



## SCIENCE TAKE-HOME KITS FACILITATOR'S GUIDE

### GLOWING NAME TAGS

- **Aim:** To create a circuit on a paper to light up the name tags.
- **Materials required:**
  - ✓ LED
  - ✓ Copper tape
  - ✓ 3V coin battery
  - ✓ Circuit template (if possible, print on thicker paper like cardstock for better results)
  - ✓ Paper clips
  - ✓ \*Glue stick
  - ✓ \*Tape
  - ✓ \*Scissors
  - ✓ \*Hole punch or pen

\*These materials are not provided in the kit. Gather these materials from home.

- **Watch the experiment video on the website at [www.pta.org/stem/athome](http://www.pta.org/stem/athome)**
- **Questions to think before you start:**
  - ✓ Have you ever created an electrical circuit on paper?
  - ✓ Does copper tape conduct electricity?

- **Instructions:**

Make sure to perform the experiment as a team (parent and student). Please read the instructions out loud.

#### A. Make the name tag

**Step 1 - Student:** Fold the paper from the center along the double dotted lines so that the circuit and the bulb are on outer sides. The side with the picture of the bulb is the front.

**Step 2 - Student:** Write your name near the bulb. Decorate the nametag as you please.

#### B. Add the LED

**Step 3 - Parent:** Fold the back corner of the sheet along the dashed line outwards. Using a glue stick, stick the folded sheets together (the front side with the lightbulb to the back, but not the flap).

**Step 4 - Student:** Use a hole punch/pen to make a small hole at the center of the lightbulb image.

**Step 5 - Parent:** Place the LED light through the hole so the light is on the front. Bend the LED legs so they sit flat along the paper with the longer one extending upward toward the "+" sign and the shorter one going down toward the "-" sign along the gray line.

**Step 6 - Student:** Secure the legs of LED light using small pieces of copper tape (use scissors to cut the tape). Make sure the two pieces do NOT connect! Stick one piece of tape on the part of the circuit that says, "Tape 1." Stick another piece of tape on the part that says, "Tape 2." Make sure the pieces of tape are the same length as the guiding lines.

#### HELPFUL TIPS

Adult supervision is required, batteries are dangerous if swallowed.

The longer leg of LED is "+" and shorter leg is "-".

Make sure to place copper tape on the solid lines only.

Secure the paper clip properly, Copper tape should touch the battery on both sides.

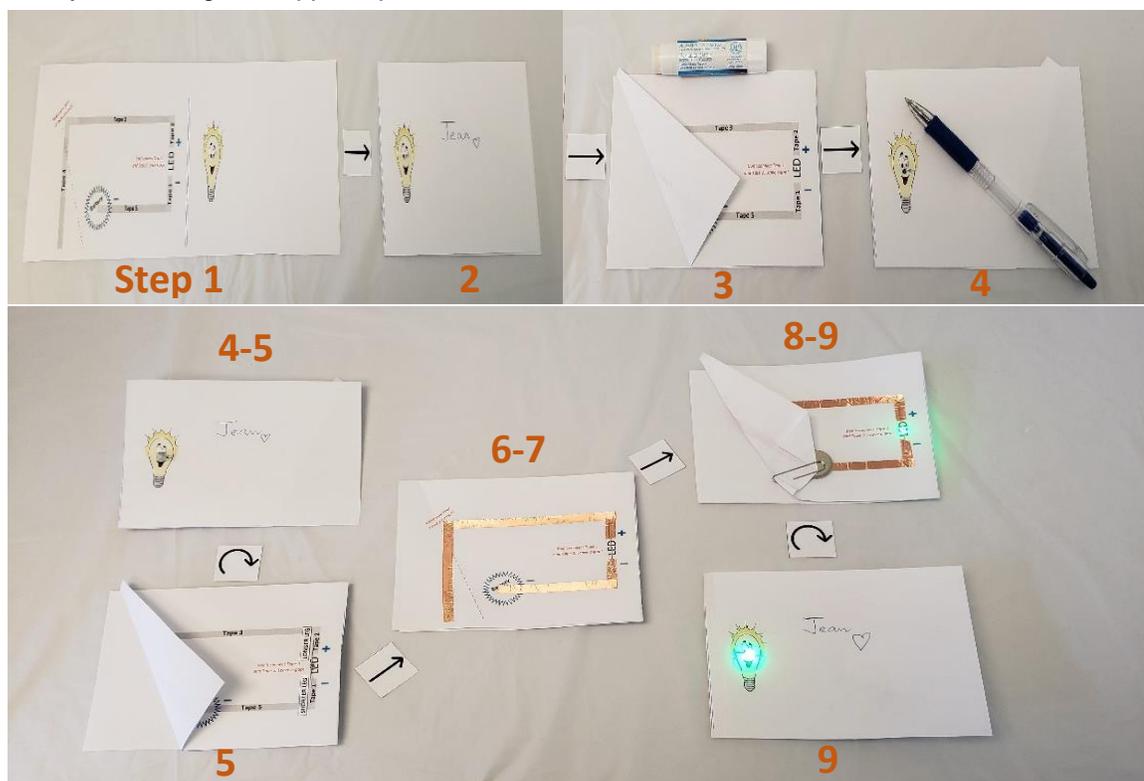


### C. Complete the circuit

**Step 7 - Student:** Use copper tape to complete the circuit. Similarly, stick three separate pieces of tape on each of the sections – “Tape 3,” “Tape 4,” and “Tape 5.” Be sure the pieces of tape connect in each corner and are the same length as the guiding lines.

**Step 8 - Parent:** Place the battery on the circle with the “-” side facing down. It should sit on the copper tape that’s inside the battery circle.

**Step 9 - Student:** Fold the corner of the sheet over the battery and clip it with paper clips. This completes the circuit and lights up the nametag. If it’s not lighting properly, you need to better secure the battery. Use clear tape to attach the flap covering the battery to the nametag. Make sure you tape it tightly so that everything sticks firmly together. Also, check to be sure your battery is touching the copper tape.



- The science behind the fun:**  
 Copper is a good conductor of electricity. The copper tape connects the “+” side of the battery to the positive leg of the LED light, and the negative leg of the LED light to the “-” side of the battery. This forms a closed circuit and hence the electricity flows from battery to the LED and the LED turns on.
- Real world application:**  
 Many devices that we use every day require electricity. All these contain electrical circuits. LEDs are also commonly used in decorative string lights, smartphone backlighting, parking garage lighting, walkway, display boards in stores and roads. They are widely used in residential homes too because they are energy efficient, that is they use less electricity than traditional lights.

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- **Expand your knowledge:**

- ✓ What happens if you replace copper tape with clear tape?
- ✓ What happens if you flip over the battery? Do the same with the LED and find out what happens.

**Did you know?**

- Pure copper is reddish orange, soft metal. Copper is used for making cooking utensils, wirings, motors, etc. in cars and trucks.
- Copper is also used in building construction for wiring, plumbing and weatherproofing.
- LED stands for Light Emitting Diode.
- LEDs can be very small (smaller than 2 mm) and can be easily attached to various circuit boards.