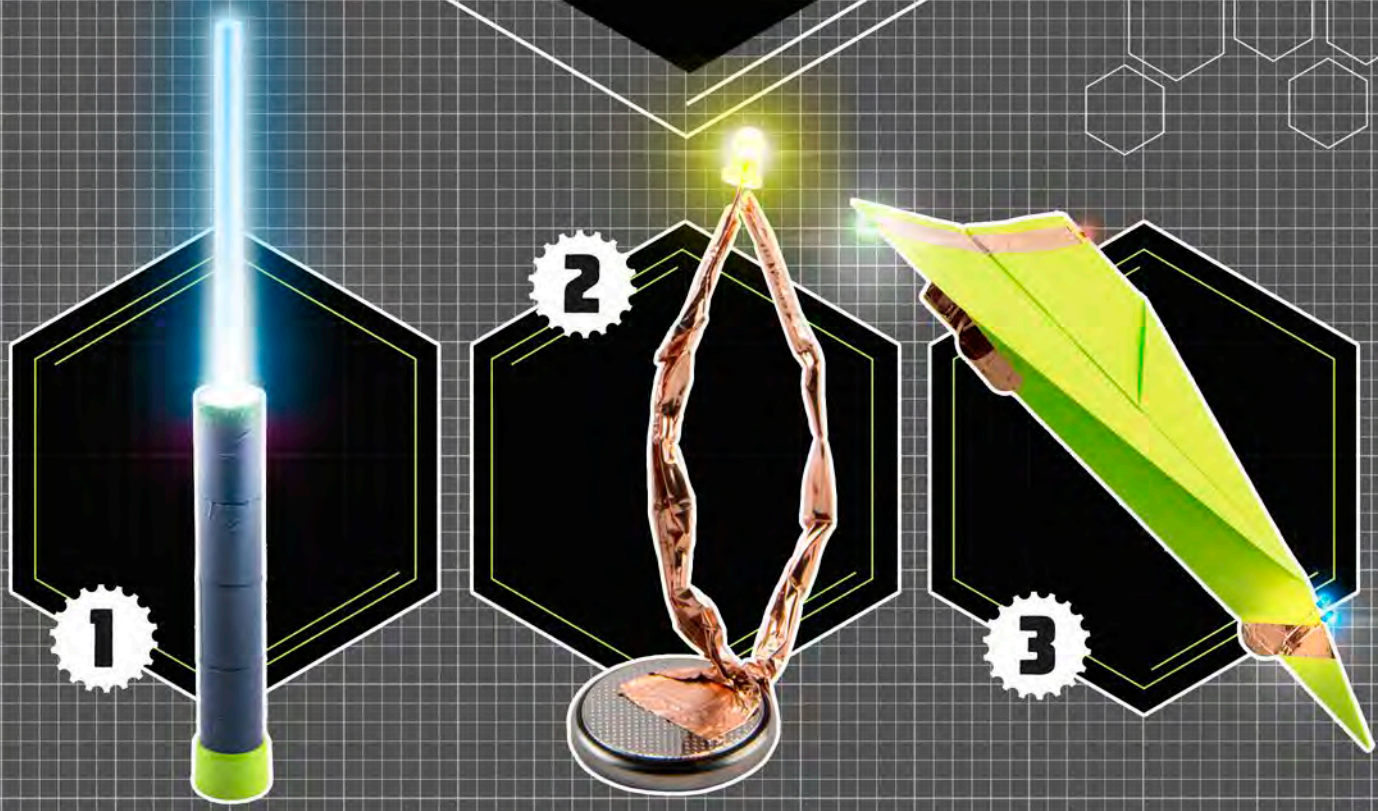
A 4D BOOK

ELECTRONICS

PROJECTS TO BUILD ON



by TAMMY ENZ

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LIGHT IT UP

Electronics power our world. From the lights that help us see to the satellites that allow us to communicate across the globe, we rely on electricity all day, every day.

Learn the science behind little lights, brilliant breadboards, and short circuits. You may be starting out small, but someday you could light up the world.

