

Challenge 9: Build It in 3D

Get Prepared

Challenge Goal: Create a 3D model of an innovation

Time Needed: Two to three 45-minute sessions

Before You Begin:

- Before the participants come in for the afternoon, set up the tablets so that their browsers are at www.scholastic.com/sparks.
- Separate the materials they will need to build their models into shoe boxes or some other containers, so that each table has its own set of materials.



What You Will Need:

Tablet Flip Book

- Innovation Flip Book



Materials

- Samsung tablets
- Engineer's Notebook (from Challenge 1)
- Presentation Guide (attached to Challenge 9)
- toothpicks
- small marshmallows, gumdrops, or balls of clay
- chopsticks or wooden dowels
- card stock
- shoe boxes or other containers to hold the supplies

SESSION 1

Experiment With Shapes

- Congratulations! You have led your group through the stages of creating an innovation. Students have used innovative thinking to create something new in response to a need in their community. Now it's time for them to build their innovation in 3D!
- Have them tap the Innovation Flip Book icon on the tablets. Then have them tap the number 6. Discuss the images of engineering and design models shown on the screen. Have them tap the number 7 and look at another image of a model.



Challenge Time!

- Explain that they will now make a 3D model of their innovation. Pass out the containers holding the supplies that kids will use to make their model. Take out four toothpicks and four marshmallows (or gumdrops). If you are using clay, show kids how to roll small balls of clay. Have them follow along as you demonstrate how to make a square, a hexagon, a wheel, and a cube (next page).
- After you have experimented with the shapes, practice cutting out card stock to make surfaces cover the shapes.

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Challenge Time! (continued)

3. Explain that in the next session, kids will use these basic shapes to build models of their innovations.

■ **Square:** Attach two marshmallows (or gumdrops or balls of clay) to each end of a toothpick. Set it down on the table and put two toothpicks into the marshmallows sticking straight up. Add a marshmallow to the end of each new toothpick and join them with a final toothpick.

◆ **Hexagon:** Attach two marshmallows (or gumdrops or balls of clay) to each end of a toothpick. Set it on the table and put two toothpicks in the marshmallows sticking out at an angle. Add a marshmallow to the end of each new toothpick. Add a toothpick sticking straight up from each new marshmallow. Repeat the steps one more time to add a marshmallow to the end of each of the newly added toothpicks. Add a toothpick tilted inward to each of the marshmallows. Join them with a final toothpick.

⊗ **Wheel:** Attach six toothpicks to a marshmallow. The toothpicks should be equally spaced and create a circle. Cut a strip of card stock long enough to go around the ends of the toothpick. Glue or tape it in place.

□ **Cube:** Make two squares following the between directions for making a square. Align the two squares and connect them with a toothpick placed horizontally between each of the four marshmallows.



SESSION 2

Build and Present!

To Get Started: Remind kids that they discussed and practiced building basic shapes in the last session.

1. Pass out the Engineer's Notebooks. Have kids look at their drawings on page 3, "Our Building Project," and consider what shapes they'll need to build to make a model of their innovation in 3D. Have group leaders move around the room to help them through any challenges in representing their ideas in 3D. Explain that it's important for them to be able to interpret the shape of their model, however, it does not have to be perfect.
2. After their shapes are reasonably close to their drawings, help them cut and attach card stock to form the surfaces of their inventions. Use an additional session if needed to allow kids to complete their models.

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Build and Present! (continued)

3. (Optional) Decide if you would like to hold a Presentation Day in which all kids show their models to the class. If you decide to hold one, dedicate a session toward using the Presentation Guide to help kids plan their presentations. After kids have filled in all the blanks on their Presentation Guide, separate them into groups so they can practice making their presentations to small groups before they present to the entire group of students. You may choose to invite family members to attend Presentation Day.

Reflection Time

Thinking about the project as a whole, ask kids to discuss the following questions as a group: ***What step did you like the most? Why? What step or steps were the most challenging? Why? What makes being an engineer or architect difficult? What other ideas came to mind when you were brainstorming?***

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Presentation Guide

Step 1: Introduce Yourself

1. My name is: _____
2. The name of my innovation is: _____

Step 2: Show Your Presentation Poster

1. Point to your poster and show the drawing of your innovation.
2. The way my innovation works is:

3. Point to your poster and show the steps for using your innovation. Explain each step.

Step 3: Explain How Your Innovation Helps Your Community

1. The people who will use my innovation are: _____
2. My innovation helps my community because:

