

Erosion Barrier

Task: Students will work in small groups to design a barrier that protects a model of a cliff from water erosion.

Getting Started

Build Content Knowledge

If you wish to provide students with background knowledge about weathering and erosion, reproduce and distribute pages 10 and 11. Preview the Visual Literacy page with students. Then read the Science Concept page to students as they follow along, or, if they are able, have them read it independently. Next, discuss the science concept and the visual literacy graphics on those pages.

Introduce the Challenge

Reproduce and distribute the STEM Challenge on page 12. Then have students read the challenge and the testable goal. Discuss the materials with the students and decide on a plan for gathering the materials.

Next, help students research weathering and erosion barriers. Ask them to think about how science, technology, engineering, and math can be used to create a barrier to slow down the erosion or weathering process. Finally, have students independently brainstorm and draw their ideas on page 12.

Completing the Challenge

Assign students to small groups.

Optional: Model the Design Process

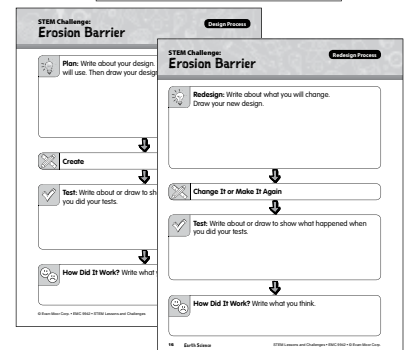
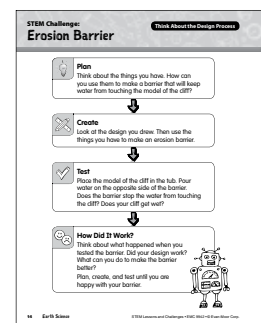
You may wish to reproduce and distribute page 14 to students. This resource is intended to help students think about how to approach each step in the design process.

Design Process Worksheets

Reproduce and distribute the STEM design process worksheets to students. Provide support when needed to help students describe and evaluate their plans.

After the Challenge

Have students share their design processes, compare their erosion barriers, and brainstorm ideas for improvements.



Shaping the Land

The land on Earth changes over time. It takes many years for these changes to happen. Wind and water are natural forces that change the shape of land. Wind and water change the Earth's land through weathering and erosion.

Weathering happens when water or wind break down rock or wear it away. The wind and water act like a hammer. Weathering can happen when a wave crashes onto the side of a cliff and hits parts of rocks on the cliff. It can happen when water slowly weathers a rock until it is smooth, like the rocks you find by a river. It can even happen when wind blows sand or water against rock.

Erosion happens when rock and soil are moved or carried away by water and wind. Erosion can sometimes happen fast. For example, you make a sand castle on the beach, and then a big wave comes and washes it away. This is one kind of erosion. But erosion mostly takes years to shape land. For example, the Colorado River carried away rock and soil and carved a path in the land. Over many years, water and wind erosion made that path into a deep canyon. Today it is called the Grand Canyon.

Most changes are too slow to see. But the land never stops changing.

Land Shaped by Weathering and Erosion



Erosion from wind and the Colorado River carved the Grand Canyon.



Weathering and erosion can become a problem for humans as land and roads are broken down.

Erosion Barriers

Barrier: A barrier is a fence or a wall that helps keep something out.



A wall of tires is built on the beach. They help hold the sand in place.



Bags of sand are piled up by the edge of a river. This stops the river water from reaching the riverbank.

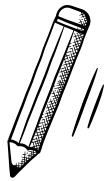
Erosion Barrier

Challenge: Build a barrier that protects a model of a cliff from water erosion.

Testable goal: The cliff model does not get wet.

Research: Look at pictures of different barriers near beaches and rivers. Notice what they are made out of.

Brainstorm: Think about all the different ways you can make a barrier. Think about the things you want to use to build the barrier. Then draw a picture of what you want your erosion barrier to look like.

A large, empty rectangular box with rounded corners, defined by a dashed border. This area is intended for the student to draw their design for an erosion barrier.

STEM Challenge: Erosion Barrier

Suggested Materials List

Items for each group

- glue
- scissors
- masking tape
- tub

cliff model: Provide each group with a sand castle made from water and sand or a structure made from three pieces of graham crackers glued with icing.

Items for the whole class

- clay
- cotton balls
- felt
- aluminum
- wax paper
- construction paper

- straws
- craft sticks
- string
- _____
- _____
- _____

Items for testing

- tub or bucket
- water
- cliff model



Plan

Think about the things you have. How can you use them to make a barrier that will keep water from touching the model of the cliff?



Create

Look at the design you drew. Then use the things you have to make an erosion barrier.



Test

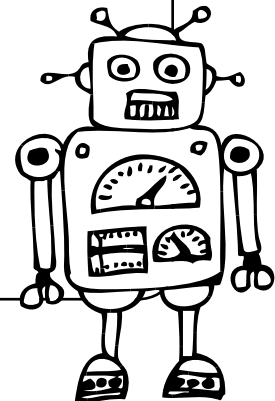
Place the model of the cliff in the tub. Pour water on the opposite side of the barrier. Does the barrier stop the water from touching the cliff? Does your cliff get wet?



How Did It Work?

Think about what happened when you tested the barrier. Did your design work? What can you do to make the barrier better?

Plan, create, and test until you are happy with your barrier.





Plan: Write about your design. Tell what things you will use. Then draw your design.



Create



Test: Write about or draw to show what happened when you did your tests.



How Did It Work? Write what you think.



Redesign: Write about what you will change.
Draw your new design.



Change It or Make It Again



Test: Write about or draw to show what happened when you did your tests.



How Did It Work? Write what you think.