Dance Pad Mania

INTRODUCTION

This activity will demonstrate the engineering design process. Teams must work together to build a dependable, functional electric circuit.

GRADE LEVEL

Middle school.

THE CHALLENGE

Build a dance pad that students step on to sound a buzzer or flash a light.

MATERIALS

- 1.5-volt AA battery
- AA battery holder (optional)
- Aluminum foil
- Bulb holders for light bulbs (enough for half the group)
- Buzzers (enough for half the group)
- 2 11 x 17-inch sheets of corrugated cardboard (per team)
- Duct tape
- Electrical wire (22-gauge works well)
- Light bulbs that can run on a 1.5-volt AA battery
- Plastic wrap
- Scissors
- Wire strippers

Estimated time to complete: 60 minutes

DISCUSSION

Encourage students to work cooperatively, rather than competitively: When you work as a team, you can often solve design challenges more quickly. For example, you can share knowledge, get new ideas, and brainstorm solutions to problems. You can also learn a lot by looking at how other teams made their pads and seeing how they solved problems.

BRAINSTORM AND DESIGN

Divide your group into teams of two. Half the teams will make floor pads that flash a light, and the other half will make floor pads that sound a buzzer. The dance pad is basically a simple electric circuit, with a power source (the battery), materials for conducting electricity (the wires and foil), and something that uses the electricity (the buzzer or light). Brainstorm answers to the following questions and have students record ideas.

- Will my pad turn on a buzzer or a light?
- How will I build a switch into my pad to turn the buzzer or light on and off?
- How big will my pad be?
- How can I make it sturdy enough to withstand constant stomping?
- Where will I put the battery? Inside the pad? Outside the pad?

BUILD, TEST, AND REDESIGN

Hints for the students if they have trouble getting started:

Connect the parts: To make the buzzer buzz or the light flash, they need to get electricity from the battery to the buzzer. To do this, connect the buzzer (or light), battery, and wires. This makes an electrical circuit.

Is the buzzer buzzing or light lighting? If not, make sure the appliance's red wire is attached to the positive (+) side of the battery and the black wire to the negative (-) side.

Add a switch to start and stop the flow of electricity. When the switch is closed (called a closed circuit),

electricity flows to the buzzer/light and it buzzes or flashes. An open circuit turns off the appliance. *Hint:* use the dance pad to open and close the circuit—it becomes the switch!

As they build, make sure the circuit works and that it will be able to stand up to some rugged treatment. Build the pad, then test it. Step on it several times in a row to turn the buzzer or light on and off. How well did it work? The teams might need to debug. For example, loose wires will make the pad stop working. Have the teams re-design to fix the problem so the pad works every time.

TAKE IT TO THE NEXT LEVEL

- Make a pad that has both a light and a buzzer.

- Make a pad that uses two batteries, two lights, or two buzzers.

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