a WOW Lab BLUEPRINT

Marble Generator

Activity Instructions

Part I - Constructing the Generator

The following items will be needed for this part of the activity:

- enamel copper wire
- clear PVC tube
- tape
- lighter
- alligator clips

Step 1

Measure and cut a 100 ft. piece of enamel copper wire. Measure 24 in. from the end of the wire and tape that point of the wire to the middle of the clear PVC tube.

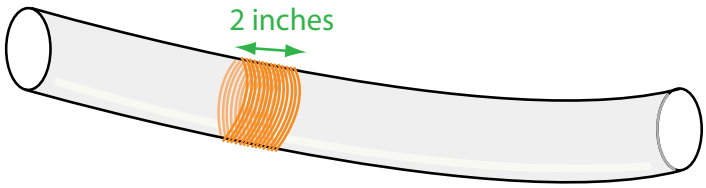

Figure 1

Step 2

Tightly wrap the long end of the enamel copper wire around the tube to form a coil no wider than 2 in. as seen in **figure 1**. Avoid overlapping the wire if possible. Stop wrapping when 24 in. of unwrapped wire remains. Keeping the coil tight, place a piece of tape over it to secure. There should be two 24 in. ends hanging freely.

Step 3

Using a lighter, strip the ends of the wire by burning 1 in. of enamel coating off the tips as shown in **figure 2**. Each end only needs to be burned for about three seconds.

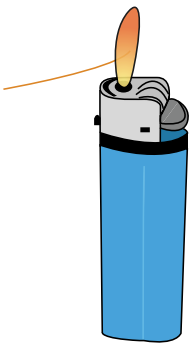

Figure 2

Step 4

Attach alligator clips to each end of the wire. Wrap the stripped ends of the wire around the alligator clips to ensure a good connection.

Part II - Visual Activity

The following items will be needed for this part of the activity:

- LED
- spherical magnetic marble
- marble generator

Since the marble is a very strong magnet, it should be handled with special care. Keep at least a foot away from any metal objects, cell phones, credit cards and computers at all times. Always keep hands over the ends of the tube to prevent the marble from flying off and shattering against a nearby metal object.

Step 1

Attach the alligator clips to the anode and cathode of the LED. Ensure that the clips are attached close to the tips of each pin and bend the pins away from each other to prevent contact between the clips. The complete setup for the visual activity is shown in **figure 3**. See *Additional Information* for explanations on how diodes work.

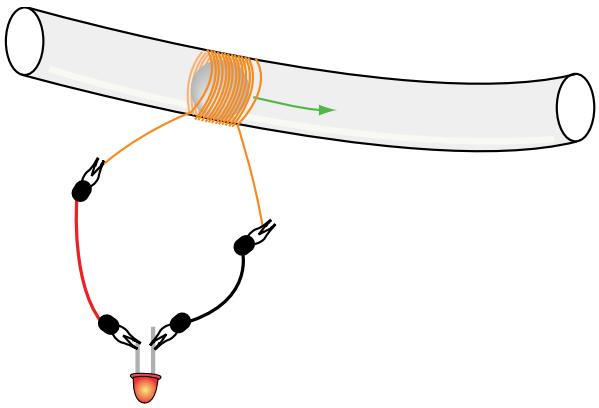

Figure 3

Step 2

Roll the magnetic marble back and forth inside the tube. When the marble goes through the coil, the LED will illuminate. Note that the light is only illuminated when the marble is moving. If the marble is stationary in the coil, nothing happens. Furthermore, if the marble is moving slowly, it will not generate enough voltage to turn on the LED. See the section on diodes in *Additional Information* for a more detailed explanation.