Conductor

Physical Science | Lesson Guide

1st Grade

Photo Description

A person is using a small light bulb and wires to test if a battery works. The light bulb is glowing, which shows electricity is moving through the wires from the battery to make light.

Scientific Phenomena

This image demonstrates an electrical circuit as the anchoring phenomenon. The battery provides electrical energy that flows through the conducting wires to power the light bulb, creating a complete pathway for electricity to travel. When the circuit is complete (closed), electrons flow from the negative terminal of the battery, through the wires and bulb, and back to the positive terminal, causing the bulb to illuminate.

Core Science Concepts

1. Electrical Circuits: Electricity needs a complete path to flow from one end of a battery to the other
2. Energy Transfer: Batteries store energy that can be changed into light energy
3. Conductors: Some materials like metal wires let electricity flow through them easily
4. Cause and Effect: When we connect a battery to a light bulb the right way, the bulb lights up

Pedagogical Tip:

Start with familiar examples like flashlights and toys that use batteries. Let students predict what will happen before demonstrating, then compare their predictions to observations.

UDL Suggestions:

Provide multiple ways to engage: hands-on circuit building, drawing circuit diagrams, and acting out being "electricity" moving through a human chain circuit around the classroom.

Zoom In / Zoom Out

1. Zoom In: Inside the wires, tiny particles called electrons are moving very fast from the battery through the wire to the light bulb, carrying energy that makes the bulb glow.

2. Zoom Out: This simple circuit connects to larger electrical systems - the same principles work in our homes where electricity travels through wires in the walls to power lights, computers, and appliances throughout the building.

Discussion Questions

1. What do you think would happen if we took one wire away from the battery? (Bloom's: Predict | DOK: 2)
2. Why do you think the light bulb is glowing? (Bloom's: Analyze | DOK: 2)
3. What other things in your house need batteries to work? (Bloom's: Apply | DOK: 1)
4. How could we make this light bulb brighter or dimmer? (Bloom's: Create | DOK: 3)

Potential Student Misconceptions

1. Misconception: "Electricity gets used up in the light bulb"
   Clarification: Electricity flows in a circle back to the battery; the energy changes from electrical to light energy
2. Misconception: "Both wires need to touch the same part of the battery"
   Clarification: One wire connects to each end (positive and negative) of the battery to make electricity flow
3. Misconception: "Bigger batteries always make brighter lights"
   Clarification: The voltage (strength) of the battery matters more than its physical size

Cross-Curricular Ideas

1. Math Connection: Count the wires, battery terminals, and light bulbs in the circuit. Create simple picture graphs showing "circuits that light up" vs. "circuits that don't light up" based on class experiments. Practice measuring wire lengths using non-standard units like paper clips.

2. ELA Connection: Write or dictate sentences about what happens when the circuit is complete or broken ("The light is on." "The light is off."). Read predictable pattern books about electricity, and create a class book where each student draws and labels one item that uses batteries.

3. Social Studies Connection: Explore how electricity helps people in the community (doctors use lights in hospitals, firefighters use flashlights, teachers use classroom lights). Discuss how people depend on electricity in their homes and schools, and why having reliable electricity is important.

4. Art Connection: Create circuit diagrams using yarn or string on paper to show the path electricity travels. Draw or paint pictures of light sources in their homes (lamps, flashlights, candles). Design a "light bulb" using recyclable materials and decorate it with markers or stickers.

STEM Career Connection

1. Electrician: An electrician installs and fixes the wires and electrical systems in homes and buildings so people can have lights and power. They use tools to connect wires safely and make sure electricity flows properly to where it's needed. Average Annual Salary: $56,900

2. Electrical Engineer: An electrical engineer designs and invents new things that use electricity, like better batteries, brighter light bulbs, and new gadgets. They use science and math to figure out how to make electricity work in smart ways. Average Annual Salary: $104,000

3. Light Technician: A light technician sets up special lights for concerts, plays, movies, and TV shows. They understand how electricity powers different kinds of lights and know how to make them bright or dim to create the right mood or effect. Average Annual Salary: $48,500

NGSS Connections

Performance Expectation: 1-PS4-3. Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.

Disciplinary Core Ideas: 1-PS4.C

Crosscutting Concepts: Cause and Effect

Science Vocabulary

* Battery: A container that stores energy to make electricity
* Circuit: A path that electricity follows in a complete circle
* Electricity: Energy that can flow through wires to power things
* Conductor: Something that lets electricity flow through it easily
* Energy: The power to make things work or change

External Resources

Children's Books:
- Switch On, Switch Off by Melvin Berger
- The Magic School Bus and the Electric Field Trip by Joanna Cole
- Oscar and the Bird: A Book About Electricity by Geoff Waring