



Light the Bulb

NC Standard
PS.6.2.5

Page 85

Activity Description & Estimated Class Time

In this 50 minute activity, students are challenged to make a light bulb illuminate using a battery, a wire, and a light bulb. In the process, they understand that electrical circuits require a complete loop for an electrical current to pass. Students demonstrate understanding by completing an electrical current diagram.

Correlations to NC Science Standards

PS.6.2.5 Carry out investigations to explain the transfer of electrical energy in electrical circuits, to include how a circuit requires a complete loop through which an electrical current can pass

Objectives

Students will develop an understanding of the following ideas and content:

- Electrical circuits require a complete loop for an electrical current to pass.
- Energy can exist in different systems, and can be transferred from one system to another.

Brief Science Background

Electrical circuits are a way to transfer energy from one system to another. In the case of a battery and bulb, energy moves from a chemical system inside a battery to a system inside a bulb that produces light. However, the electricity can only move when it has a continuous, unbroken path through a material that can conduct electricity, such as a wire. Every part of the path contacts a conductor that leads through the battery and the object that is using the electricity, such as a bulb or a motor. When they are all connected, all of the elements of the path conduct electricity, including the battery, the wire, and the bulb.

Light the Bulb

Materials

Materials for the whole class

- Ability to project Electrical Circuit Diagram (SD 1)

Materials for group of 2 students

- 1 wire
- 1 AA battery
- 1 light bulb
- 2 Light the Bulb Student Activity Sheets (SD 2)

Procedure

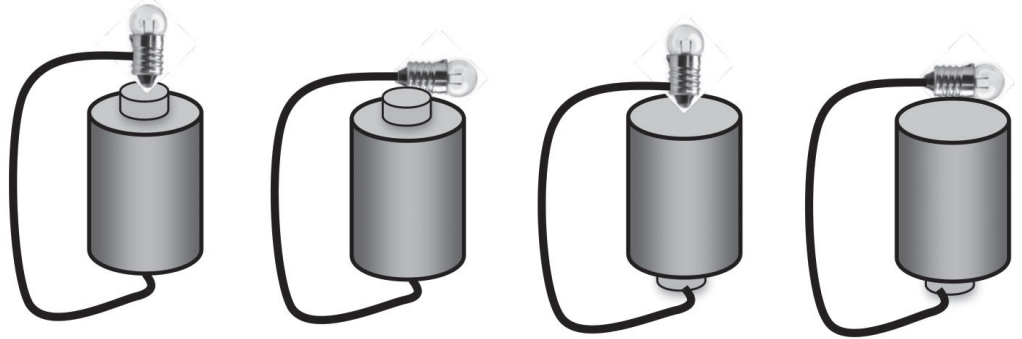
1. Inform students that they will work with a partner to solve this problem: Using only one wire, one light bulb, and one battery, get the bulb to light.
2. As students puzzle through the challenge, ask them to keep track of every attempt on their Light the Bulb Student Activity Sheet (SD 2), especially the ones that don't work. Ask students to draw a diagram for each attempt, whether it is successful or not.
3. Hand each pair of students their materials and let them begin.

This challenge can be frustrating. Allow time to explore and experiment. Avoid giving hints. Eventually all pairs will get the bulb to light.



**Procedure
cont.**

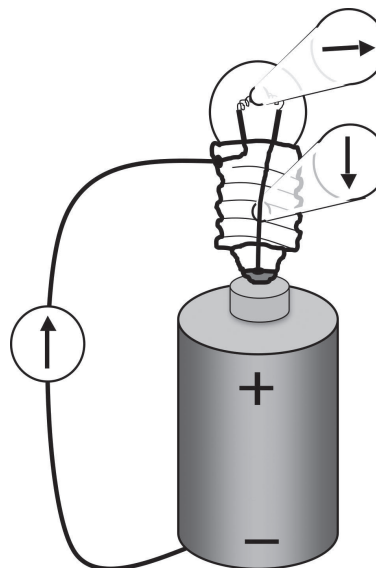
4. As students work, be sure they record all results on SD 2.
For students who light the bulb, to save batteries and bulbs, ask them not to keep the bulb lit.
5. At some point, a pair of students will get the bulb to light. When they do, challenge them to find three other ways, using the same materials, to get the bulb to light. There are 4 ways.



6. To help students who are struggling, allow them to ask one question that would help them move forward. After they ask the question, have a student who has successfully completed the challenge answer it.
7. Continue until every group has lit the bulb.
8. Lead a discussion and have students report how they went about solving the problem.
9. Project Electrical Circuit Diagram (SD1) and introduce the idea of a circuit and how it is necessary for the electrical current to pass.
10. Have students find the Electrical Circuit Diagram on SD 2. Inform students their job is to add arrows to the diagram inside the circles showing the path and direction of the electricity at each point.

Allow students to ask questions as they attempt to complete the diagram. For example, students may not know that electrons move from (-) to (+).

Answer key:





**Procedure
cont.**

**Content
Connection**

11. Ask students to look at their notebook and identify an attempt to light the bulb that failed. Ask them to explain why the attempt failed and what they did or could have done to correct it. Have several students share failed attempts and ask the class to discuss why it failed.

