

# MAKING IT REAL:

## DRIVING HOME THE ELECTRIFYING GAMES UNIT



### SHOW KIDS THE RELATED TV EPISODE



Show students *Just for Kicks*, the full-length *Design Squad* episode related to the *Electrifying Games* unit, where the *Design Squad* teams design and build a device that automatically feeds a stream of balls to a professional soccer player. Watch it online at: [pbs.org/designsquad](http://pbs.org/designsquad).

**Overview:** Students take their work beyond the walls of the classroom, using a combination of presentations, videos, and discussion. They present their kick sticks and gameboxes, discuss how they demonstrate the unit's science concepts, point out how they are thinking and working like engineers, and discuss how engineering is a field centered on improving people's lives.

#### Preparation

□ Visit [pbs.org/designsquad](http://pbs.org/designsquad) and download the following video clips from the "Teacher's Guide" page: **Just for Kicks Judging** (4 minutes), **Design Process: Testing & Frustration** (1 minute), and **Judy Lee** (2 minutes). Be prepared to project them.

#### 1 Raise student awareness of engineering (5 minutes)

Our world is molded by the engineering that surrounds us. Yet, many students are unaware of what engineers do. Probe students' ideas about engineering. Ask:

- What do engineers do? (*Because few students—or even adults—can answer this question fully, it is a provocative opener. List students' ideas.*)
- Then ask: What things in this room were probably designed or made by engineers? (*There is very little in the room other than the people, plants, and dirt that does not bear the mark of an engineer. For example, the classroom lights, the clean drinking water, and the filtered, air-conditioned air are all brought to you courtesy of engineers!*)

#### 2 Relate students' work to science and engineering (25 minutes)

Show the **Just for Kicks Judging** and the **Design Process: Testing & Frustration** videos. Ask:

- How is the process you followed similar to the one the kids on *Design Squad* did? (*Both the students and the Design Squad teams brainstormed lots of ideas, then built, tested, and revised their designs, and finally presented their solutions to others.*)
- When testing shows that things aren't going according to plan, what are some ways to redesign, even as time is running out? (*Make sure you understand why things aren't working as expected; do the simple things first; get everyone's input; divide up the tasks*)

Students are proud of having met the challenge. Have them show their work. Use the following questions to help them talk about the process they went through.

- How did what you learned about circuits and switches in *Kick Stick* help you when you designed and built your electric gamebox?
- What were some of the problems you solved as you built, tested, and redesigned your kick stick and electric gamebox?
- What clues did you learn from testing that helped you improve your design?
- In what ways did you think and work like an engineer as you made your kick stick and electric gamebox? (*Followed the design process; applied science concepts; made something people want; used creativity; tackled interesting challenges*)

*"Students attempted several changes to "fix" the problem with their designs. They observed other students' trials and created new prototypes in an attempt to resolve problems their peers experienced. They were also able to explain why they needed these changes."*

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### 3 Meet an engineer (10 minutes)

View the **Judy Lee** video to introduce students to an engaging young engineer involved in exciting challenges and doing interesting, creative work. Judy designs toys and other products. In the video, she reinforces the design process, the importance of teamwork, and the fun side of engineering.

- After watching, have students recap Judy's brainstorming rules. (*Sketch as you think; defer judgment; encourage wild ideas; build on others' ideas; and go for quantity*)
- What would people expect in a ball-and-target game they bought? (*Fun; everything works; easy to play; doesn't wear down or wear out; challenging but not impossible to succeed; different levels of play; exciting payoff like a buzzer; cool design; etc.*)
- Tell students that their designs are **prototypes**—models for testing and improving a design in order to develop a final product. Ask: If Judy Lee's company wanted to produce your kick sticks and games, what improvements could you recommend to make them work better or be more fun?

### 4 Make the engineering real (10 minutes)

Use the following questions to help students see how their work relates to engineering and see that engineers design things that matter and improve people's lives. Ask:

- Why are games important? (*People love playing games, whether they're card games, board games, or video games. The message is: Making games matters.*)
- How is what you're doing in *Kick Stick* and *Electric Gamebox* related to what engineers do? (*Games are fun and enrich people's lives. Since engineers work to improve the world, they are often involved in designing games and equipment that make life more fun.*)
- Who might be interested in buying a buzzer-equipped ball-and-target game? (*Schools and afterschool programs, kids, parents, recreation centers, camps, game manufacturers, hospitals; etc.*)
- What are some ways that engineers are involved in making games? (*Designing sports equipment; programming video games; manufacturing board games; applying new materials and technology; inventing new game ideas; etc.*)

#### Extension Ideas

- Share photos of your students' designs and see what others have made. Visit DS XCHANGE, *Design Squad's* online community at [pbs.org/designsquad](http://pbs.org/designsquad).
- Find lots of build-it-yourself circuit gadgets at: [buildinggadgets.com/index\\_circuitlinks.htm](http://buildinggadgets.com/index_circuitlinks.htm).

#### Interdisciplinary Connections

- *History*: Have students look up toys from the past. What toys were popular 100 years ago? How did kids play or entertain themselves in the past?
- *History/Technology*: If you lived at a time when small motors and batteries were unavailable, how could you make your blades spin? How could you make your game work without electricity?



Students develop a working knowledge of circuits in *Kick Stick*, take their understanding further in *Electric Gamebox*, and explore the relevance of the science and engineering in *Making It Real*.



Engineers design and build things that matter to people, including games and equipment that makes life more fun.

#### TELL US WHAT YOU THINK

Take our quick online survey, and we'll send you a *Design Squad* class pack (while supplies last—see back cover for details).