



nn

STEMulates Project-Based Challenge

Challenge: Create a Circuit (4-6)

Learning Outcome: Students will learn how to create a basic circuit using simple materials to light up a small LED. They'll explore how electricity flows through a circuit and what happens when the circuit is open or closed.

Concepts Covered:

Electricity Flow: Discuss how electricity flows from the battery, through the wires, to the LED, and back to the battery in a circle, forming a circuit.

Open vs. Closed Circuit: Explain the concept of an open circuit (disconnected) and a closed circuit (connected).

Polarity: Teach that the LED has positive and negative sides and will only work if connected correctly.

Procedure

1. Set up the Battery and Holder:
 - Show the students the battery and the battery holder. Insert the AA battery into the holder.
2. Connect the LED:
 - Explain that electricity flows from the battery through wires to light up the LED.
 - Attach one end of an alligator clip wire to the positive (red) wire from the battery holder.
 - Attach the other end of the wire to the longer leg of the LED (the positive side).
3. Complete the Circuit:
 - Now, connect another alligator clip wire to the negative (black) wire from the battery holder.
 - Attach the other end of this wire to the shorter leg of the LED
4. Turn On the Light:

Materials:

- 1 AA battery
- 1 battery holder (with wires attached)
- 1 LED light bulb (or small 3V light bulb)
- 1-2 alligator clip wires (or insulated copper wires with exposed ends)

Additional Supplies (Step 2)

- Light bulb holders
- Paper
- 2 paperclips

- When both wires are connected to the LED, the circuit should complete, and the LED will light up. If it doesn't work, check to ensure all connections are tight and that the LED is connected the right way.

5. Explore and Experiment:

- Show students how disconnecting a wire (or opening the switch) turns off the light.
- Let them try adding a switch if you have one or disconnect/reconnect the wires themselves to see how a circuit opens and closes.

6. Add a Switch

- Locate the red wire attached to the battery holder; this is the positive wire.
- Take one alligator clip wire and attach one end to the red wire.
- Hold the LED light bulb and find its two legs. The longer leg is the positive side, and the shorter leg is the negative side.
- Attach the other end of the alligator clip wire (connected to the red wire) to the longer leg of the LED.)
- Now locate the black wire from the battery holder; this is the negative wire.
- Take the second alligator clip wire and attach one end to the black wire.
- Attach the other end of the second alligator clip wire to the shorter leg of the LED.
- At this point, the circuit should be complete, and the LED should light up!

Notes: This is because the metal paperclips do conduct electricity but the paper does not.

Metals are good conductors of electricity , so wires are made from copper, which has the added advantage that it can be stretched thin without breaking. The wires you use are covered in a coat of plastic for safety which does not conduct electricity.