

Dams

Task: Students will work in small groups to design and set up a dam that can hold back water for a period of time.

Getting Started

Build Content Knowledge

If you wish to provide students with background knowledge about constructing dams, reproduce and distribute pages 10 and 11. Then have students read and 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, have students research dams. Ask them to think about how science, technology, engineering, and math are part of the dam-building 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

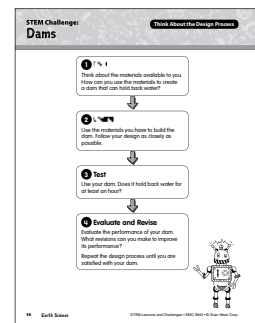
You may wish to reproduce and distribute page 14 to students. This resource is intended to help students think about how to approach each step in the design process.

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 dams, and brainstorm ideas for improvements.



Constructing Dams

Dams are structures built to hold back water. Dams create a body of water called a **reservoir** behind them. The first dams were built by ancient Egyptians about 5,000 years ago. Egypt is in the world's largest desert, the Sahara. Egyptians built dams on the Nile River to help provide year-round water for their people. They also used the water to **irrigate**, or bring water to, crops and farms. Today there are dams all over the world.

The main reason to build a dam is to store water to be used later. Dams are built in areas that have a lot of people and not enough water during the dry season. The water is also used for farms. Dams can also be built to capture flood water and prevent it from damaging homes and roads.

Dams can be made with natural materials, such as dirt and rocks. They can also be constructed with manufactured materials, such as concrete. The material chosen depends on the size and purpose of the dam and where it is located. The dam must be high enough to store enough water for a community's needs. It must also be strong enough to hold back all that water. Modern dams have a pipe or gate that allows water to be released as it is needed by people in the area.

A simple and common type of dam is an **embankment** dam. This type is made from soil, dirt, sand, pebbles, and rock. Beavers make small embankment dams using wood and other natural materials.

Water flows very easily. It can flow through a riverbed or through a tiny crack in a pipe or a water balloon. How well a dam works depends on how well it is put together.

STEM Challenge: Dams

Visual Literacy



Beavers chew tree trunks to cut them down.



Two beavers work together to build a dam.



A beaver dam



A manufactured embankment dam

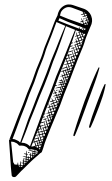
Dams

Challenge: Design a dam that holds back water.

Testable goal: The dam holds back water for at least an hour.

Research: Look at pictures of dams. Notice how the dams are constructed. Think about how science, technology, engineering, and math are used to create the dam.

Brainstorm: Draw one or more design ideas for a dam.
There are many different ways to complete this challenge. Be creative!



A large, empty rectangular area with a dashed border, intended for drawing design ideas for a dam.

STEM Challenge: Dams

Suggested Materials List

Items for each group

- foil baking tray or plastic bin, with sides at least 3" high
- spray bottle filled with water

Items for the whole class

- | | |
|---------------------------------------|--------------------------------|
| <input type="checkbox"/> dirt | <input type="checkbox"/> _____ |
| <input type="checkbox"/> sand | <input type="checkbox"/> _____ |
| <input type="checkbox"/> rock | <input type="checkbox"/> _____ |
| <input type="checkbox"/> gravel | <input type="checkbox"/> _____ |
| <input type="checkbox"/> tape | <input type="checkbox"/> _____ |
| <input type="checkbox"/> wood blocks | <input type="checkbox"/> _____ |
| <input type="checkbox"/> craft sticks | <input type="checkbox"/> _____ |
| <input type="checkbox"/> dominoes | <input type="checkbox"/> _____ |
| <input type="checkbox"/> clay | <input type="checkbox"/> _____ |

Items for testing

- watering can, pitcher, or gallon container of water

1 Plan

Think about the materials available to you. How can you use the materials to create a dam that can hold back water?



2 Create

Use the materials you have to build the dam. Follow your design as closely as possible.



3 Test

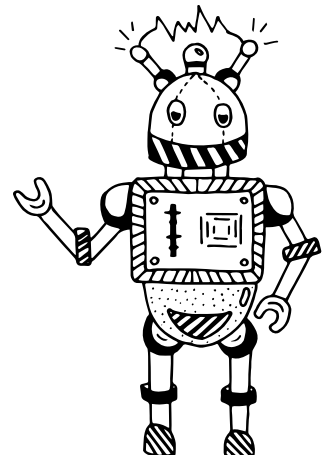
Use your dam. Does it hold back water for at least an hour?



4 Evaluate and Revise

Evaluate the performance of your dam. What revisions can you make to improve its performance?

Repeat the design process until you are satisfied with your dam.



1 Plan: Describe and draw your design. List your materials.



2 Create



3 Test: Describe and draw your results.



4 Evaluate

1 Redesign: Describe what you will change. Draw your new design.



2 Revise or re-create



3 Test: Describe and draw your results.



4 Evaluate