1. Ask an adult to download the app.

Capstone 4D Education

2. Scan any page with the star.

3. Enjoy your cool stuff!

OR

Use this password at capstone4D.com

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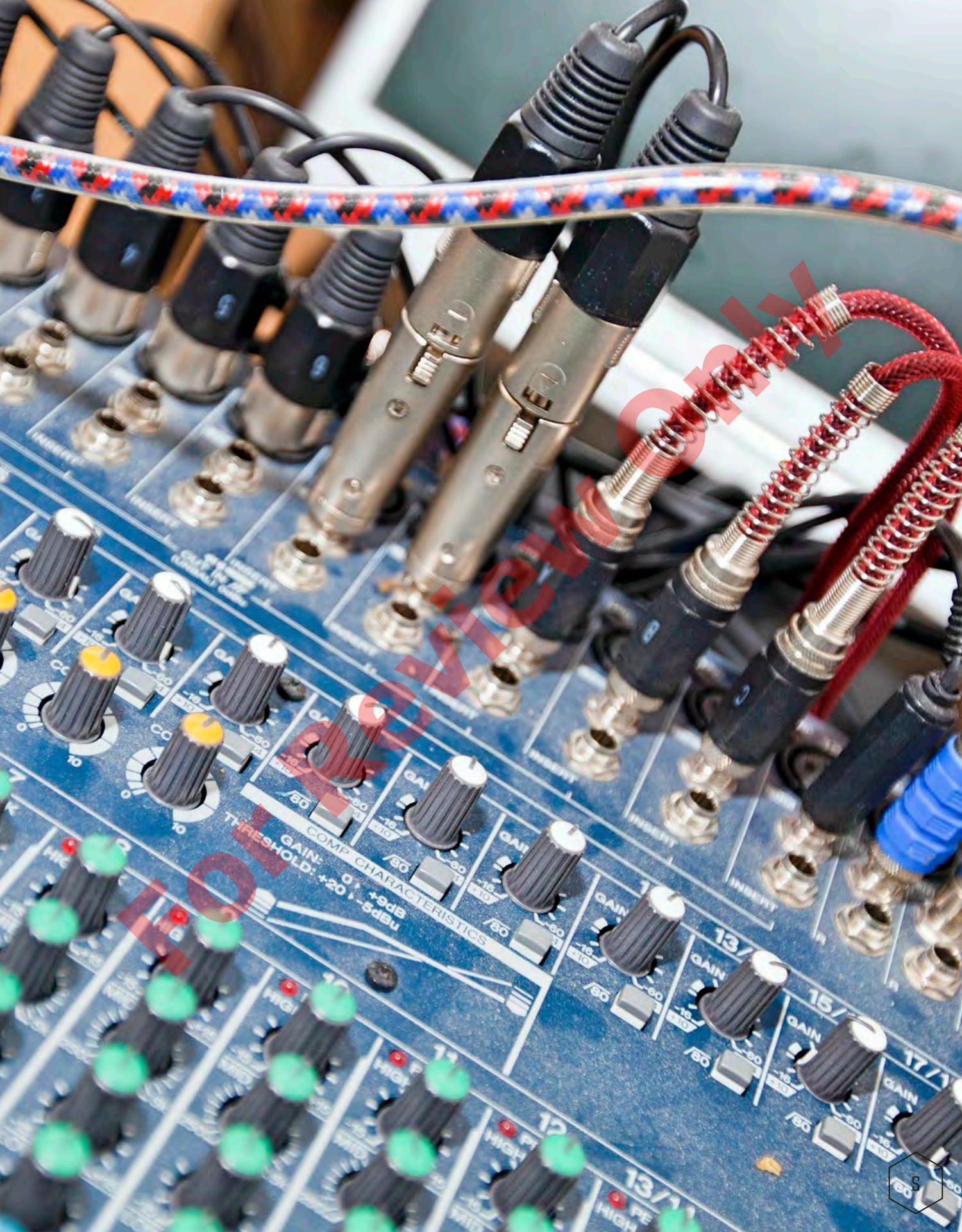


PROJECT 1

USING LEDS

Light-emitting diode (LED) lights are small but powerful. When paired with a power source, these little bulbs light up and let you know your electrical experiment is on the right track.

FACT LEDs glow when electrical current passes through them. The longer lead on an LED is positive '+'. It must be connected to the positive '+' side of the battery.

PROJECT 1, LEVEL 1

LIGHTS ON

Wiring up the lights in a house seems like a big job. Many electrical circuits run through walls to get switches and lights to work. But you can make your own simple circuit in a snap.

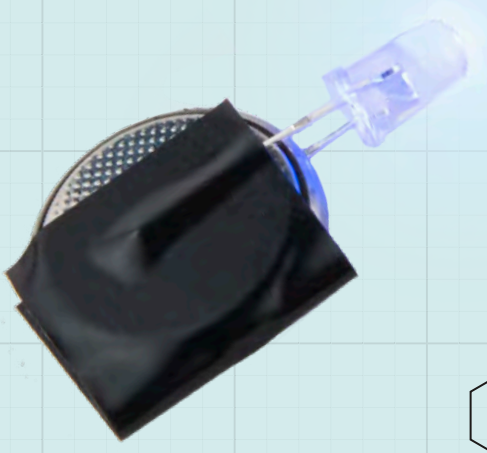
YOU'LL NEED

- CR2032 battery
- 5mm LED
- electrical tape

STEPS

1. Slide the battery between the leads of the LED. Make sure the longer lead is touching the '+' side of the battery. The shorter lead should touch the '-' side of the battery.
2. Wrap the tape around the battery to hold the LED in place.
3. To turn the LED off, unwrap the tape and remove the LED.

