ACTIVITY GUIDE



INTRODUCTION

Let's learn all about Homopolar Motors & Electromagnetism! In this activity, participants will create Tiny Dancers made of copper wire that spin on top of a battery. These dancers are actually homopolar motors demonstrating something called the Lorentz Force. This activity is a simple way to engage youth in the world of science through electricity and electromagnetism.



MATERIALS

- Copper Wire (16 gauge)
- Neodymium Disc Magnets (1/2"* 1/8")
- AA Bateries
- Pliers
- Wire Cutters
- Template (courtesy of BabbleDabbleDo)
- Crepe Paper (for dancer skirts advanced skill)
- Hot Glue (for dancer skirts advanced skill)

INSTRUCTIONS

Step 1 - Download this easy-to-use template from BabbleDabbleDo.com - http://bit.ly/tinydancer1

Step 2 - Measure out about 10 inches of copper wire and cut.

Step 3 - Lay your wire on the template and bend the wire using the pliers to the template. It does not need to be perfect but it does need to be as symmetrical as possible.

Step 4 - To create the base of the wire that wraps around the magnets, bend the wire around the

battery (maybe a loop and a half or two loops). Wide the circular loop a little with your finger so that it can easy spin around the base of the battery.

Step 5 - Place three magnets on the negative side of your battery. Step 6 - Place your Tiny Dancer on the positive side of the battery with the base loops going around the battery. The base of your

Tiny Dancer must be low enough to encircle the magnets.

Step 7 - Let it go! If properly constructed and balanced, the Tiny Dance will begin to spin.

Advanced Skill - If your homopolar motor spins, you can add a skirt by cutting a small piece of crepe paper, making a small slit to have the wire go through, and then fixing with a hot glue gun.





Concepts:

- Motion, Magnetism, Energy, Force, Circuits

TEKS: TAC §112.16(b)(6)(A-D)

- Force, motion, and energy. The student knows that energy occurs in many forms and can be observed in cycles, patterns, and systems.

TXPOST Standard(s): - 3.1.C, 6.2.C, 7.2.C



ENGAGE •

Here are some simple questions to get everyone excited about the Tiny Dancer project:

- What is a homopolar motor?
- How does a homopolar motor work?
- Describe the significance of Lorentz Force.
- Who was Michael Faraday?
- What is a homopolar motor used for?

EXPLORE
Build a Tiny Dancer
Iterate the Tiny Dancer Project

Notate thoughts & experiences



EXPLAIN

A homopolar motor is a type of electric motor that uses direct current to create continuous circular motion. Successfully designed by Michael Faraday in 1821, the homopolar motor does not have much practical use except to demonstrate the effects of electromagnetism

and how electric motors works.

A homopolar motor creates circular motion thanks to Lorentz Force. When the copper wire connects to the positive part of the battery and to the magnets at the negative part, you complete a direct current (I) circuit that allows electrons to flow. This creates a electromagnetic field that interacts with the field produced by the permanent magnet (B). Lorentz Force is the result and it acts upon the wire causing the "Tiny Dancer" to turn.



EXPAND

Expand your experience by researching more about the following related items:

- Michael Faraday
- Humphry Davy
- William Hyde Wollaston
- Electomotive Force
- Electric Motors
- Ball Bearing Motor
- Railgun
- Homopolar Generators
- Barlow's Wheel
- Faraday's Law of Induction



What three things did you learn from the Tiny Dancers project?

Name two things that you would like to learn more about.

Record one question that you still have about the Tiny Dancers project.