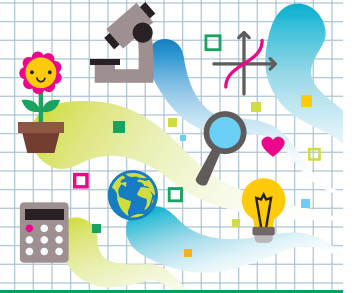




HEADS IN, HEARTS IN

Marble Maze

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 paper plates
- Small marble
- Straws
- Chenille stems
- Marker
- Tape
- Display table

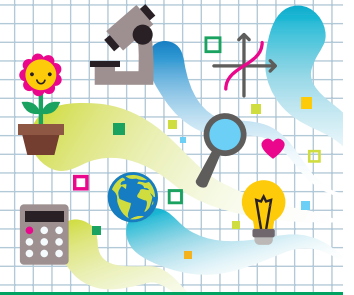
Activity Preparation

- ▶ 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

Marble Maze 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 design many things for entertainment, such as toys. When designing a toy, engineers consider how to create a toy challenging enough to be fun but not so difficult that the person playing with the toy becomes frustrated and gives up.

What you will do and learn:

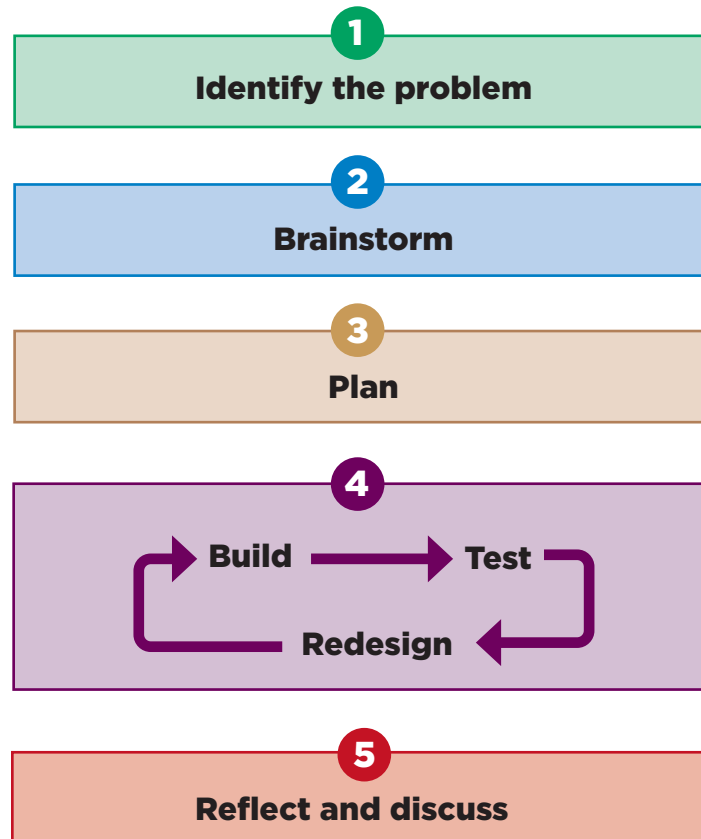
In this activity, you will practice using the engineering process to build a maze. The goal of this activity is to build a maze that a marble can go through from beginning to end while navigating a variety of obstacles.

Instructions

1. Using the “Engineering Process” handout, start to work through building your maze. The paper plate will be the foundation on which your maze is built.
2. Identify the problem: How can I make an entertaining toy that moves a marble using a paper plate as its foundation?
3. Brainstorm: How can you build your maze? What is the purpose of a maze game? Why might it be created? What makes a maze fun? What makes it too easy or too difficult? What skills might you gain playing a maze game?
4. Plan: Make a drawing or sketch of your design. Gather your materials.
5. Build: Build your maze using the paper plate as the foundation. Use straws for the walls of your maze, attaching them to the plate with the tape. Use the marker to label where the marble should “begin” the maze and “end” the maze.
6. Test: Place a marble on the paper plate where it is labeled “begin.” Tilt, turn or twist the paper plate to move the marble in the direction it needs to go to navigate through the obstacles. Could you get the marble to the end of the maze? Was there an obstacle where the marble got stuck? Was the maze too easy? Does the maze need additional obstacles?
7. Redesign: Make some changes to your design to improve your maze using the available materials. 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 build your maze? What materials would you consider using when making another maze? Can you share your maze with a friend to see if they can move the marble from the beginning to the end? How might this apply to 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?