

Locker Lights

CREATE A CIRCUIT THAT LIGHTS UP YOUR LIFE!

Circuits are all around you. They're in children's toys, in lamps, in flashlights. Many of these circuits include a switch that lets us control when electricity flows through it. With a few simple materials, you can make a switch and a circuit to display anywhere!

SMART START:

- ★ For a good introduction to circuits and LED lights, do the SciGirls Dough Creatures activity first.
- ★ If girls are unfamiliar with LEDs (light emitting diodes), start with a brief introduction. LEDs are a bright, energy-efficient, and long-lasting light source made from semiconductors. Point out that each LED has two legs, or leads, one slightly longer than the other. Ask girls if they can think of any places they have seen LEDs (bike lights, camping flashlights, light-up sneakers, cell phones, toys).
- ★ When storing button batteries leave them in their original packaging or store them flat. If they touch each other they can heat up and be drained of power.

HERE'S HOW:

1. Introduce circuits. Ask your girls: What is electric current? A circuit? What are batteries used for in a circuit? (In a circuit, current flows in a complete loop, for instance from a battery, along one wire, through a device such as a buzzer or light bulb, then along another wire and back to the battery.) Circuits need three things:

- ★ source of power (battery)
- ★ conductive materials for electricity to flow (metal)
- ★ load (motor, lightbulb, buzzer, etc.)

You'll need:



For each girl:

- 1 LED light bulb
- 1 three-volt button battery
- craft foam, cardboard, or cardstock
- large paper clips
- brass fasteners
- markers/stickers/pipe cleaners/other decorative objects
- optional: scissors, single-hole punch, wire, wire strippers

2. Experiment with LEDs. Give each girl one battery and one LED. Each girl should use the battery to light up her LED. After 2 to 4 minutes of experimenting, discuss the positive and negative sides of the battery, and what the girls had to do to make their LED light up. Note that the longer side, or lead, of the LED must be touching the positive side of the battery, while the shorter lead must be touching the negative side.

3. Introduce switches. Switches disrupt the flow of electricity. Ask the girls where they have seen switches (phones, lights, fans)². Discuss how the girls could make a switch using simple metal materials, like paper clips and brass fasteners. Suggest that movable metal parts (for example, a paper clip attached to a brass fastener) make good switches.

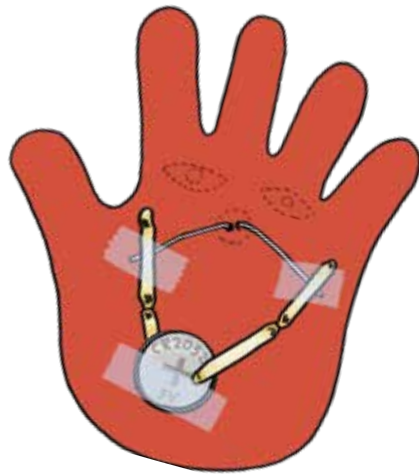
4. Make a switch. Pass out the brass fasteners and paper clips. Have the girls use the materials to create a circuit with a switch on the table first using only the brass fasteners and/or paper clips. Encourage them to troubleshoot and work with their neighbors.



SAFETY NOTE: In this activity it is very easy to create a short circuit (when the positive and negative sides of the circuit touch), which can cause the metal parts and battery to heat up very quickly. To avoid this, talk about short circuits and have girls draw out their circuit before connecting

5. Introduce the SciGirls Challenge: Create a locker decoration that lights up and can be turned on and off using a switch. Have the girls sketch out their designs, labeling the flow of electricity of the circuit. Remind them that the paper, tape, foam and/or cardboard that they will use are insulators.

6. Build: Create the locker decoration. If the girls run into problems, encourage them to trace the path of electricity through their circuit, and modify the design.⁶



POINTER:

If the girls want to hide the parts of their circuit they can put them on the other side of the cardstock/foam along with the battery. *Note: Warn them that the LED leads will break off if they bend them back and forth more than a few times.*



7. Decorate: Once the girls' circuit is working, tape the LED and any loose parts to the cardstock/foam, and decorate using markers, pipe cleaners, and other objects.⁴

POINTER: Some decorative materials, like pipe cleaners, are conductors. Girls should be sure that any decorative materials do not interfere with the circuit itself.



8. Share: Have the girls display their designs and discuss the parts of the project that were challenging. How did they overcome those challenges?⁵

9. Extension: Can girls make a circuit with two or more LEDs? What other materials could they use to make their decoration?



Mentor Moment

Natalia Rodriguez is a software engineer working on data visualizations. She gets to be creative, designing visualizations that people can understand and learn from. Her advice is to bring your whole self to whatever work you do, and create products that are inclusive.



Introduce your girls to inspiring role models, like Natalia Rodriguez, by watching **Role Model Profiles** on the *SciGirls* website!⁷

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