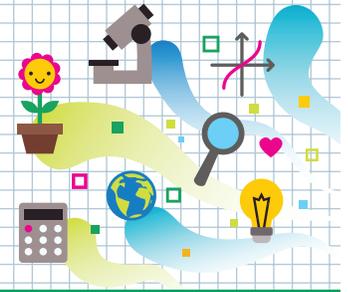




HEADS IN, HEARTS IN

Building Like a Beaver

Instructions for Set-Up



Supplies

- “Guide for Families” handout
- Clear plastic standup display (optional)
- “Engineering Process” handout (1 per participant or family)
- Paper
- Pencils
- large disposable baking foil pans (suggested size: 17 inches long by 12 inches wide by 3 inches deep)
- Various materials for building a dam, such as sand, potting soil, several small rocks, several pebbles or aquarium gravel, mud, modeling clay, sticks, or leaves
- Craft sticks
- Water
- Display table

Activity Preparation

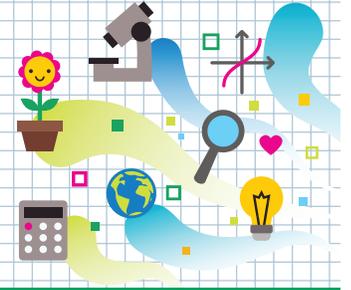
- ▶ Purchase or locate items on supply list.
- ▶ Print one copy of the “Guide for Families” handout. Laminate or place in a clear plastic standup display to allow participants to see it more readily.
- ▶ Print one “Engineering Process” handout per participant or family. Optionally, print and laminate a few to leave on the table.
- ▶ Set up the display table and arrange needed supplies.



HEADS IN, HEARTS IN

Building Like a Beaver

Guide for Families



Learning Objectives

What you need to know:

Engineering is a process used to solve problems by designing, building and testing things. An engineer is a person who uses math and science to create new things, solve problems or make things better.

Beavers build **dams** using materials such as rocks, branches, grass and mud that are natural to their habitat (where they live). Have you ever wondered why beavers build dams? They build them so that they can stop water from flowing freely to create a pool or pond of water where they can live. This water protects them from **predators** (animals that will kill and eat them). It also allows the beaver to get more food.

Humans build **dams** too using materials such as earth, rock and concrete. Our dams are built to stop water from flowing freely too. With the water that is pooled or ponded we are able to create energy (**hydroelectric power**), use the water to grow crops (**irrigation**), fish, boat, swim and even prevent flooding.

What you will do and learn:

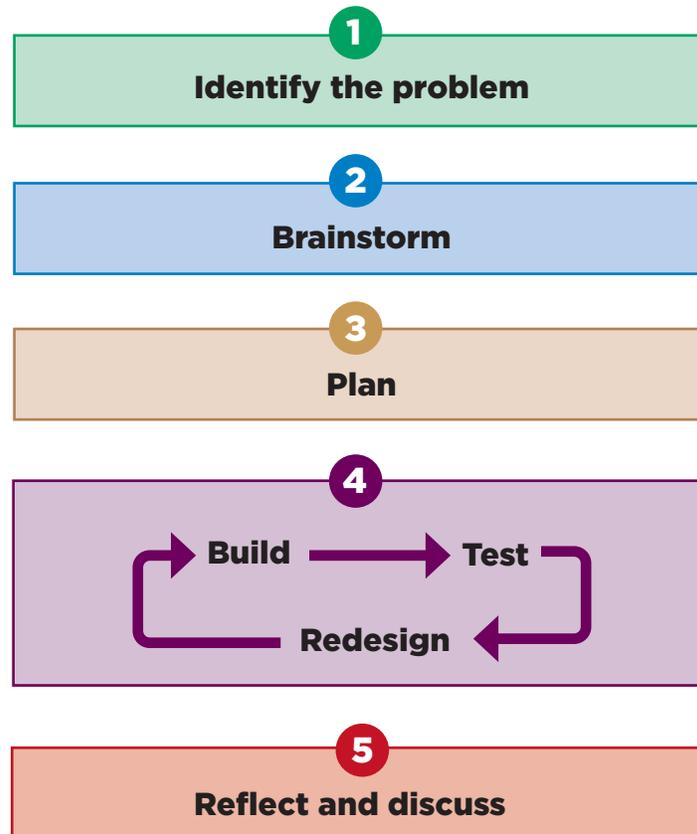
In this activity, you will practice using the engineering process to build a model of a dam. The goal of this activity is to build a dam that prevents water from flowing freely and creates a pool or pond.

Instructions

1. Using the “Engineering Process” handout, start to work through building your dam.
2. Identify the problem: How can you build a dam that prevents water from flowing freely through a pan?
3. Brainstorm: What materials allow water through and what do not? What does it take to make a watertight seal? What do you need to know to build a dam that will prevent water from flowing freely? How can you use your design to create a pool or pond of water? How can you build your dam? What might happen if you pick a different solution?
4. Plan: Make a drawing or sketch of your design. Gather your materials.
5. Build: Build your dam inside the disposable baking pan.
6. Test: Add water to one side of the baking pan. Angle the pan so water might flow to one side. Does the dam hold the water? Does water leak through the dam? Does the dam collapse?
7. Redesign: Make some changes to your design to improve your dam. Try some of the ideas you came up with during your brainstorming.
8. Repeat steps 6 and 7 as many times as needed.
9. Reflect and Discuss: How did you find the solution to this problem? What materials could you use instead of the materials provided today? How would it have been different with different materials?

Engineering Process Handout

Engineering Process



- 1. Identify the problem:** Engineering is about identifying problems and designing solutions. As you go through these activities, think of the goal you are trying to achieve.
- 2. Brainstorm:** What are the many different ways I could solve this problem? What are the potential advantages and disadvantages of different ideas? What things do I need to think about to make that solution successful?
- 3. Plan:** What are the different ways I can solve this problem or make the build? What steps can I take to try out my solution? What do I need to do to prepare my build? What might happen if I choose that solution? During your design phase, you might discover new problems that you need to brainstorm.
- 4. Build:** Construct and carry out the design. As you build your design, you might come up with more problems that you need to brainstorm and design new ideas for.
Test: How does my solution work? Does it solve the problem? Is it effective? Are there additional problems?
Redesign: How can I improve my design? What can I try to make my solution work better?
- 5. Reflect and Discuss:** How did the solution turn out? What could I do differently next time? How would my design be different if I had different materials?