



SCIENCE TAKE-HOME KITS FACILITATOR'S GUIDE

COPPER TAPE FLASHLIGHTS

- **Aim:** Make your own flashlight at home.
 - **Materials required:**
 - ✓ LED
 - ✓ Copper tape
 - ✓ 3V coin battery
 - ✓ Popsicle stick
 - ✓ Paper clips
 - ✓ *Pen
 - ✓ *Scissors
 - ✓ *Clear tape
- *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**
 - **Questions to think before you start:**
 - ✓ Have you ever made an electrical circuit with popsicle stick?
 - ✓ Does the LED need electricity to light up?

- **Instructions:**

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

Step 1 - Team Work:

- ✓ Using a pen, mark one end of popsicle stick as "+".
- ✓ Then, mark the other side of the same end of the popsicle stick as "-". (The "-" sign should be behind the "+" sign.)
- ✓ Place the LED light on the tip of the labeled end of the popsicle stick so that the longer leg of the LED light falls along the "+" side and the short leg of the LED light falls along the "-" side of the stick.
- ✓ The parent should keep holding the LED light in this position.

Step 2 - Student: Cut the strip of copper tape so it will cover the length of the popsicle stick minus ½ an inch. Stick the tape on the popsicle. Start by covering the LED light's legs and going all the way down to ½ an inch above the bottom end of the popsicle stick.

Step 3 - Parent: Cut another strip of copper tape the same length and place it on the opposite side of the popsicle stick in the same way.

Step 4 - Student: Place the battery around 2/3 of the way down towards the bottom end of the popsicle stick (opposite the LED light). It should be on the "+" side of the stick. The battery should sit "+" side down on the copper tape. Hold it there.

Step 5: Parent: Use one to two paper clips to hold the battery in place on the stick (it's easiest if you attach 2 paper clips horizontally, one coming from the left and one from the right). Now, your flashlight is ready! If your LED light is not lighting up, secure the battery to the stick (and copper wire) more firmly – you can use a small piece of clear tape if the paper clips aren't enough.

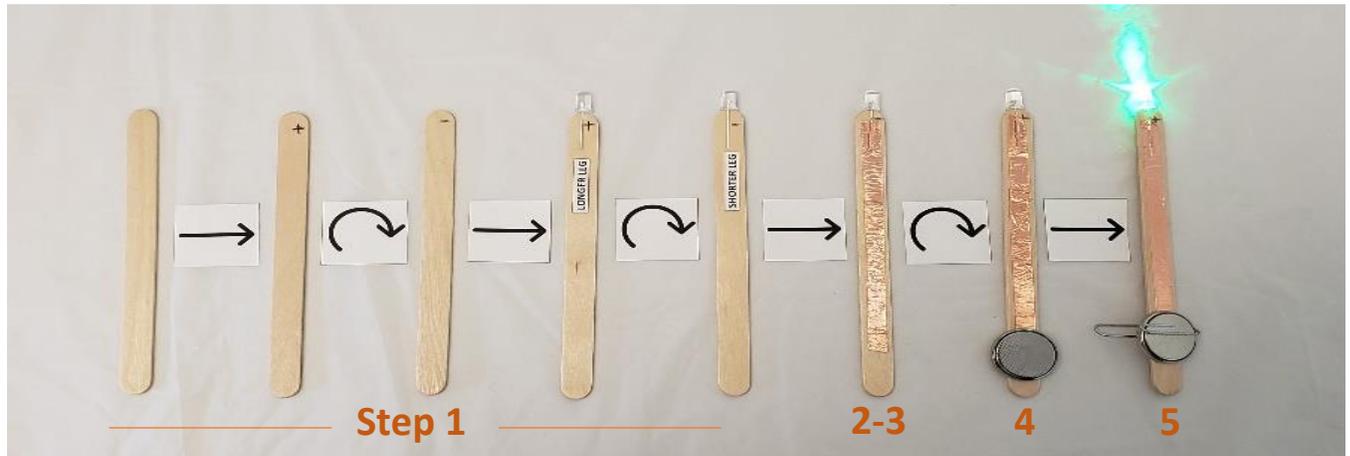
HELPFUL TIPS

Adult supervision is required, batteries are dangerous if swallowed.

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

Secure the paper clip properly. It should press the battery firmly into the copper tape and popsicle stick.

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- 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. The copper tape carries the charge from the power source (battery) to the LED light. The paper clip helps to complete the circuit and allows the LED light to glow. This makes your flashlight work.
- Real world application:**
 Nowadays, LED lights are used everywhere due to their compact size and low consumption of energy. LEDs are also in residential and business lighting tasks such as in desk lamps, reading lights, night lights, security lights and spot lights. Also, many devices that we use every day require electricity, which means that they contain electrical circuits, like we built here!
- Expand your knowledge:**
 - ✓ What happens if you don't attach the paper clip?
 - ✓ What happens if you don't place the battery on the copper tape?


Did you know?

- The “+” and the longer leg of the LED light is called “anode.” The “-” and the short leg of the LED light is called as “cathode.”
- LED lights don't attract as many insects as other traditional light sources since they have very little UV content.

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