

DIY Electroscope



FUN FACT

Lightning is a form of static discharge and lightning strikes have been recorded at distances of 10 miles. If you are close enough to hear thunder, it's important to take shelter.

MATERIALS

- Glass jar or cup
- Straw
- Cardstock
- Scissors
- Copper wire
- Pencil
- Aluminum foil
- Balloon

DIFFICULTY



STATIC ELECTRICITY

Static electricity is a stationary electric charge. This charge is typically produced by rubbing two objects together. The friction causes electrons to transfer from one object to another to create a build up of electrons, or static charge.

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**What happens if you plant
a lightbulb in a garden?**

*Answer on the next page

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EXPERIMENT

Step 1: Create a card stock lid for the top of your jar (about 1 inch larger than the jar). Carefully pierce a hole in the center of your lid.

Step 2: Cut the straw to approximately 3 inches in length and push through the hole in your card stock lid.

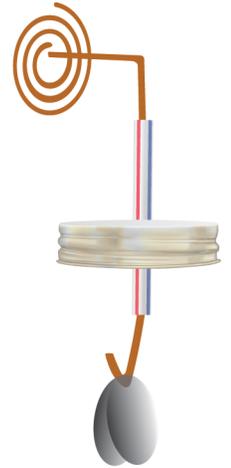
Step 3: Cut a length of the copper wire approximately 10 inches. Use approximately 4 inches of one end of the wire to create a flat spiral. Run the straight end of the wire down, through the straw and into the jar.

Step 4: Carefully cut two, 1 inch oval-shaped pieces of aluminum foil. Pierce a small hole in one end of each piece and using the copper wire inside the jar as a hook, hang them next to each other inside the jar.

Step 5: Use your electroscope to detect static charge on different objects by placing them near the wire spiral.

Step 6: Hold the blown up balloon up to the wire spiral of your electroscope. Then try rubbing the balloon against your hair and then hold the balloon to the wire spiral of your electroscope and observe any differences.

*Joke Answer -
You grow a power plant!



WHY IT WORKS

Rubbing a balloon against your hair transfers electrons from your hair to the balloon. This transfer of electrons will cause the balloon to become more negatively charged. When you move the balloon closer to the electroscope, this will cause the negatively charged electrons on the copper wire to move down and away from the balloon. The electrons move down the copper wire and transfer onto the pieces of foil. Now both pieces of foil have the same charge and want to repel one another. This causes the aluminum pieces to spread apart.

EXTEND YOUR LEARNING

- What other objects can you test?
- Could you create a scale to measure how far your aluminum pieces separate?
- What do you think causes them to separate more or less?
- Could the aluminum foil be replaced with something like paper? Would your electroscope still detect charges?

WORKFORCE CONNECTION

Electrostatic discharge engineers are scientists that focus on minimizing or eliminating electrostatic discharge. Their jobs require them to understand how the build up and discharge of electrons can impact sensitive electronics. For example, eliminating sparks created by static electricity is critical for the safety of astronauts working on space equipment. Even the slightest spark of electricity could ignite catastrophic fires when working in space.