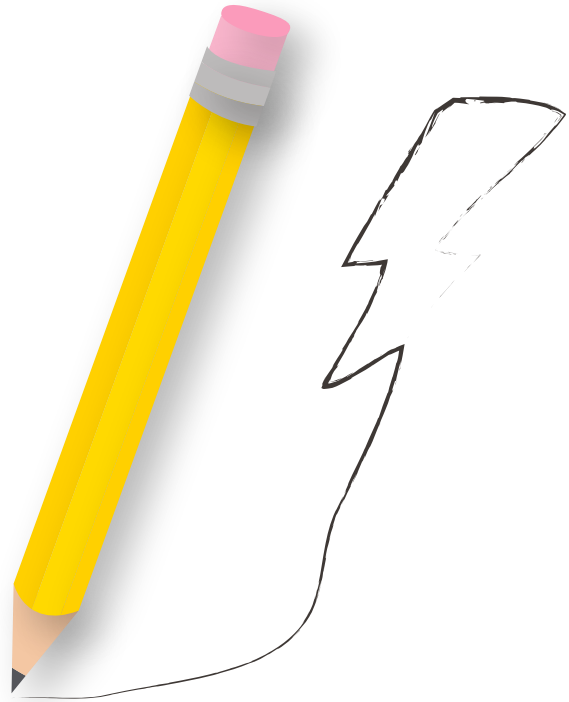# Pencil Power!

Collect

- Wooden Pencil
- 3 volt button battery
- LED
- Pencil sharpener
- Aluminum foil
- Scissors
- Tape

Build a circuit

1. Cut a strip of aluminum foil so that is about ½ inch wide and 3 inches long.

2. Place the negative side of the battery on top of one end of the foil. Tape the battery and foil together. Make sure that the tape doesn't completely cover the positive side of the battery.

3. Tape the positive (longer) leg of the LED to an exposed portion of the positive battery contact.

4. To light up the LED, complete the electrical circuit by bending the foil strip so that it can touch the negative (shorter) leg of the LED.

Electrify the pencil

5. Find the metal piece that holds the eraser to the pencil. Touch this metal to the aluminum foil strip

6. Touch the negative leg of the LED to the metal part of the pencil, making sure that the leg does not touch the foil. Did it light the LED?

7. Test other parts of the pencil like the wood, graphite point, and eraser in the same way.

8. Remove the eraser end from the pencil. Sharpen the pencil at both ends.

9. Try to light the LED by touching one tip of the pencil to the foil strip and the other tip of the pencil to the negative leg of the LED.

10. Try adding other materials to the circuit like paper clips, rubber bands, wax paper, keys, coins, or crayons to test if they are insulators or conductors.

What happened?

Electricity is the flow of electrons through a circuit. This kind of energy is used to make things light up, move, make sound, and heat up. A circuit is a path that electricity moves through. Circuits are usually made of metal wire that connects a power source to a load and back. The pencil circuit used a battery as the power source and the LED as the load.

Only some of the parts of the pencil allowed the LED to light up. That is because not all materials allow electrons to flow easily through them. The metal and graphite parts of the pencil are conductors, which allow the electricity from the battery to be transferred easily to the light. Other materials are insulators, like the eraser or wood of the pencil. These materials do not allow electrons to flow freely, which means electricity cannot pass through them, and the LED will not light.