

Photo Description



A person is using a small light bulb and wires to test if electricity can flow through different objects. The light bulb sits on top of a battery, and red and black wires connect to make a simple circuit that can light up the bulb.

Scientific Phenomena

This image demonstrates electrical conductivity - the ability of materials to allow electricity to flow through them. The anchoring phenomenon is a simple electrical circuit being used to test whether different materials are conductors (allow electricity to flow) or insulators (block electricity). When the circuit is complete with a conducting material, electrons flow from the battery through the wires and material, causing the light bulb to illuminate. The battery provides the electrical energy, and the continuous path allows current to flow, demonstrating the fundamental principle that electricity needs a complete circuit to work.

Core Science Concepts

1. Simple Circuits: Electricity needs a complete path (circuit) to flow from the positive end of a battery, through wires and components, and back to the negative end.
2. Conductors vs. Insulators: Some materials (like metals) allow electricity to flow through them easily (conductors), while others (like plastic, wood, rubber) block electricity (insulators).
3. Energy Transfer: The battery stores chemical energy that gets converted to electrical energy, which then becomes light and heat energy in the bulb.
4. Observable Evidence: We can tell if electricity is flowing by observing whether the light bulb glows, providing concrete evidence of an invisible phenomenon.

Pedagogical Tip:

Start with hands-on exploration before introducing vocabulary. Let students predict which materials will make the light work before testing, then discuss their observations to build understanding naturally.

UDL Suggestions:

Provide multiple ways for students to engage: tactile exploration of different materials, visual charts to record predictions and results, and verbal discussions. Use picture cards showing conductors and insulators for students who need visual supports.

Zoom In / Zoom Out

1. Zoom In: At the atomic level, conductors have electrons that can move freely between atoms, creating an "electron highway." In insulators, electrons are tightly bound to their atoms and cannot move easily, blocking the electrical flow.
2. Zoom Out: This simple circuit testing connects to larger electrical systems in our homes, schools, and cities. Understanding conductors and insulators helps engineers design safe electrical systems, from the copper wires in our walls to the rubber coating that protects us from getting shocked.

Discussion Questions

1. What do you think will happen if we touch the wires to a penny? A crayon? (Bloom's: Apply | DOK: 2)
2. Why do you think some things make the light work and others don't? (Bloom's: Analyze | DOK: 3)
3. What would happen if we took out the battery from our circuit? (Bloom's: Predict/Apply | DOK: 2)
4. How is this tiny light bulb similar to the big lights in our classroom? (Bloom's: Compare | DOK: 2)

Potential Student Misconceptions

1. "Electricity comes from the light bulb" - Students may think the bulb creates electricity rather than understanding that the battery provides the energy and the bulb uses it to make light.
2. "Big objects conduct better than small ones" - Students might think size determines conductivity, when actually the material type (metal vs. non-metal) is what matters most.
3. "If it doesn't light up, the battery is dead" - Students may not realize that an incomplete circuit or insulating material prevents the light from working, even with a good battery.

Cross-Curricular Ideas

1. Math Connection: Create a chart to record which materials make the light work (yes/no) and count how many conductors vs. insulators the class tested. Students can make simple tally marks or use picture graphs to show results, practicing data collection and basic counting skills.
2. ELA Connection: Read *Switch On, Switch Off* by Melvin Berger, then have students draw pictures and dictate or write simple sentences about things in their homes that use electricity (lights, refrigerators, toys). Create a class book titled "Things That Need Electricity" to build vocabulary and comprehension.
3. Art Connection: Have students create a colorful poster showing "Things That Let Electricity Through" (conductors) versus "Things That Block Electricity" (insulators) using magazine cutouts, drawings, or collage materials. This makes abstract concepts concrete and visually memorable.
4. Social Studies Connection: Discuss how electricity helps people in different jobs (firefighters use electric lights, teachers use projectors, doctors use electric tools). Connect to community helpers by exploring how electricity makes our neighborhoods and schools safe and functional.

STEM Career Connection

1. Electrician - An electrician is a person who installs and fixes the wires and lights in houses, schools, and buildings. They use special tools to make sure electricity flows safely where it's needed so we have lights, power for our computers, and electricity for all the things we use every day. Average Salary: \$56,900/year
2. Electrical Engineer - An electrical engineer designs new things that use electricity, like phones, toys, light bulbs, and solar panels that catch energy from the sun. They figure out how to make electricity work better and create new inventions that help people. Average Salary: \$104,000/year
3. Renewable Energy Technician - A renewable energy technician helps install and take care of solar panels and wind turbines that create electricity from the sun and wind instead of batteries. They work to help our Earth stay clean by using natural energy sources. Average Salary: \$56,200/year

NGSS Connections

- Performance Expectation: K-PS3-1 - Make observations to determine the effect of sunlight on Earth's surface
- Disciplinary Core Ideas: K-PS3.A - Energy and Matter (sunlight warms Earth's surface)
- Crosscutting Concepts: Cause and Effect - Simple tests can be designed to gather evidence to support or refute student ideas about causes

Note: Electrical circuits are typically introduced in upper elementary grades, but this can connect to K standards about energy and cause-and-effect relationships.

Science Vocabulary

- * Circuit: A complete path that electricity can follow to flow from a battery and back again
- * Battery: A container that stores energy and can power electrical things
- * Conductor: A material that lets electricity flow through it easily, like metal
- * Insulator: A material that blocks electricity and keeps it from flowing through
- * Electricity: A type of energy that can flow through wires to power lights and other devices
- * Current: The flow of electricity through a wire or circuit

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