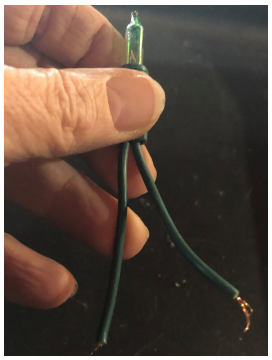
_____ STEM Bites _____

TODAY'S EXPLORATION: Electrical Cards

Grades 3–4

NGSS:
4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

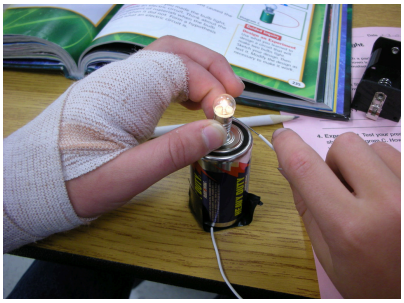


Materials:

- Cardstock, file folders, or construction paper (two pieces per card) or used greeting cards
- AAA or AA battery
- Drawing materials (crayons, markers, pencils)
- Aluminum foil
- Tape (electrical or masking)
- Old set of holiday lights. *To use holiday lights, cut the wire on either side of one light bulb as close to the neighboring bulbs as possible, leaving a long length of wire attached on both ends of the bulb you will be using. Using scissors, strip the ends of the wire by removing the rubber casing and exposing the wire strands.*

Investigations:

1. Learn about electrical circuits by first messing around with the battery and bulbs. Explore how to connect the wires to the battery to make the bulb light up.
2. After getting the bulb to light explore how a folded strip of aluminum foil can be used as wire. Insert the foil between the bulb and the wires.
3. Experiment with different materials to determine which conduct electricity and which are insulators; preventing the electricity from flowing. Place the different items between the foil and the wire. If the bulb lights the material is a conductor, if it does not light the material is an insulator.
4. Next, use the batteries, bulbs and foil to make an electrical card. Fold a piece of cardstock in half to make a card. Can also use old file folders cut to the size desired.
5. Create a design (or find something interesting on an old greeting card) that would be enhanced by a small light on the front of the card (such as a cupcake with a candle that uses the light for the flame or stars in the sky).



6. Make a hole in the card where you would like the light to poke through.
7. Get a light from a set of old holiday lights. Poke the light through the image on the front of the card.
8. Tape the battery in place so the wires from the light can reach the battery.
9. When everything is in place the card is ready to be delivered. Just before handing it off connect the light to the battery. Congratulations, you just made a circuit to light up someone's day with a glowing card!

Extensions

1. Design a way to make the light turn off when the card is closed and on when the card is open. This can be done by developing a way to have the circuit open or disconnected when the card is closed.
2. Explore how different sized batteries affect the brightness of the bulb.

Guiding Questions:

1. Describe the path of energy as it is being transferred from place to place in this exploration.
2. Is it possible to light more than one bulb with your battery? Explain any differences you notice if more than one bulb is used.

Product or Artifact Possibilities:

- Draw a diagram of the circuit created with the bulb and battery. Describe the different types of energy involved in the circuit.
- Make different cards for family and friends. Send a thank you card to your teacher.
- Write a fairy tale to go with your electrical card.

What Are We Discovering?

"Circuit" comes from the same root word as "circle" because of the way a circuit works. A wire, connected to a power source, makes contact with a device requiring power to function or operate. A second wire runs from the device back to the power source. These connections make a pathway, allowing electrons to flow through the "circle" of wires.

Reading Connection:

What is Electricity?: By Ronald Monroe
Epic Books for Kids

Acknowledgments:

Lesson contributed by GO-STEM. Adapted from National Inventors Hall of Fame "Brighten someone's day" activity.