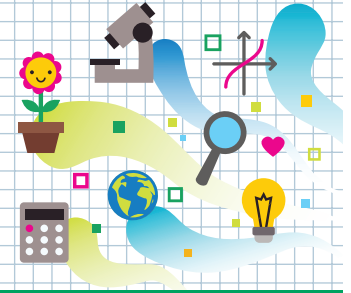




HEADS IN, HEARTS IN

Humming Harmonica

Instructions for Set-Up



Supplies

- “Guide for Families” handout
- Clear plastic standup display (optional)
- “Engineering Process” handout (1 per participant or family)
- Wide wooden craft sticks (4 per participant or family)
- Rubber bands (2 per participant or family)
- Toothpicks (3-4 per participant or family)
- Plastic straws (3-4 per participants or family)
- Paper (3-4 per participant or family)
- Scissors
- 3 medium-sized bowls to hold supplies (optional)
- Display table

Activity Preparation

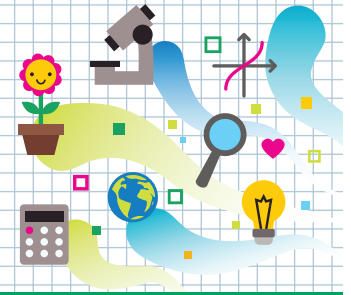
- ▶ Purchase or locate items on supply list.
- ▶ Print one copy of the “Guide for Families” handout. Laminate or place in a clear plastic standup display to allow participants to see it more readily.
- ▶ Print one “Engineering Process” handout per participant or family. Optionally, print and laminate a few to leave on the table.
- ▶ Using the scissors, cut the paper into approximately 1-inch by 5 inch-strips. Cut both the toothpicks and the plastic straws into 1-inch pieces.
- ▶ Set up the display table and arrange needed supplies.



HEADS IN, HEARTS IN

Humming Harmonica

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.

Engineers use their skills to design, build and tune musical instruments. The design of an instrument changes the sounds the instrument makes.

Sound is the noise that you make by creating vibrations (such as singing, humming, whistling or music). The sound can be described in many ways such as warm, ringing or shrill.

What you will do and learn:

In this activity, you will build two harmonicas and practice using the engineering process to create harmonicas that make different sounds.

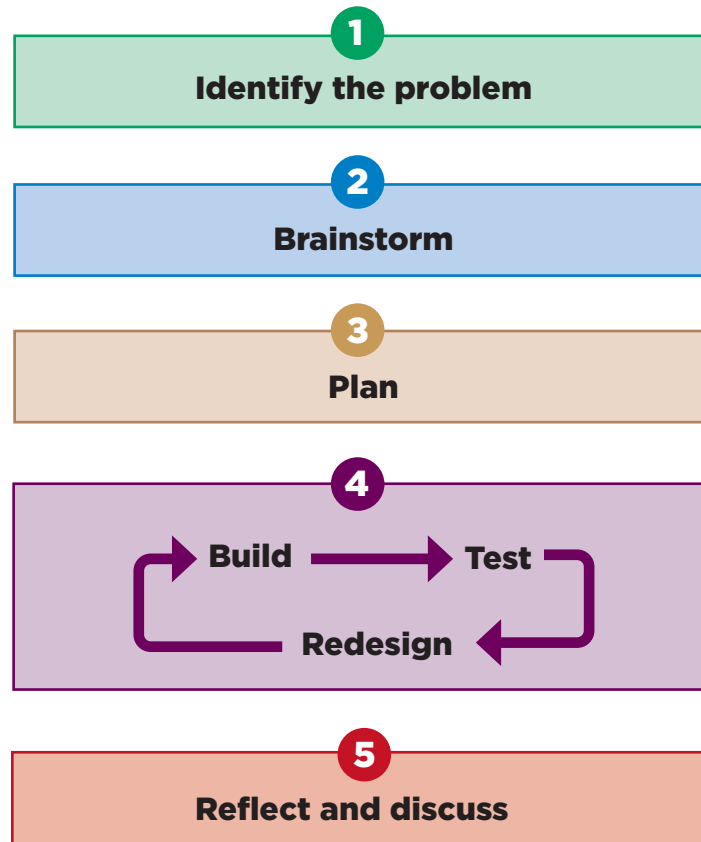
Instructions

- Build your first harmonica.
 - Sandwich a strip of paper in between two craft sticks.
 - Wrap a rubber band tightly around one end of the craft stick.
 - Slide a toothpick to the inside of the rubber band on one side.
 - While holding the toothpick in place, wrap the other end of the craft sticks with a rubber band until it's tight.
 - You should have two crafts sticks rubber banded together with a toothpick at each end holding the crafts sticks a little bit apart.
- Using the "Engineering Process" handout, start to work through building your second harmonica.
- Identify the problem: Can you make two harmonicas with each producing a different sound? Practice using your first harmonica.
- Brainstorm: How does a harmonica make sound? What features of a harmonica help it make sound or change the sounds it makes?
- Plan: Discuss how you will alter your design to make a second harmonica that makes a different sound. Gather your materials.
- Build: Build your second harmonica.
- Test: Hold your second harmonica up to your lips and blow. Is the sound it makes different from your first harmonica? Does it sound the same or different?
- Redesign: Modify your harmonicas so they make different sounds. Use the initial directions to help determine how to modify your harmonicas. Try some of the ideas you came up with during your brainstorming.
- Repeat steps 7 and 8 as many times as needed.
- Reflect and Discuss: Were the sounds made by your first harmonica different from the second harmonica? What features of musical instruments help to make the sounds they produce? What materials could you use to create different sounds rather than the materials provided today? Could you make one



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?