INTRODUCING THE DESIGN PROCESS

APPLYING THE DESIGN PROCESS

The design process is built into each challenge. As students work through a challenge, they'll see that the steps of the design process encourage them to think creatively to solve a problem.

"Engineering activities tend to allow for more creativity and differences in thinking than science labs. They ask students to be creative, problem solve, and work directly with materials."

Rosemary B.
Fairgrounds Middle School Nashua, NH

Engineers' initial ideas rarely solve a problem. Instead, they try different ideas, learn from their mistakes, and then try again. The steps engineers use to arrive at a solution are called the **design process.** As students work through a challenge, use the questions below to tie their work to specific steps of the design process.

BRAINSTORM

- What are some different ways to tackle today's challenge?
- Off-the-wall suggestions often spark GREAT ideas. How creative can you be?

DESIGN

- Which brainstormed ideas are really possible, given your time, tools, and materials?
- What are some problems you need to solve as you build your project?
- How can a sketch help clarify your design?

BUILD

- What materials will you need?
- What can you learn by looking at other students' projects?

TEST, EVALUATE, AND REDESIGN

- Why is it a good idea to keep testing a design?
- What specific goal are you trying to achieve, and how will you know if you've been successful?
- How does the design meet the criteria for success presented in the challenge?

SHARE SOLUTIONS

- What's the best feature of your design? Why?
- What were the different steps you did to get your project to work?
- What was the hardest problem to solve?
- Did you have to do something a few times to get it to work? What?
- If you had more time, how would you improve your project?

IDENTIFY PROBLEM
↓
BRAINSTORM
↓
DESIGN
↓
BUILD
→ **TEST & EVALUATE** → **REDESIGN** →
↓
SHARE SOLUTION
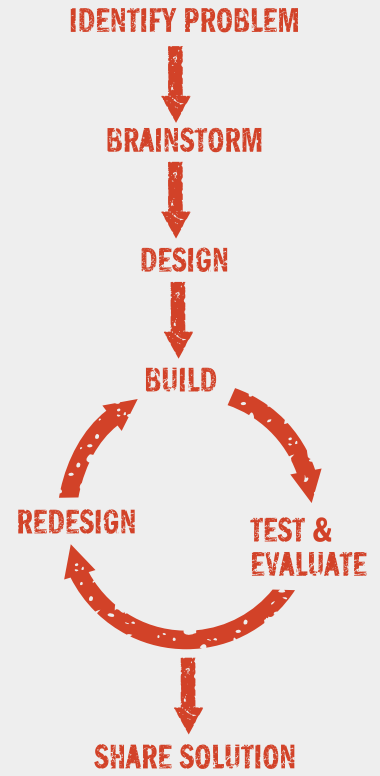
The design process is a great way to tackle almost any task. In fact, you use it each time you create something that didn't exist before (e.g., planning an outing, cooking a meal, or choosing an outfit).

WATCH CLIPS OF THE DESIGN PROCESS IN ACTION

There is a short video clip of each design process step on the *Design Squad* Web site. By watching the *Design Squad* teams work through each step of the design process, students will learn to think creatively when solving a problem and strengthen their critical-thinking abilities. Also, if your class is struggling with any particular step or with group dynamics, these videos offer a convenient way to talk through an issue. Download the clip(s) you want from the "Teacher's Guide" page at **pbs.org/designsquad**.

Identify the Problem (1½ minutes)
Understanding the problem paves the way for solving it. This clip lets you emphasize to students the importance of defining the challenge(s) clearly before getting started. As a class, discuss how the *Design Squad* teams prepare to design and build furniture out of cardboard.

Brainstorm (1½ minutes)
Coming up with many possible solutions is a powerful way to begin a project. This clip shows *Design Squad* teams generating lots of ideas for devices that a dancer can use in an underwater performance. As a class, discuss what made this brainstorm successful.

Design (1 minute)
Now it's time to choose the best solution and plan how to build it. In this clip, the *Design Squad* teams squabble about when to stop designing and start building their specialized bikes. As a class, discuss possible solutions for moving a team forward when there is disagreement.

Build, Test, Evaluate, and Redesign (1 minute)
Once kids settle on a design, it's time to build, test, and redesign it. This clip shows that things don't always work as planned. As a class, discuss how the *Design Squad* teams learn from their testing results and figure out how to redesign and make improvements.

Share Solutions (2 minutes)
Presenting one's work to others is a constructive way to conclude a project. As a class, discuss how the *Design Squad* team's presentation validates the team's work, places it in a broader context, and lets the team members reflect on how effectively they communicated and collaborated.

Watch Video ▶

Let the *Design Squad* teams model the steps of the design process for your students. Download these five brief videos from the Teacher's Guide page at **pbs.org/designsquad**.

EXPAND YOUR SKILLS

Build your skills and confidence in guiding students through engineering activities using the design process. Through this free, self-guided, NASA–*Design Squad* online training, you'll see what the design process looks like in the classroom, learn a host of implementation strategies, and experience the fun and relevance of engineering. Find it at: **pbs.org/designsquad/ educators**.