



Challenge 8: How can we show how innovative design works?

Get Prepared

 **Challenge Goal:** Create flowcharts to show how their innovations will work and how people in their community will use them

 **Time Needed:** 45 minutes, plus one additional 45-minute session (*optional*)



What You Will Need:

Printouts

- Activity Sheet I: Set the Scene

Materials

- paper
- pencils
- markers or colored pencils (*optional*)
- glue or tape (*optional*)
- poster board (*optional*)

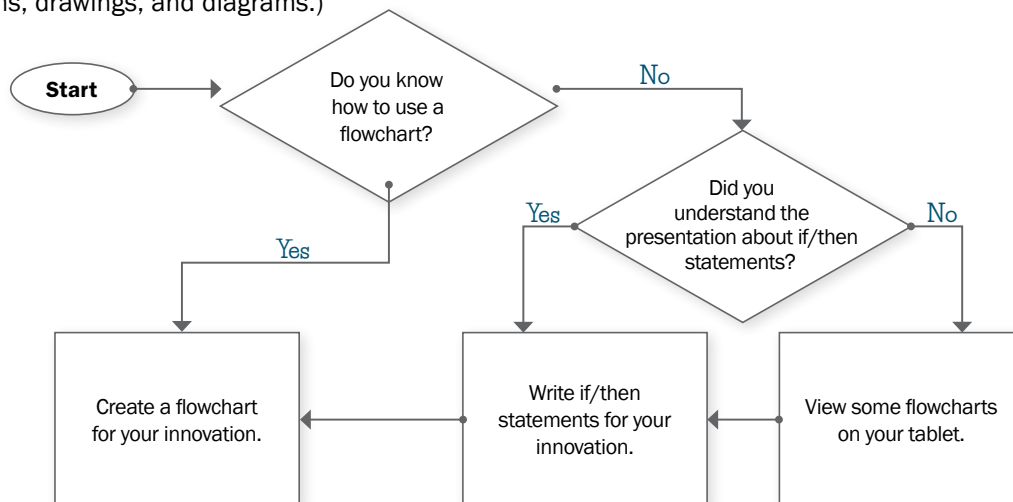
SESSION 1

Engineering in Action 5 mins.

Once engineers have identified their goals, they then have to identify strategies to make them work. Teams have already set their goals for Unit 3, now they will focus on setting strategies.

1. Explain that engineers have many tools to help come up with strategies on how exactly an innovation will function. Ask kids: **What are some ways that engineers could show the community how an innovation will work?** (Answers might include: creating models, graphs, charts, computer simulations, drawings, and diagrams.)

2. Explain that a flowchart is one tool engineers use to show how the strategy behind an innovation will function. A flowchart is a diagram that uses boxes and arrows to show the steps involved in a process, the order in which the steps occur, and the possible outcomes of each step.



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Challenge 8: How can we show how innovative designs work? (continued)

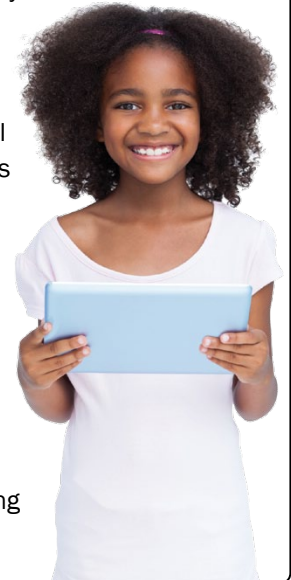
Use the Tablets! 40 mins.

1. Show kids an image of a flowchart on your tablet: bit.ly/1qYGJcP. Point out that flowcharts show a series of actions and reactions that could be difficult to explain in words alone. Because flowcharts outline how steps connect, they can be used to show how an innovation will work.
2. Have kids access the **Draw Express Diagram Lite app** on their tablets. Explain that they will use it to create flowcharts for their innovations. Tell them that this chart will detail how their innovations will function and how residents in their community would use them.
3. Discuss the importance of if/then statements when devising a flowchart. An if/then statement states:

If _____ step happens, then it causes _____ step to happen next. If/then statements allow people to plan out exactly how an innovation will work and react to the person using it. Tell kids that these statements will help them keep track of all the steps in a process. These steps will also help them see setbacks to their ideas that would need rethinking/revising.

Wrap-up Session and Reflection:

4. Instruct kids to use the **Draw Express Diagram Lite app** to create if/then statements for their innovations. As they record each interaction from the innovations on their flowcharts, they will reflect more deeply on what happens during each step of their innovations in action.



SESSION 2

Shifting Gears: STEM Challenge! 45 mins. (optional)

To Get Started: Remind kids that they discussed engineering tools in the previous session, focusing on flowcharts. Ask them to discuss why a flowchart is so helpful in showing how an innovative design works.

1. If you would like to add a session, prepare your kids to do more! Let them know that a flowchart may reveal how an innovation will function, but it has a downside. It's so technical that it doesn't give a good overall picture of the innovation at work. A more visual way to show an innovation in action is with a storyboard. A storyboard is a type of graphic organizer that shows a sequence of illustrations acting out a scene, sometimes with explanatory text or dialogue.
2. Use your tablet to share this article about storyboards with kids at: www.scholastic.com/teachers/article/what-are-storyboards. Ask kids what they notice about how the storyboards are organized.

Wrap-up Session and Reflection Activity:

3. Hand out **Activity Sheet I: Set the Scene**. It will guide kids through the steps necessary to plan and draw storyboards of their own. Have kids reflect on the best sequence of illustrations to represent community residents using their innovations. Encourage kids to discuss why community residents would use their innovations. This will provide them with great insight while they complete this activity.

NAME: _____

Set the Scene

A flowchart may reveal how an innovation will work, but it doesn't give the whole picture. To really show your innovation in action, you're going to create a storyboard by following the steps below. It will show, in a series of images, how people in your neighborhood will use your innovation.

1. **Plan Your Panels:** Jot down some ideas for a series of illustrations that will show residents of your community using your innovation. You will use six sheets of paper as your six storyboard panels. The panels should tell a visual story like a scene in a movie. Make sure the scene unfolds panel-by-panel in a logical order so that anyone who views it will understand the steps of how your innovation works.
2. **Ready, Set, Draw:** Begin drawing rough pencil illustrations for each panel in the storyboard template below. Work together as a team to reflect on whether the sketches are effective. Make revisions to be sure you're presenting your innovation in the best way possible. When done, add final details, outlines, and color to the panels.
3. **Mount Your Storyboard:** Arrange the panels in order in two rows of three on a piece of poster board. Give your storyboard a title and add text or dialogue underneath each panel to help explain what's happening in each. Make sure you make any text on the poster large enough for an audience to read.