1. Hold up a battery and ask:

a. How does the class know the battery has energy?

It does things when connected (lights a bulb, runs a motor, etc).

b. What kind of energy does the battery have?

Students will have many different answers, but the most common is electric.

c. What electrical activity do they see in the battery.

None.

2. Connect the battery to a bulb and ask:

a. What kind of energy does the bulb have when lit?

Light

b. How does the energy get from the battery to the bulb?

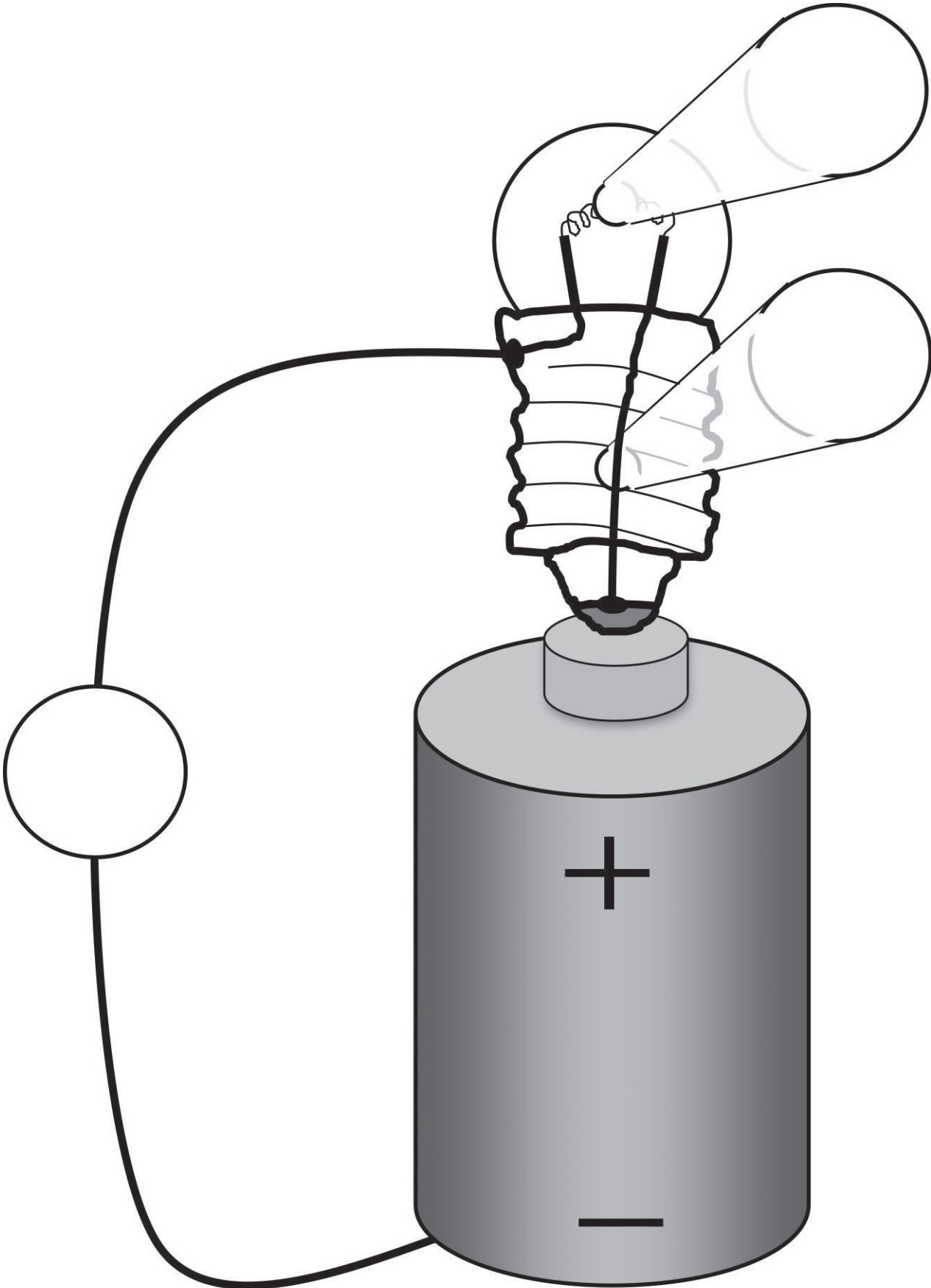
Through the wires.

3. Explain to the students that batteries contain chemicals that react when the terminals are connected to something that conducts electricity. The chemical reaction transfers electrical energy into whatever conductor (such as a wire) is connected to the terminals. In the process, the energy changes from one form to another [from chemical to electrical to light].

The kit comes with working batteries and bulbs. However, bulbs may burn out and batteries may go dead. It is possible that some students may have the set-up correct but the bulb may not light. If this happens, guide students to identify the problem and try a different bulb or battery to confirm.

SD 1

Electrical Circuit Diagram



SD 2

Light the Bulb Student Activity Sheet

Name:

Draw a diagram of every attempt you make to light the bulb. Document if it is successful or not.

For the diagram on the right, add arrows inside the circles showing the path and direction of the electricity at each point.

