

Ages:

10 to 13

## Activity 6:

# Build a Series 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:** In a series circuit, lights or other electrical loads are connected one after the other in a single line forming a circuit. The electrons must pass through the first bulb to get to the next bulb. If one bulb burns out or is removed, an open circuit will be produced and the other bulb will go out.

**Objective:** Build a series circuit and understand how it works.

**Materials:** For each pair:

- q Screwdrivers
- q 4 pieces of 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:** Can you think of an example of a series circuit? (Christmas lights.)

**Activity:**

1. With the switch open, connect the conductor wires to the terminal screws in a clockwise direction as follows:
  - a. Wire #1: + battery terminal to front switch terminal.
  - b. Wire #2: Rear switch terminal to left terminal of socket #1.
  - c. Wire #3: Right terminal of socket #1 to right terminal of socket #2.
  - d. Wire #4: Left terminal of socket #2 to - battery terminal.
2. Screw the two lamps into their sockets and close the switch.
3. Unscrew one lamp and see what happens.

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

q Explain why the socket lamp went out when the other lamp was unscrewed in electrical terms. (An open circuit was created when the one lamp was unscrewed not allowing the electrons to flow.)

## **Background:**

There are two basic ways to make a circuit with several loads (or lights). One way is to hook the lights (or other devices) one after another in a line. Electricity must flow through the first device into the second. This is a series circuit.

As long as each light bulb burns, and passes the electrons on to the next bulb, the circuit is complete and the flow continues. If one bulb burns out, electrons cannot pass and the flow stops.

Some Christmas tree lights were wired in series. (Imagine how much fun it was to find out which light was burned out!) In a series circuit, the same amount of electrons flows through each device and they must share the voltage applied to the circuit.

## **Vocabulary:**

**voltage:** The "push" or electrical pressure sending electrons through a wire. If voltage needs to be shared among devices (lights) each will receive less, resulting in less output (dimmer lights).

**Extensions:** Continue with Activity 7, Build a Parallel Circuit.