

Circuit Reindeer

Create a circuit to brighten up your holiday décor! Channel your inner electrical engineer to design your own light up reindeer. With a nose so bright, let your reindeer's glow lead the way through the dark night.

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 A: The student is expected to explore the uses of energy, including mechanical, light, thermal, electrical, and sound energy.

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:

- 6 brown pipe cleaners
- Clothespin
- 3V coin cell battery (CR 2032)
- Electrical tape
- 2 googly eyes
- 5mm LED light bulb (red)
- 2 4-6-inch pieces of 24-gauge insulated wire
- Scissors or wire strippers

How To:

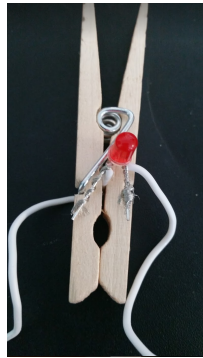
1. Test your LED light and battery to make sure they work. The LED should light up when you insert the battery between its legs/pins. If it doesn't light up, try turning the battery around. Be sure everything works before creating your circuit reindeer!
2. Take the two pieces of wire and strip 1 inch off both ends of each wire. **Safety: An adult should assist when stripping wires.**

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3. The longer leg of the LED is the positive leg. Take the end of one wire and wrap it around the positive leg of the LED. The stripped metal part of the wire must be touching the positive leg of the LED.
4. Repeat step 3 with the other piece of stripped wire, but this time wrap it around the negative leg (the shorter leg) of the LED.
5. Touch the other stripped end of the wire wrapped around the positive leg of the LED to the positive side of the battery and the other stripped end of the wire wrapped around the negative leg of the LED to the negative side of the battery to see if the LED lights up. If the LED doesn't light up, try rewrapping the wires on the positive and negative legs to ensure the metals are in contact.
6. Attach the LED to the middle of the clothespin. One leg should be on each side of the clothespin and when you bend the legs of the LED, the two sides should be divided. This prevents the positive and negative wires from touching, which could cause a short circuit (a disruption to the circuit). Tape the LED legs onto each side of the clothespin with electrical tape.



7. Run the wires from the LED down each side of the clothespin while it is open and wrap them as you go down. Wrap the negative wire around one side of the clothespin clamp (the part that closes tightly), and then wrap the other side of the clothespin clamp with the positive wire.



8. After wrapping your wires along each side of the clothespin, make sure the loose stripped part of each wire is on the inside of the clamp! If your wires are too long and bulky, you can trim them before wrapping them around the clamp of the clothespin. The loose stripped ends of each wire need to get tucked into the clamping part of the clothespin because the stripped wires need to touch the battery to complete the circuit that will light the LED. **Safety: An adult should assist with trimming and stripping the wires as needed.**

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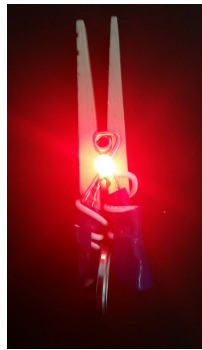
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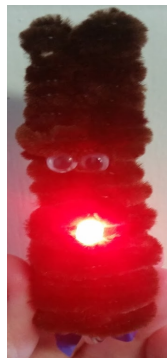
9. Using electrical tape, secure the wires to the clothespin and the stripped ends inside the clamp. Be sure not to cover the stripped ends inside the clamp because it will close the circuit.



10. Place the battery in the clamp of the clothespin to light your circuit reindeer's nose! The positive wire should be touching the positive side of the battery and the negative wire should be touching the negative side of the battery. If your reindeer's nose is not lighting up, try turning the battery around. If this doesn't fix the problem, you will need to disassemble your reindeer to find what is interrupting your circuit. To turn your reindeer off, simply remove the battery.



11. Design your reindeer! Wrap the pipe cleaners around the clothespin to make the face and antlers. First, start with the part of the clothespin that you squeeze, and work your way down the clothespin. The parts that you covered first will become the antlers, and the bottom will become the face and body of the reindeer. Be creative, but be careful—the pipe cleaners should not get twisted with the stripped wires because they can interfere with the circuit.
12. Add two googly eyes above the light to complete your reindeer's face. When you've finished your reindeer design, insert your battery into the clothespin so that it touches the stripped wire in the clamp. Your reindeer can now illuminate the night!



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STEM Explanation:

A circuit is a path for electrical current to pass through. The components of the circuit in this activity include a battery, wires, and LED light. Chemical energy from the battery transforms into electrical energy to travel through the wires to the LED. Once this energy reaches the LED, it causes the LED to light up. When the circuit is incomplete, or open, the wires are not connected to the battery and therefore there is no flow of electricity. To make the LED light up, the battery must be connected to the wires. This makes a closed circuit through which the electric current can pass.

Career Connection:

Electrical engineers design and build small- and large-scale electrical systems. In the circuit design area of electrical engineering, engineers use their knowledge of the conductivity of materials to design circuit boards that are used in cell phones, TVs, toaster ovens, computers, and many other devices. Understanding the dangers of mixing electricity and water helps engineers design for safety.

Resource:

<http://www.steampoweredfamily.com/activities/circuit-bugs/>

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