

Explore the concept of energy transfer using everyday items you can find around your home. Students will conduct an experiment using a lightbulb, foil, battery, and wire to create an illuminated lightbulb. This hands-on activity will help students visualize how energy moves through a circuit, enhancing their understanding of electrical conductivity and the importance of creating a closed loop for effective energy transfer. This experiment emphasizes critical thinking and problem-solving skills as students work to ensure their circuits function correctly.

Chip Kids is a digital series about the science and engineering behind microchips and how semiconductors influence our everyday lives. Each episode features a fun, hands-on experiment that can be recreated using ordinary, safe materials. The series and the accompanying learning materials aim to inspire and motivate all students to see STEM careers as exciting opportunities they can achieve.

Learning Objectives:

- Students will understand the concept of energy transfer.
- Students will learn how energy moves from one place to another.
- Students will conduct an experiment to visualize energy transfer using a battery, aluminum foil, and a lightbulb.

Materials:

- Aluminum foil
- AA Batteries (1)
- D Batteries (2)
- Tape
- 1.5 v Lightbulb (flashlight bulb)
- Copper Wire
- Scissors
- Light It Up! Lab Report
- TWLH handout

Driving Question

- How does energy move from one place to another?

Standards

- **4-PS3-2.** Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

Science and Engineering Practices

- Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or to test a design solution.

Crosscutting Concepts

- Energy can be transferred in various ways between objects.

Vocabulary

- Circuit- a pattern that can allow electricity to flow if closed.
- Current Electricity- the flow of electrons through a complete circuit of conductors.
- Hydraulic systems- complicated fluid-based systems for transferring energy.

Before Viewing

1. Introduction
 - Ask students what they think energy is and how it can move from one place to another.
 - Explain to students that energy can be transferred in several ways, such as through heat, light, or electricity.
2. Explanation of Energy Transfer
 - Energy in Everyday Life: Discuss common examples of energy transfer, like toaster heating bread or a car engine running.
 - Focus on Electrical Energy: Explain how electricity can transfer energy through circuits, making devices work.
3. Experiment: *Light It Up!*
 - Set-up Instructions:
 - Distribute materials: *Light It Up!* Lab Report, TWLH handout, a battery, a small lightbulb, a piece of aluminum foil, tape, and scissors.
 - Have students complete the “T” and “W” portion of the TWLH handout.

- Have students write their hypothesis in their Lab Reports.
- Demonstrate how to connect the battery to the lightbulb using the aluminum foil as a conductor.
- Instruct students to use the foil to create a circuit, ensuring that the foil touches both the battery terminals and the lightbulb contacts.
- Explain that the battery has a positive side (cathode) and negative side (anode). Electrolytes in the battery allow the flow of electrical charge between the anode and cathode.
- Conduct Experiment:
 - Have students work in groups to complete the Light It Up! experiment.
 - Encourage them to observe and complete their Lab Reports.

While Viewing

Video: *Light It Up!*

- Allow students to complete lab questions.
 1. What happens when the wire or foil is connected to the battery?
 2. What happens when the lightbulb is added to the circuit?
 3. What would happen if two batteries were stacked on top of each other?

After Viewing

Class Discussion:

- Ask students to share their observations. Did their lightbulb light up? Why or why not?
- Discuss why aluminum foil works as a conductor and the importance of creating a closed circuit.
- Talk about how energy is transferred from battery to the lightbulb to produce light.

Conclusion

- Recap how energy can be transferred from the battery to the lightbulb, making it light up.

Discussion Questions for Students:

1. What are some other examples of energy being transferred in your daily life?
2. Why is it important for the circuit to be closed for the lightbulb to work?
3. Can you think of any other material other than aluminum foil that might work to conduct electricity? Why or why not?
4. How does understanding energy transfer help us understand technology more effectively?