



Project Exploration creates transformative learning opportunities for youth underrepresented in the sciences –particularly students of color and girls – by equipping them with the skills, practices, and mindset needed for a lifelong pursuit of learning. STEM@Home makes activities around science, technology, engineering, and math accessible and fun to do at home. This STEMbook activity, resources, and more are available at www.projectexploration.org/stemathome.

In this activity, you will:

Apply the steps of the engineering design process to a problem. Create a model of a shower head that conserves water but rinses well.

Supplies Required:

- Graphic organizer
- 4 Clear plastic cups
- Pen and permanent marker
- 1 Craft foam sheet
- Water
- 1 Plastic bowl or tub to catch water
- Ruler or measuring tape
- 3 Push pins to make holes
- Scissors
- Stopwatch or timer app

Video

Engineering design process is like tacos: <https://tinyurl.com/y84bhjnd>

Overview

In an average American home, a shower typically lasts 8.2 minutes using 17.2 gallons of water. Do a quick Google search, or go around your home, and make some observations about shower heads. What do you notice? They often come in several shapes and sizes. Some have a few large holes while others have small holes. Some even come with a combination of large and small holes. Do the size and number of holes make a difference?

Project Exploration students were called by the Kohler company to help them develop a shower head that saves water but rinses soap. They have asked us to engineer a new type of shower head for them. Using the materials, develop the next great showerhead!



Instructions

1. Use the graphic organizer.
2. STEP 1: Problem: What do we want to solve? How can you create a showerhead that will save water but still rinse off soap?
3. STEP 2: Solutions: What are some ways to solve the problem?
4. STEP 3: Model: Build your design!
5. Trace the bottom of the cup on a piece of craft foam. Cut the foam out.
6. Use the permanent marker to make a horizontal line across the middle of all four plastic cups. Use a ruler or measuring tape to ensure that the line is in the same spot on all of them.
7. Using a pushpin, carefully poke one hole in the bottom of a plastic cup. Stick the point of a pen in the hole to make it a little larger.
8. Using a pushpin, carefully poke six small holes on the bottom of a second cup.
9. Place the foam circle under the cup with the large hole. Hold the cup over the catch tub. Fill the cup to the marker line with water. Record how long it takes for the water to drain from the cup on the graphic organizer.
10. Repeat the process with the cup with six small holes.
11. Take a third cup and create your first prototype. Test it out and record how many seconds it took for the cup to drain.
12. STEP 4: Test: Does your model work?
13. STEP 5: Reflect & Redesign: Was your model successful? Does it need to be redesigned?
14. Using the fourth cup, see if you can improve your design. The longer the water stays in the cup, but still flows to rinse off soap, the better your design is.

Additional Resources

1. What are fluid dynamics? <https://tinyurl.com/ycvr8fjg>

Share It Out

Share on social media: Share the results of your design with your friends and family on social media! Explain the steps of the engineering design process in a video! Use the hashtags:

#EngineeringDesign
#ProjectExploration
#StemAtHome

Share via PE's website: Students who complete STEM@home activities and share what they learned with the PE team via our website will earn points which can be traded in for cash prizes at the Explore Store. Your project number is 306. Learn more at www.projectexploration.org/explore-store



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