FACT The power source for this project is a battery. A different type of power lights up the bulbs in your home. NEVER experiment with the outlets in your home. That power source is very strong and can be dangerous.



PROJECT 1, LEVEL 2

FIREWORKS FLINGER

Use your LEDs to light up the night sky. Give your circuit a super simple switch and then send it spinning.

YOU'LL NEED

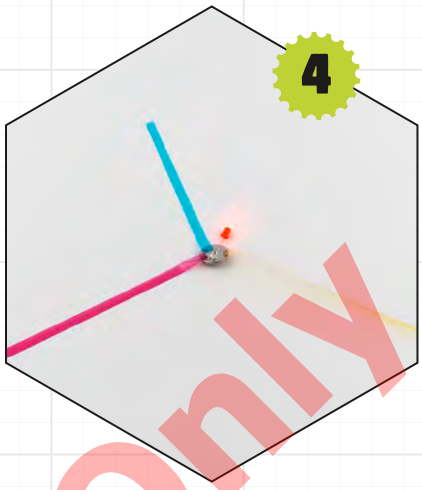
- CR2032 battery
- 5mm LED
- hot glue and hot glue gun
- three 0.25-by-6-inch (0.6-by-15.2-cm) strips of cellophane
- sturdy index card

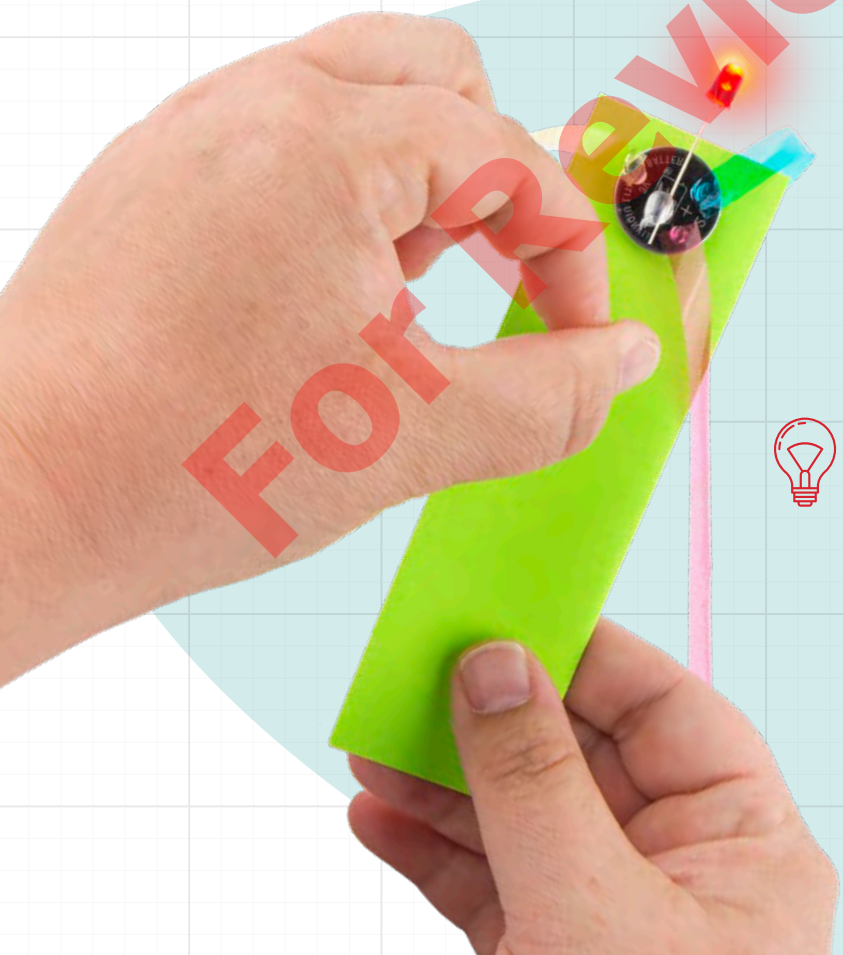
STEPS

1. Slide the battery between the LED leads.
2. Make sure the longer lead is touching the '+' side of the battery. The shorter lead should touch the '-' side of the battery.
3. Glue the '+' lead to the '+' side of the battery.

FACT LEDs come in many different colors. The materials contained inside them makes their color. Make your fireworks show in a rainbow of colors. How many can you send off at once?

4. Glue the cellophane strips to the '+' side of the battery.
5. Fold the index card in half the long way.
6. Slide the folded card under the '-' lead. The LED should turn off.
7. Hold the other end of the card. Then give it a flick to send the battery flying.





FACT A circuit is a complete and closed path that allows electrical current to flow. In this case, it flows from one side of a battery through an LED. Then it flows back to the other side of the battery. When the circuit is opened, the flow of electricity is broken. The card's presence prevents this flow of electricity. The LED will stop glowing until the card is removed. The card acts like a simple switch.