

Origami Firefly Circuit

Fold in half, then fold in the corners, only a few more folds and you will create an origami firefly. Explore electrical energy, circuits, and switches to make your unique origami 'lightning bug' shine!

TEKS:

SCI 4.6 A: The student is expected to differentiate among forms of energy, including mechanical, sound, electrical, light, and thermal.

SCI 4.6 C: The student is expected to demonstrate that electricity travels in a closed path, creating an electrical circuit.

SCI 5.6 B: The student is expected to demonstrate that the flow of electricity in closed circuits can produce light, heat, or sound.

Materials:

- Adhesive copper tape (¼-inch width; 7-inch length)
- Clear tape
- 3V coin cell battery (CR 2032)
- 5mm LED light
- Scissors
- 8.5 x 11-inch sheet of colorful paper

How To:

Part 1: Making the origami firefly

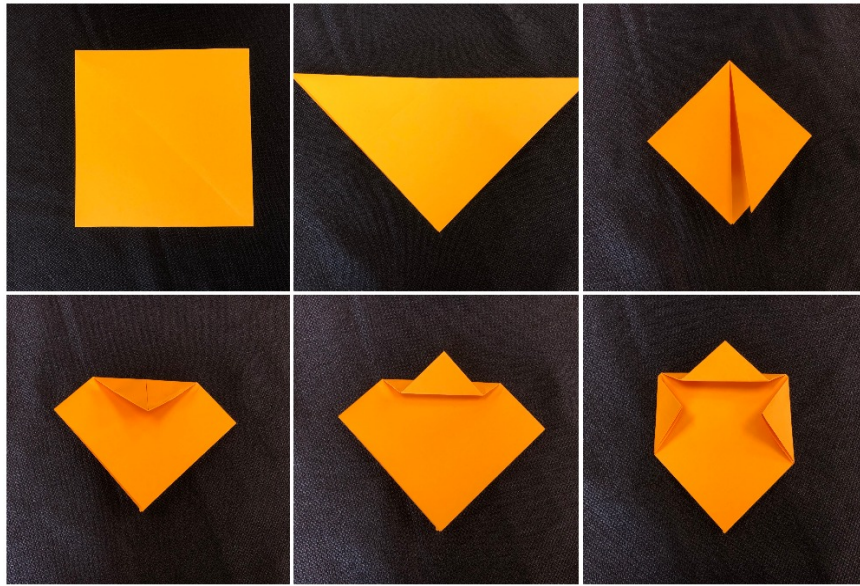
1. Trim your piece of paper into an 8.5 x 8.5-inch square.
2. Fold the paper in half along the diagonal.
3. Fold down the left and right corners of the newly-formed triangle to meet the other point at the bottom. These are going to be the wings of the firefly.
4. Turn the paper over and fold down the top corner. Fold it back up part way, making the head of the firefly.

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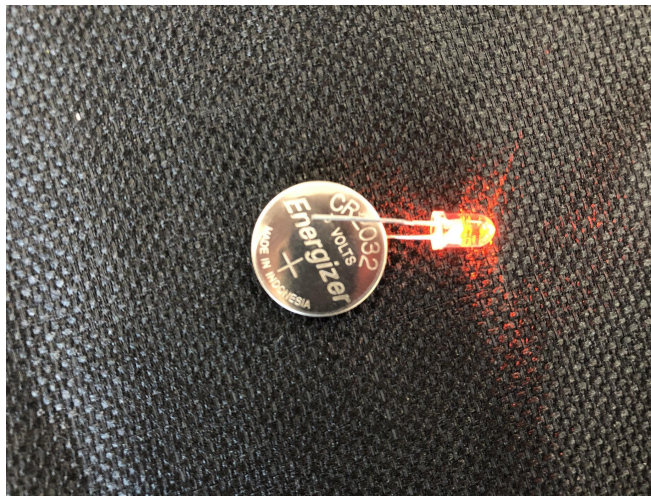
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5. Fold in the left and right sides of the paper until the top angle of the side meets the bottom angle of the head. Flip the paper over. The origami part of the firefly is now complete!



Part 2: Testing the LED and battery

1. Grab the 5mm LED light and look very closely at the silver wires, or “legs,” coming out of the light. The longer leg is the positive side of the LED, and the shorter leg is the negative side of the LED.
2. Place your coin cell battery in between the two legs of the LED, with the positive side of the battery touching the longer positive leg. The light should light up.
3. If it doesn't, try flipping the battery. If it still doesn't light up, you either need to use a new LED or a new battery.



