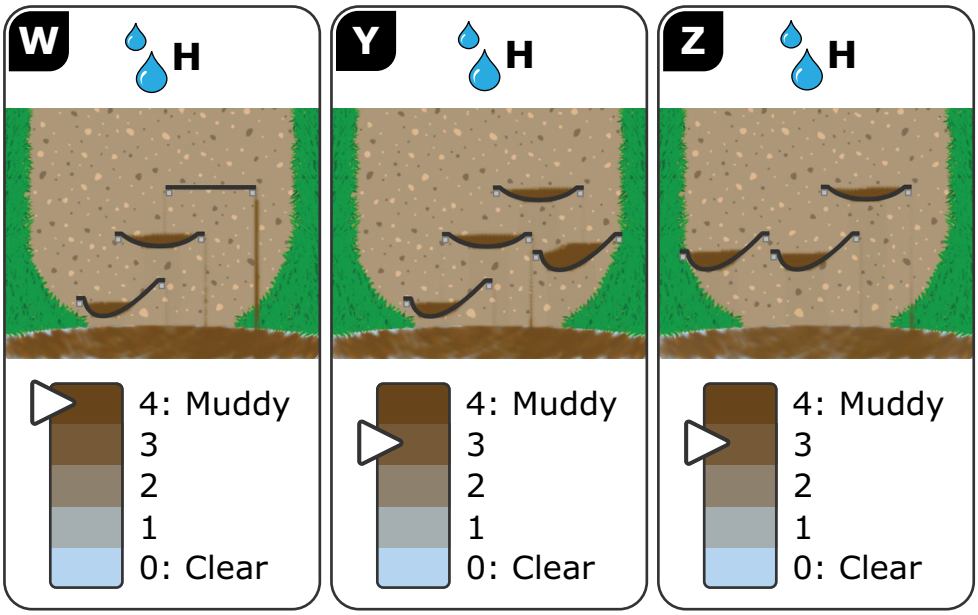
Ⓒ Replace the metal posts on the I barriers with wooden posts.

Ⓓ Create openings along the bottom of the I barriers to allow water to flow through.

This question has three parts. Use the following information to answer the questions. Write your response on the next page. Be sure to label each part of your response.

8 The teacher presents three sediment barrier designs (W, Y, and Z) to the students. The students need to evaluate the designs and determine which design **best** meets the criteria in a heavy rainfall.

Sediment Barrier Designs



Key

H Heavy rainfall

L Light rainfall

4: Muddy
3
2
1
0: Clear
Muddiness Scale

Criteria for Evaluating Designs

Criterion 1: Prevents the greatest amount of sediment from entering the lake

Criterion 2: Uses the smallest number of barriers

A. Describe one reason a construction company would include "Prevents the greatest amount of sediment from entering the lake" as one of the criteria for evaluating sediment barriers.

B. Which design (W, Y, or Z) best meets the two criteria for evaluating designs? Provide evidence to support your answer.

C. Describe one change the students could make to improve the barrier design from Part B. Explain how the design change reduces the amount of sediment that enters the lake.

Go On

8

This is the end of the session. You may check your work for this session only.

STOP!

Grade 5 Innovative Science Assessment
Spring 2022 Released Sample Task Items

Task Set Item Number	Reporting Category	Standard		Science and Engineering Practice Category	Item Type	Item Description	Correct Answer and Number of Points
1	*Earth & Space Sciences*	5.ESS.2.1		C. Evidence, Reasoning, and Modeling	SR	Students will describe the water cycle process that moves sediment from a construction site, down a hill, and into a lake.	D (1 point)
2	*Life Science*	Part A	3.LS.4.4	C. Evidence, Reasoning, and Modeling	SR	Students will describe how heavy rain would affect a food chain in a lake if no barriers were used at the construction site.	C (1 point)
		Part B	5.LS.2.1	C. Evidence, Reasoning, and Modeling			A, A (1 point)
3	*Technology & Engineering*	4.ETS.1.3		A. Investigations and Questioning	SR	Students will evaluate how well different types and arrangements of barriers reduce the amount of sediment that flows into a lake.	B (1 point)
4	*Earth & Space Sciences*	Part A	4.ETS.1.3	A. Investigations and Questioning	SR	Students will evaluate how well different types and arrangements of barriers reduce the amount of sediment that flows into a lake during the worst weather conditions.	A, C (1 point)
		Part B					E (1 point)
5	*Earth & Space Sciences*	4.ESS.2.1		C. Evidence, Reasoning, and Modeling	SR	Students will compare the amount of erosion that occurs after a heavy rainfall to erosion after a light rainfall.	A, A (1 point)
6	*Earth & Space Sciences*	5.ESS.3.1		C. Evidence, Reasoning, and Modeling	SR	Students will identify if observations provide evidence that barriers work to keep sediment in the construction site.	B (1 point)
7	*Earth & Space Sciences*	4.ETS.1.3		C. Evidence, Reasoning, and Modeling	SR	Students will identify how a barrier design can be improved at a construction site.	B (1 point)
8	*Earth & Space Sciences*	Part A	3.ESS.3.1	C. Evidence, Reasoning, and Modeling	CR	Students will evaluate three designs to see how well they use the fewest number of barriers to prevent sediment from entering the lake.	See scoring guide. (Maximum of 4 points).
		Part B					
		Part C					

Scoring Guide	
Score	**Description**
4	The response demonstrates a thorough understanding of evaluating the merits of a sediment barrier design in preventing damage to a lake caused by sediment due to weather. The response clearly describes the reason for a criterion of using fewer barriers. The response correctly identifies the design that best meets the design criteria and uses evidence to explain the reasoning. The response also clearly describes an improvement to the design.
3	The response demonstrates a general understanding of evaluating the merits of a sediment barrier design in preventing damage to a lake caused by sediment due to weather. The response clearly describes the reason for a criterion of using fewer barriers. The response correctly identifies the design that best meets the design criteria and uses evidence to explain the reasoning. The response also clearly describes an improvement to the design.
2	The response demonstrates a limited understanding of evaluating the merits of a sediment barrier design in preventing damage to a lake caused by sediment due to weather.
1	The response demonstrates a minimal understanding of evaluating the merits of a sediment barrier design in preventing damage to a lake caused by sediment due to weather.
0	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.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