

# A STEM in the Park

## Take Home Activity

# STEM

in the **PARK**™

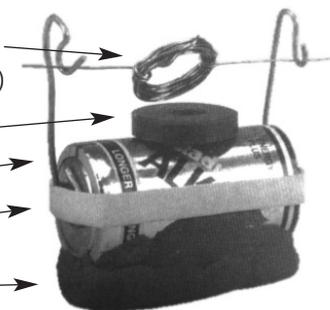
Science, Technology, Engineering, and Mathematics

## Make a Mini-Motor

*Activity adapted from  
Exploring Energy with  
Toys (Taylor, 1998)*

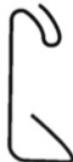
### **What You Need**

- D-cell alkaline battery
- 100 cm (~39 in) 22-gauge magnet wire (Available at Radio Shack - Model: 278-1345 / Catalog #: 278-1345)
- doughnut-shaped ceramic magnet (Available at most craft stores)
- 30 cm (~12 in) 14-gauge wire (Available at most hardware stores)
- thick rubber band
- modeling clay
- short dowel rod or similar object about 2.5 cm (~1 in) in diameter
- two 30 cm (12 in) pieces of 18-gauge wire with alligator clips on both ends
- needle-nose pliers with cutting edge or wire cutters
- sandpaper



### **With the help of an adult, build your mini-motor**

- Cut 14-gauge wire into two 15-cm pieces and bend both as shown to form posts.
- Attach 14-gauge posts to battery with rubber band.
- Push battery into a blob of clay to keep it from tipping over.
- Stick magnet onto top of battery with clay.
- Wind 22-gauge wire around dowel rod to make a very tight coil.
- Keep about 6 cm (~2.5 in) of wire sticking out from each end of the coil to serve as leads.



**Continued on back**

- Loop each lead around the coil of wire to hold the coil in place and straighten the leads.
- Use sandpaper to remove varnish from both leads.
- Hang leads of the 22-gauge coil on the loops of the 14-gauge posts.
- Adjust the height of the loops so that the coil is level and rests just above the magnet.

### ***Tips...***

- Make sure coil leads are symmetrical, with half of the coil above them and half below them.
- Tilt the magnet to one side so that it is not perfectly level on the battery.
- Move coil to the left or right to center it above the magnet.
- Adjust level of the 14-gauge posts to keep the coil from sliding to one end of the battery or the other.

### ***Observe...***

- Observing your mini-motor for several minutes.
- How would you describe its motion?
- Now touch the wires. Do they feel warm? Can you think of something in your house in which the electric wires get warm and maybe glow?

### ***Investigate...***

- How does the strength of the magnet affect your motor?
- Try replacing your magnet with one that is either stronger or weaker.
- What do you see?

### ***Investigate Further...***

- How does the strength of the battery affect your motor?
- Your D-cell battery supplies 1.5 volts of electricity to your motor. Replace your D-cell battery with a stronger battery, such as a 6-volt battery. The easiest way to do this is to slip a piece of paper between the 14-gauge posts and each end of the D-cell battery. The coil should no longer spin. Clip one alligator clip wire to one of the battery terminals and one to one of the 14-gauge posts. Clips the other alligator clip wire to the other battery terminal and the other 14-gauge post.
- What do you see?

***This activity is brought to you by the BGSU Early Childhood Education Science Methods Students (Dr. Rick Worch, Associate Professor)***