

Ages:

10 to 13

Activity 1:

Build a Closed 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: Electricity is the most common form of home energy. It provides light and power for our appliances. Electricity serves you best when you understand how it works and how to use it properly.

Objective: Learn common electrical terms and identify and use basic tools.

Materials: For each pair:

- q Screwdrivers
- q Wire strippers
- q Circuit board (see handout distributed at session)
- q D-cell batteries (4 four each circuit board)

q Conductor wire

Motivator: Use the questions below to pique interest.

Questions:

q How does water flow between two connected buckets: From a full bucket to an empty bucket **or** from an empty bucket to a full bucket? (Answer: From a full bucket to an empty bucket.)

q Describe safety rules when using tools. (Answers: Do not run with tools. Do not play with tools - poke, toss, throw, etc.)

q When attaching a wire to a terminal screw, the wire should be placed under the screw in a _____ direction? (Answer: Clockwise.)

q A screwdriver with a + tip is called a _____ screwdriver? (Answer: Phillips head.)

Activity:

1. Connect the conductor wire to the battery and light receptacle terminals on the circuit board. Place the wire under the terminal screw in a clockwise direction. This will draw the wire for a neat connection as the screw is tightened.
2. When the circuit is complete, the light should go on.
3. Cut the wire in half between the + (positive) battery terminal and the light. Notice the light goes out. This is called an open circuit because you broke the complete path.

4. Strip 1 inch of insulation from the newly exposed ends to prepare them for Activity #2, Testing Conductors and Insulators.

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

- q Identify each tool and describe its function.
- q Demonstrate the proper use and care of each tool.
- q Describe the flow of electrons from the negative terminal to the positive terminal of the battery when there is a closed circuit.
- q Construct a closed (complete) circuit.
- q Describe an open circuit.

Background:

Electricity is the flow of tiny parts of atoms called electrons. If something contains extra electrons, it is negatively charged. If there is a shortage of electrons, it is positively charged.

Electrons flow from negative to positive, seeking to create a balance. For electricity to do its work, it must have somewhere to start, someplace to go, and a path back to where it started.

Without this, the flow of electricity will stop. Electric current (electron flow) must make a complete path, returning to the starting point. This path is called a circuit. An open circuit is created when the path for electron flow is broken (e.g. loose or broken wire).

Vocabulary:

Electrons: Tiny parts of atoms.

Electricity: Flow of electrons.

Extensions: Continue with Activity 2, Testing Conductors and Insulators.