

Ages:

10 to 13

Activity 3:

Build a Switched Circuit

(Adapted from *4-H Electrical Science Program -- Electrical Projects and Idea Sheets*. See “More Great Resources for Grab and Go with Science Activities” for more information.)

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Main idea: A switch is a device for making an open or closed circuit.

Objective: Youth will learn how to put a switch in a circuit.

Materials: For each pair:

q Screwdrivers

- q Conductor wire
- q Circuit board (see handout distributed at session)
- q D-cell batteries (4 four each circuit board)

Motivator: Use the questions below to pique interest.

Questions:

- q What different types of switches can be found in a home? (Answer: Light switch, on/off buttons for televisions & games, refrigerator light switch, etc.)
- q Describe how a switch operates in terms of electron flow. (Answer: When a switch is in the off position, it causes an open circuit which does not allow for electrons to flow. When a switch is in the on position it provides a closed or complete circuit for electrons to flow through.)

Activity:

1. Replace the wire that was cut in Activity #1. Explain the hazard of twisting wire ends together and covering them with electrical tape. (When the tape wears off there no longer will be an insulator. This might cause an electrical shock or fire.)
2. With the switch on your circuit board open, carefully connect each wire clockwise around the switch's terminal screws.
3. Open and close the switch to test your circuit.

Learning checks: After the activity, the youth are able to:

- q Explain the role of a switch in terms closed circuit (switch closed allowing for electrons to flow) and open circuit (switch open not allowing electrons to flow through it).

- q Explain why a burned out bulb causes an open circuit.

Background:

You want a circuit that can be opened and closed easily. You open and close electrical circuits for lights and television often.

A switch is a conductor that can be moved between two contacts so that the circuit can be opened or closed. You turn the lights on or off in your home in the same way. When you flip the switch "on," you make a closed circuit and the light glows.

In a normal circuit, the electron path should be continuous and unbroken. A broken wire or burned-out bulb can cause an unwanted open circuit. When a bulb burns out, the tiny piece of wire inside is broken. There is no longer a complete path for the electrons, causing the flow to stop. A switch in the circuit will produce the same results since it will break the path.

Vocabulary:

Switch: A device for making an open or closed circuit.

Extensions: Continue with Activity 4, Create a Short Circuit.