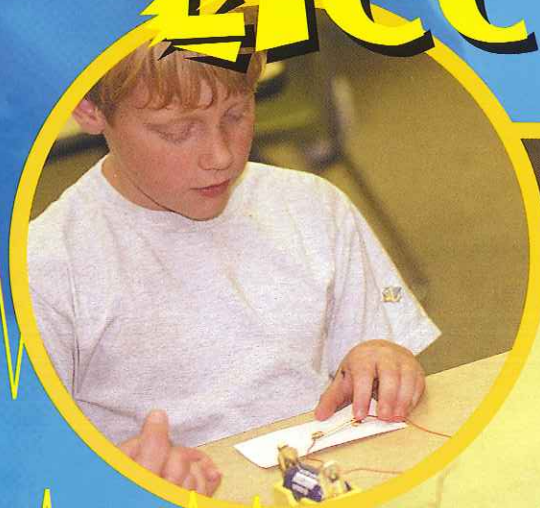


National 4-H Curriculum
BU-06848



Magic of Electricity

Photo Courtesy: Science First Inc.



Project Activity Guide

Name _____

County _____



REVIEWED & RECOMMENDED
National 4-H Curriculum

Bright Lights

Imagine that you are out in the woods and your flashlight gets smashed on a rock. It is starting to get dark. You take the flashlight apart and discover that the **incandescent light bulb** and the batteries are okay, but the case has been destroyed. In this activity you will see if you can fix the light to use on your camping trip.

Power Up

Night is fast approaching, and you really need to light the bulb since it is your only source of light. You look in your backpack and find a piece of aluminum foil. Using only the battery, bulb and the piece of aluminum foil, see if you can make the bulb light. Brain storm with your helper to come up with ideas on how to make the bulb light. Once you have made the bulb light, take a close look at your set-up. Can you imagine the flow of electricity from the battery, through the bulb filament, and back to the battery? Draw a picture of the path that the electricity follows to light the bulb.



Brain Boosters

1. Using items found around your house, make a flashlight that is easier to use than the one you made in this activity. Demonstrate to your helper how your new flashlight is different from the one you would buy at the store.

2. Think about what other things electrical circuits do other than light up flashlights. Are there circuits in CD players? clocks? doorbells? Explain to your helper how electric circuits run many of the things we use.

Activity:
Life Skill:

Electric Skill:
Science Process Skill:

Success Indicator:

National Science Standard:

Build a flashlight
Solving Problems—Identifying a problem, generating solutions and evaluating results
Wiring a simple circuit
Solving problems through experimentation
Understands why an incandescent bulb lights up
Electricity in circuits can produce light



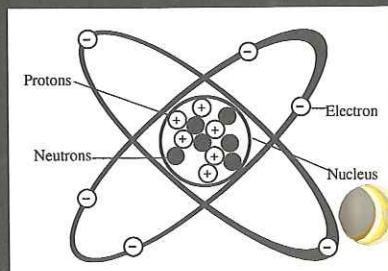
D-cell battery, light bulb, a piece of aluminum foil



What is Electricity

Although we cannot see electricity, we know it exists because we use it every day to run things such as toasters, vacuum cleaners and computers. Scientists have discovered that everything in the world is made of tiny particles called **atoms**. Atoms are made up of even smaller particles called **electrons**, **protons** and **neutrons**. Electrons have a negative charge and protons have a positive charge. Electricity is produced when something upsets the balance between

electrons and protons in the atoms, causing the electrons to move from one atom to another. This movement of electrons creates the **energy** that powers your CD player or television!



"The Pathway to Light"

Glossary Words

- Atom
- Battery Terminal

- Circuit
- Electron
- Energy

- Filament
- Incandescent Light Bulb

- Neutron
- Proton
- D-cell Battery

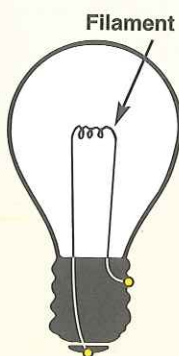


Lighting the Bulb

The light bulb in your flashlight needs electricity to light it up. Electricity is the flow of **electrons**. A battery provides a flow of electrons by pushing electrons out of one end and pulling electrons back into the other end. This flow of electrons will only happen when the electrons are given a path that they can travel along. Metal makes a great path for electrons to travel on, which is why aluminum foil is used in this activity. Air, on the other hand, makes a terrible path! That is why the electrons don't just run out of a battery when the **battery terminals** are touching only air.

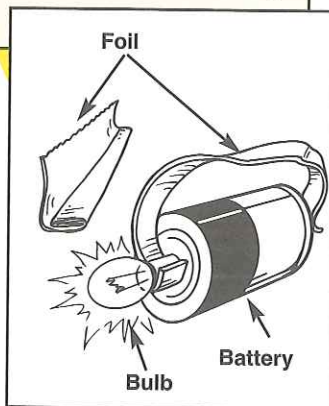
The only way to make the bulb light is to make sure that the electrons have to go through the bulb to get back to the battery. Look at the picture of a light bulb. When the electrons go through the filament of the bulb the bulb lights up. To make the electrons go through the filament, you must make sure that the filament is part of the path! To do this you must make sure that one part of the path touches the metal side of the light bulb, and another part touches the light bulb at the very bottom of the bulb.

If there is a path that doesn't include the bulb filament, the electrons will choose that path. The filament is a tight squeeze for the electrons and they will take an easier way if it is available.



Making the Bulb Light

1. Cut the aluminum foil into a strip about 2 inches by 6 inches.
2. Fold the foil over and over along the long edge, until you have a piece that is still six inches long, but only a quarter of an inch wide.
3. Touch one end of the battery to the bottom end of the bulb, and then connect the side of the bulb to the strip of aluminum foil.
4. Connect the strip of foil to the other end of the battery.



You have built your first **circuit**! A circuit needs three things:

- Something to push electrons (in this case, a battery)
- A path for the electrons to follow (aluminum foil and light bulb)
- Something for the electrons to do (like light up a light bulb)

To test your understanding of a circuit, see what happens when you connect the foil to both ends of the battery and then put the bulb on top of the foil strip. Does the bulb light up? Why?



Making Connections

Share With Your Helper

- ☐ What equipment was needed to make the bulb light?
- ☐ What was the source of electricity used to make the bulb light?

Process What's Important

- ☐ How is your imitation flashlight different than one you would buy at a store?
- ☐ Why is it important to understand how electricity works?

Generalize To Your Life

- ☐ What is another time that you experimented to solve a problem?
- ☐ Describe another time when brainstorming helped you solve a problem.

Apply What You Learned

- ☐ When faced with a new problem, like fixing a flashlight, describe some ways that you could figure out the answer.
- ☐ Describe how technology can help us organize our thoughts and solve problems.



In 1709, an English scientist, Francis Hawksbee, made the first electric light! First, he removed most of the air from a hollow glass ball. Then he spun the ball on an axle with a crank and let it rub against his hand. As a charge of electricity built up in the hollow globe, it began to glow! Bright Lights!