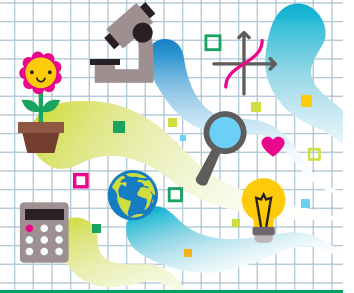




HEADS IN, HEARTS IN

Index Apex

Instructions for Set-Up



Supplies

- “Guide for Families” handout
- Clear plastic standup display (optional)
- “Engineering Process” handout (1 per participant or family)
- Paper
- Pencils
- 3-inch by 5-inch index cards (25–30 per participant or family)
- Several yard sticks or measuring tape
- Ruler(s)
- Display table

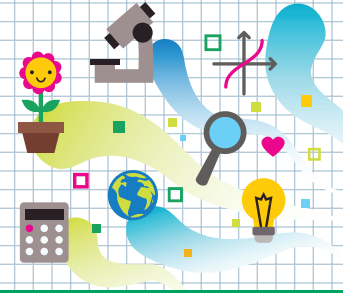
Activity Preparation

- ▶ 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

Index Apex 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.

Some engineers work to build structures or buildings. A **structure** is the result of building or constructing something by arranging materials or parts. How a structure or building is designed can affect how safe and durable it is. An **apex** is the highest point of something. In this activity, the apex is the tallest point on a tower.

What you will do and learn:

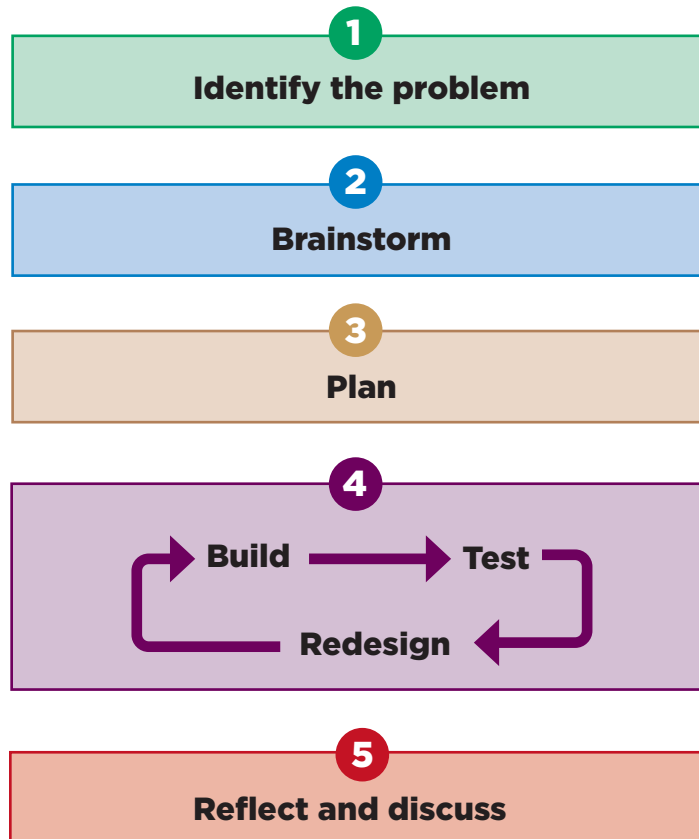
In this activity, you will practice using the engineering process to build a tower structure. The goal of this activity is to build a tower with the highest apex using index cards.

Instructions

1. Using the “Engineering Process” handout, start to work through building your tower.
2. Identify the problem: How can you build the tallest tower possible out of index cards that will stay standing on its own?
3. Brainstorm: How can you build your tower? How many different ways can you stack the cards? Why might one design be better than another? Is one way sturdier? Do you think the angle that you lean the cards against each other will affect the stability of the design?
4. Plan: Make a drawing or sketch of your design. Gather your materials.
5. Build: Build your tower.
6. Test: Use the yardstick or sewing tape measure to measure the height of your tower.
7. Redesign: Make some changes to your design to improve your tower. 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? Did your changes lead you to build a taller tower? What materials could you use instead of the materials provided today? How would it have been different with other materials? How might you change your tower design if it had to support weight? How does the design of your tower compare to towers in the real world?

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?