

PRESENTED BY:



Magnetic Motor

Can you create a shape that spins around a battery? All you need is a copper wire, two magnets, and a battery! Discover how electromagnetism works and see it in action when you create your own homopolar motor!

TEKS:

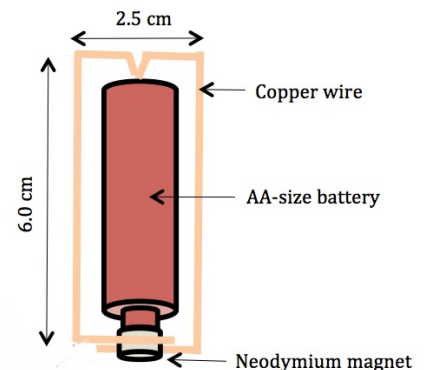
- 4.6A Differentiate among forms of energy, including mechanical, sound, electrical, light, and heat/thermal.
- 4.6B Differentiate between conductors and insulators.

How To:

1. Place the magnets on top of each other under the positive terminal of the battery.
2. Use the uncoated copper wire to create a shape that will spin around the length of your battery. The shape can have angles and even cross over on top of itself, but it must be tall enough for the battery to fit inside it lengthwise. The top of your shape should dip down to make a point where it will touch the negative terminal. The bottom of your shape should extend so that it touches the magnets on the positive terminal of the battery. See the diagram to the right.
3. Set the point from the top of your shape on the negative terminal of the battery, making sure the bottom of your shape is touching the magnets. Once the copper wire comes in contact with the magnets, the shape should start spinning. If it doesn't, redesign your shape until you create one that spins.

Materials:

- 18G uncoated copper wire
- 2 Neodymium magnets
- AA or AAA battery



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The STEM Explanation:

A homopolar motor is a direct current electric motor with two magnetic poles, the conductors of which always cut unidirectional lines of magnetic flux by rotating a conductor around a fixed axis so that the conductor is at right angles to a static magnetic field. This results in an electromotive force, or the motion of our copper shape spinning in one direction. The copper shape is the conductor that rotates around our battery, or fixed axis. Conductors allow energy/electricity to travel through them. As energy travels through a conductor, it creates a magnetic field (the magnetic effect of electric currents and magnetic materials) around it in the direction the energy flows. This allows your copper shape to spin in the magnetic field. The spinning is continuous because the battery axis provides electrical energy to keep it moving.

Career Connection:

Physicists are scientists who study the natural world, from the tiniest subatomic particles to the largest galaxies. They conduct experiments that help discover and explain the laws of nature, including what things in the universe are made of (matter) and how/why they behave the way they do. Physicists also study energy and how it changes from one form to another.

Resources:

- <http://skullsinthestars.com/2014/12/12/the-mystery-of-the-magnetic-train/>
- <http://geekologie.com/2015/03/no-choo-choo-make-your-own-simple-electr.php>
- <http://physicslens.com/wp-content/uploads/2013/01/homopolarmotor1.png>

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