

GUIDING THE INVESTIGATION

PART 1: LIGHTING A BULB



MATERIALS FOR STEP 1:

- *The Flow of Electricity* sheet

ASSESSMENT NOTE: See the scoring guide for this sheet on page 9 of the Assessment folio.



MATERIALS FOR STEP 3:

- 2 Lightbulbs

MATERIALS FOR STEP 4:

- 2 D-cells
- 4 Wires

1. ASSESS IDEAS ABOUT CURRENT FLOW (OPTIONAL)

To assess students' entry-level ideas about how a bulb connects to a battery to produce light, use the sheet called *The Flow of Electricity*. Students will need about 10 minutes to complete this sheet.

2. INTRODUCE THE D-CELL

Hold up a D-cell and ask if students recognize it and know what it is used for. Let them share a few stories. To verify, tell them,

This is a D-cell, but most people call it a battery. It is a source of electric energy. Source means a place to go where something is available, or where something comes from. In this case the D-cell is a source of electricity to make flashlights and radios work. It is a very safe source of electricity for us to work with. But the electric energy in wall sockets is another story. Wall sockets have dangerous levels of electric energy. We will not put anything into wall sockets at any time.

Your challenge is to find out how to get the electric energy from this electricity source, the battery, to a lightbulb.

3. INTRODUCE THE LIGHTBULB

Hold up a bulb. Tell students,

This is the lightbulb we will use. It is the kind of lightbulb you might find in a flashlight. Let's start by observing it for a minute.

Have GETTERS get two lightbulbs for their groups. Ask students to pair up and observe the lightbulb closely. After a minute, call on students to share what they observed and what they know about using bulbs.

4. PROPOSE MAKING THE BULB LIGHT

Ask,

- *Can you use a battery to turn on the lightbulb?*

Tell students that there is a battery for each pair of students and a supply of wires for the class. Have GETTERS go to the materials station to get one battery and two wires for *both pairs* of students at their tables.

5. MONITOR STUDENT PROGRESS

Walk among the groups as they try to find a way to light the bulb. It may be several minutes before every pair has successfully lit the bulb; holding wires to make contacts can be clumsy. Resist the temptation to show students what to do.

6. REVIEW SUCCESSES

When everyone has succeeded in lighting the bulb, ask a few students to share their method for producing light. Guide the discussion with questions.

- *Where did you connect the wires to the battery?*
- *Where did you connect the wires to the lightbulb?*
- *What happens when you touch the wire to the glass part of the bulb?*

7. INTRODUCE “ELECTRICITY RECEIVER”

Tell students,

Anything that uses electricity to do something is an electricity receiver. The lightbulb produces light when it receives electricity as it flows through the whole circuit.

8. DRAW BULBS AND BATTERIES ON THE BOARD

Draw a couple of large pictures of lightbulbs on the board. Ask two students to come up and draw a battery and connections showing how to light the bulb. Invite the class to review the drawings critically.

9. INTRODUCE “CIRCUIT” AND “COMPONENTS”

Using one of the student drawings, trace the path taken by the electricity from one end of the battery to the tip of the bulb, through the bulb, and from the silvery side of the bulb back to the other end of the battery, and finally through the cell back to the starting point. Ask,

- *What general shape am I tracing? [Circle.]*

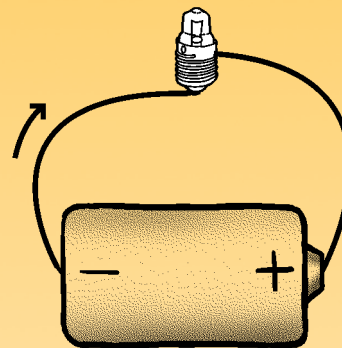
Tell students,

*The pathway through which the electricity flows from the D-cell to the light and back to the cell is a **circuit**. “Circuit” sounds like “circle” and has a similar meaning. The circuit must form a complete circle from one end of the D-cell back to the other end of the D-cell for the electricity to flow. We call the individual items in the circuit **components**.*

Point out that the current flows from the negative end of the battery (the flat end), through the circuit, and to the positive end (the end with the bump).



SAFETY NOTE: *If students complain that the bulb or battery is getting hot, tell them to stop what they are doing and try something else. The heat is evidence of a short circuit.*



WRAPPING UP PART 3

12. MAKE WORD BANK ENTRIES

Add new words to the class word bank.

- A **conductor** is a substance, commonly a metal such as copper or aluminum, through which electricity will flow.
- An **insulator** is a material that prevents the flow of electricity, commonly plastic, rubber, glass, or air.

13. MAKE CONTENT/INQUIRY ENTRIES

Add new concepts to the content/inquiry chart.

- *How do you know if a material is a conductor or an insulator?* [When you use it to complete a circuit, you can tell which it is: conductors allow the flow of electricity; insulators do not.]
- *Do you notice anything similar among all the materials that are conductors?* [They are all metals.]
- *Were there any metals that weren't conductors? Why do you think they weren't?* [Metals that are covered with an insulator, such as paint, won't conduct electricity.]

Add student questions to the chart, and project ideas to the folder.

14. READ SCIENCE STORIES

Have you read the science stories called *Making Static* and *A Fictional Interview with Benjamin Franklin*? See the Science Stories folio for more information.



WORD BANK

conductor
insulator

CONTENT/ INQUIRY

- Materials that allow the flow of electric current are conductors.
- Materials that do not allow the flow of electric current are insulators.
- All metals are conductors.
- Metals that are covered with an insulating layer will not conduct electricity.
- *Student questions?*