

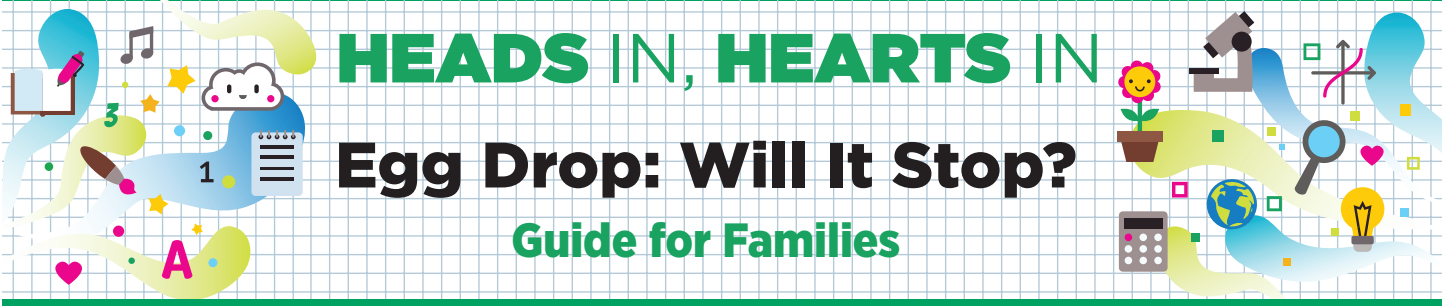


Supplies

- “Guide for Families” handout
- Clear plastic standup display (optional)
- “Engineering Process” handout (1 per participant or family)
- Paper
- Pencils
- Heavy-duty trash bag
- Eggs (uncooked, still in shell)
- Various household materials, such as coffee filters, newspaper, yarn or string, plastic cups, tissue paper, chenille stems, straws, plastic baggies, toothpicks and others
- Tape
- Scissors
- 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.
- ▶ Place the heavy-duty trash bag on the floor. You may want to use tape to secure it to the floor.
- ▶ Set up the display table and arrange needed supplies.



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.

A **device** is an object or machine that is made for a specific purpose.

What you will do and learn:

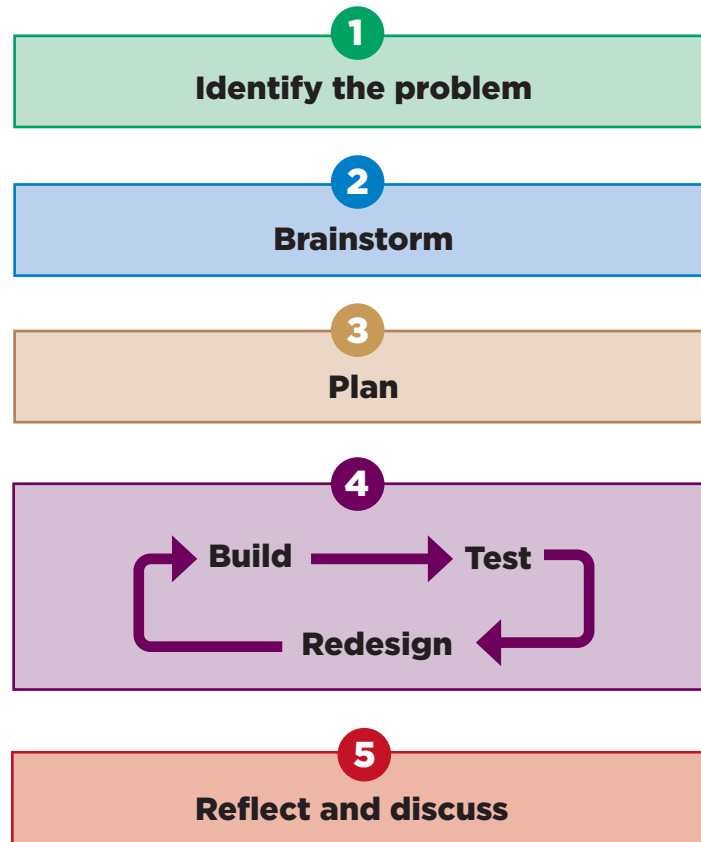
In this activity, you will practice using the engineering process to build a **device** from household items that will protect an egg from breaking when it is dropped. The goal of this activity is to develop a **device** that protects an egg so that when it is dropped, it does not break, but instead, it safely lands on the ground.

Instructions

1. Using the “Engineering Process” handout, start to work through building your device.
2. Identify the problem: How can you build a device to support an egg while it is dropped to keep it from breaking?
3. Brainstorm: Think about other items that keep things safe. How are they constructed? How can you build your device? What materials should you use? How can you keep the egg protected?
4. Plan: Make a drawing or sketch of your design. Gather your materials.
5. Build: Build your device. When you are done building, include your egg into the structure.
6. Test:
 - Hold your egg-protecting device in one hand. Extend your arm out directly in front of you. Open your hand and allow the egg-protecting structure to fall to the ground.
 - Examine your egg-protecting device and egg. Is the egg broken or cracked? Did the structure keep the egg protected?
7. Redesign: Make some changes to the design of your structure to improve its ability to protect the egg. Try some of the other ideas you came up with during your brainstorming.
8. Repeat steps 6 and 7 as many times as needed.
9. Reflect and Discuss: What materials could you use instead of the materials provided today? How would it have been different with different materials? Were you able to achieve the goal?

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?