

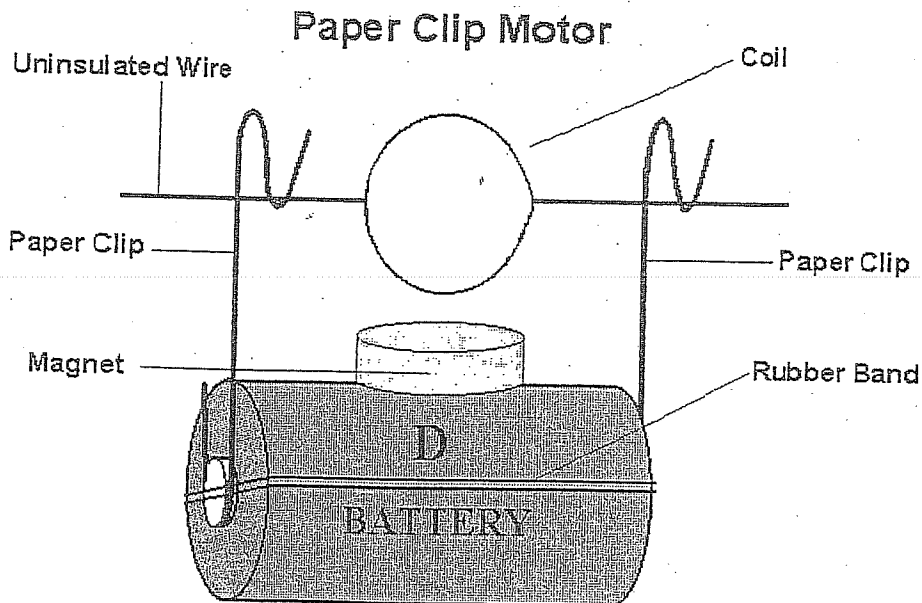
Name _____

Electric Motor Lab

Introduction: An electric motor contains an electromagnet free to rotate between the poles of a fixed, permanent magnet. When a current flows through the electromagnet, a magnetic field is produced in the coil. The key to the motor working is **switching** the poles. If the poles are not switched, there is no longer a force that will keep the motor spinning. A simple switch called a commutator reverses the current in the coil. The current from a battery is direct (**DC**), flowing in only one direction.

- A) You are to construct a functioning electric motor. **Important considerations:**
 - B) **Symmetry** – keep the spinning part of the motor (coil) very balanced see board.
 - C) **Commutator** – follow step # 3 perfectly or you will not have effective current reversal and your coil will just attract to one position (the “F” position) and not spin.
 - D) **Have your motor checked off.**
 - E) You **must return your magnets** and be checked off the list.
 - F) You are to build 2 motors, a) and a large coil (D cell) and b) small coil motor using the marker. *(if time allows.)*
- There is a set of class instructions on the next page for your use.

Motor Diagram:



2. On one tail, use fine sandpaper to completely remove the insulation from the wire. Leave about 1/4" of insulation on the end and where the wire meets to coil. On the other tail, lay the coil down flat and lightly sand off the insulation from the top half of the wire only. Again, leave 1/4" of full insulation on the end and where the wire meets the coil.

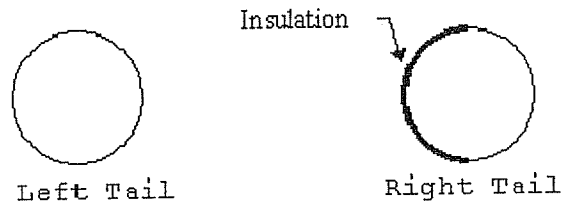


Figure 2: M2.gif

3. Bend the two paper clips into the following shape (needle-nosed pliers may be useful here):

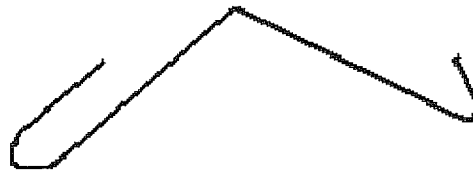


Figure 3: M3.gif

4. Use the rubber band to hold the loop ends (on the left in the above drawing) to the terminals of the "D" Cell battery:

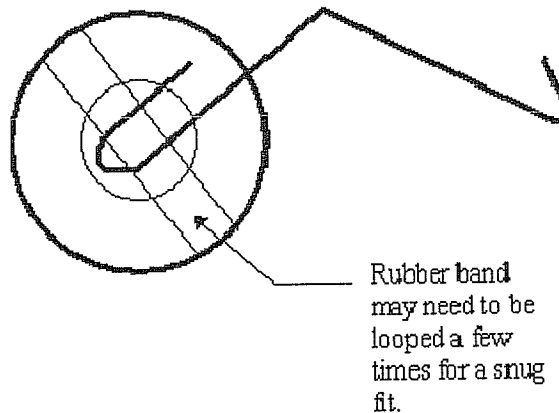


Figure 4: M4.gif

5. Stick the ceramic magnet on the side of the battery as shown:

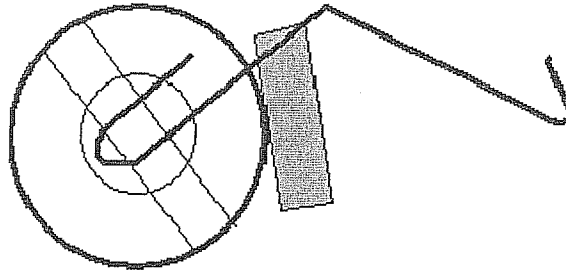


Figure 5: M5.gif

6. Place the coil in the cradle formed by the right ends of the paper clips. You may have to give it a gentle push to get it started, but it should begin to spin rapidly. If it doesn't spin, check to make sure that all of the insulation has been removed from the wire ends. If it spins erratically, make sure that the tails on the coil are centered on the sides of the coil. Note that the motor is "in phase" only when it is held horizontally (as shown in the drawing).
7. For display, you will probably need to build a small cradle to hold the motor in the proper position. It might also help to bend the ends of the coil a bit so that as it slips right or left, the bends keep it in the proper position:

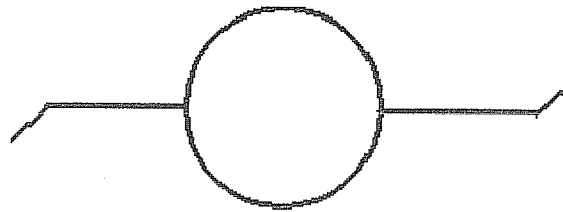


Figure 6: M6.gif

8

8