

Name _____ # _____ Date _____

Name _____ # _____ Physics

Name _____ # _____ Section _____

Part I

Electromagnetism Lab (Group Lab) (54 points)

Your challenge in this lab is to create a strong electromagnet. You will use some wire, a nail, electric tape and a power source.

1. From your notes, list 3 characteristics of a strong electromagnet. **(9 points)**

2. Everyone will get 4 meters of wire to make an electromagnet. However, you will have to decide on the thickness you want for your wire.

Which wire did you choose? Thin? Moderately thin? Thick?? (Circle) **(5 points)**

3. Explain why you think the wire you choose will make a stronger magnet. **(5 points)**

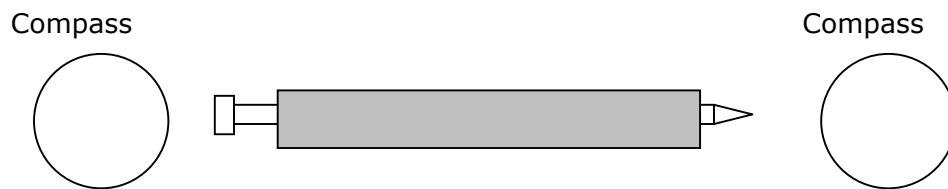
4. What does the iron nail do to increase the magnetism created by the wires? (see notes) **(5 points)**

5. Name two other good cores that could be used in your electromagnet. **(5 points)**

Making your magnet: 1) Wrap your wire around your nail **2)** Sand off the coating on the ends your wire **3)** Wrap your electromagnet with the electrical tape **4)** Attach the wires to your source

1. What could you do to 'quantify' the strength your magnet? **(5 points)**

2. Put a compass at both ends of your electromagnet. Draw an arrow into the compasses illustrated in this picture to show how the North Pole of your compass is pointing. **(5 points)**



6. Which end is the North Pole of your electromagnet? The pointed end or the flat end? **CIRCLE YOUR CHOICE (5 points)**

7. What could you do to reverse the poles of this magnet? **(5 points)**

8. Use the correct Left Hand rule to determine the direction of the current in front of the nail. Draw arrows into the picture below to show how the current is moving **(5 points)**.



World's Simplest Motor Lab (25 points)

Use the directions given on the second page of this lab to construct your simple electric motor.

When your motor finally works call me over to sign this sheet _____

1. Discuss the role of each major part of your motor. Explain how each part is involved in making the motor work **(6 points)**

_____ -

_____ -

_____ -

2. Why did you have to scrape the enamel coating off the ends of the wire? **(2points)**

3. What 2 techniques could be employed that would change the direction that your motor spins? **(4 points)**

4. List three ways you could redesign this motor to make it stronger. **(6 points)**

a)

b)

c)

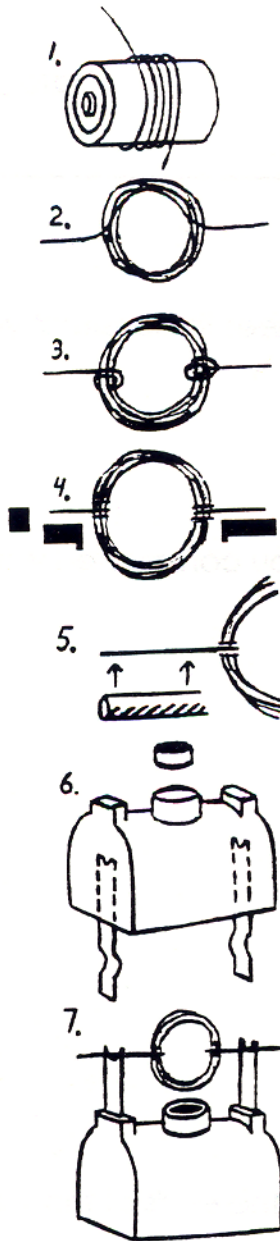
5. Name the two kinds of magnets in your motor. **(2 points)**

6. Pull out the magnet in your motor. Connect the wires and start the motor with a push. Describe what happened and **explain it. (2 points)**

7. How would you totally redesign your motor to make it faster? **(3 points)**

The World's Simplest Motor™

Directions: Requires D-Cell Battery



1. Unwrap the wire and straighten out any bends. Leaving about 2 inches straight, (about the length of a D-cell battery), wrap the wire around the battery to form a coil. (Figure 1) Unwrap a small amount from the 2nd end so that you now have about two inches of wire sticking out from either side. (Figure 2)
2. Each end of the wire is wrapped tightly around the coil for two turns. (Figure 3) This will keep the coil together. The two ends should stick out directly opposite of each other and should be at least 1 inch long. Excess can be trimmed or wrapped around the coil as additional turns.
3. The wire is covered with an enamel coating for insulation. Hold the coil vertically and then rest one of the wire ends on a flat surface. (Figure 4) Using the edge of a metal support, **scrape the enamel coating off the entire top half of the wire end.** Turn the coil slightly as you scrape so that the top half of the wire is scraped bare. Do not scrape the bottom half of the wire. Repeat this for the 2nd wire sticking out from the opposite end of the coil. **The enamel is left on the bottom half of each wire.** (Figure 5)
4. Slide the metal supports (U-end first) up through the slots in the plastic base. The bump in the metal faces towards the battery. The battery is pushed in and must touch both metal supports. (Figure 6) Set the magnet into the round holder.
5. Set the coil ends into the U of the supports and your motor is ready to run. Give the armature a gentle spin. (Figure 7) If it does not continue to turn, try the opposite direction. After the motor works, the very ends of the wire can be bent to help keep the coil centered. If the motor does not work, check to see if the shiny side of the wires are both facing up when the coil is vertical. (Figure 5) Also, make sure the wire ends of the coil are centered. (Figure 3)