Part 3: Building and connecting the circuit

1. Cut the 7-inch length of adhesive copper tape into two 3.5-inch length pieces.
2. Lift the wings of your firefly and place a 3.5-inch piece of copper tape down the center of the insect.

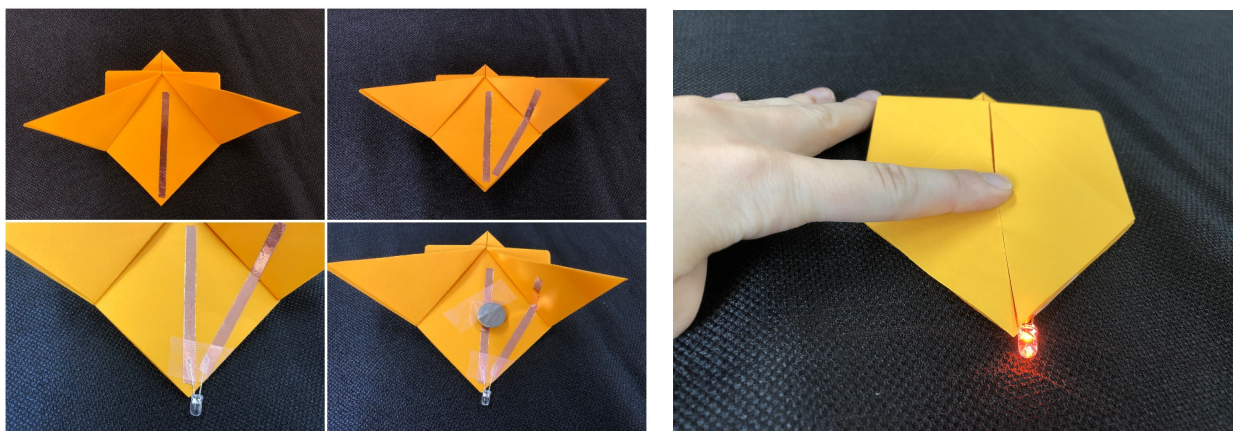
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3. Place another 3.5-inch piece of copper tape about 1 inch away from the first one, at a slight angle. This piece will go over the underside of the wing. Make sure that the two pieces of copper tape do not touch each other or overlap.
4. Use clear tape to attach the LED to the bottom of the insect. Make sure that the positive, or longer, leg of the LED is touching the piece of copper tape that goes out to the wing at an angle and the negative, or shorter, leg of the LED is touching the piece of copper tape that goes down the center of the insect.
5. Using clear tape, attach the battery to the center piece of copper tape with the positive side facing up. Make sure that the battery is directly underneath the copper tape that is attached to the underside of the wing. Make sure that you do not cover the entire battery with tape because part of both the negative and positive sides of the battery will need to touch copper tape when the insect is closed.
6. Close the wings of your firefly and the LED should illuminate!*

*If the LED doesn't light up, lightly press on the paper directly above the battery, flip the LED, or flip the battery. Also, make sure that there is copper tape directly touching both sides of the battery and both legs of the LED, and that the copper tape is smooth and not overlapped on itself.



STEM Explanation:

A circuit is simply a path that conducts electrical current. Complete, or closed, circuits allow electricity to flow, while incomplete, or open, circuits do not. Materials that allow the flow of electricity are known as conductors, and in the circuit that you just built, the battery, the legs of the LED, and the copper tape all acted as conductors! When all of these materials were connected together in a loop, the flow of electrical current caused the LED to light up. The copper tape on the firefly's wing acted as a switch, a device that can make, break, or change the connections in an electrical circuit. Lifting the wing of the firefly broke the connection between the copper tape and battery and resulted in an open circuit with no electrical current. Once the wing was pressed back down, the circuit's connections become closed, electricity started flowing, and the LED was able to light up again!

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Career Connection:

Circuit designers work with small-scale circuits that are put in larger products. They are given requirements to follow, need to stay on budget, and meet deadlines. Their circuits are used in cell phones, TVs, toaster ovens, computers, and many other devices.

Resource:

<https://teachbesideme.com/origami-firefly-paper-circuits/>

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