Beakman’s Motor

Materials Required:
- One Alkaline Battery
- One Rubber Band
- Two Paper Clips
- One Ceramic Magnet
- Magnet Wire (22 or 24 gauge)
- Fine Sandpaper

Instructions:
1. Starting about 3 inches from the end of the wire, wrap it 10-35 times around the battery. You do not have to be neat as some randomness does not affect the motor performance and may help the coil to hold its shape better.
2. Carefully remove the battery. Cut the wire, leaving 3 inches at the other end of the coil. Wrap the ends around the coil 2-3 times to hold the coil together with both ends extending perpendicular to the coil as shown below. The ends should be aligned in a straight line to form a good axle.

Note: Be sure to center the two tails on either side of the coil. Balance is important. You might need to put a drop of glue where the tail meets the coil to prevent slipping.

3. Using fine sandpaper, completely remove the insulation from one end. On the other end, lay the coil down flat and use the sandpaper to remove the insulation from only the top half of the wire.
3. Bend the two paper clips into the following shape. (Needle-nosed pliers may be useful here):

![Image](image1.png)

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

![Image](image2.png)

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

![Image](image3.png)

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.

**Troubleshooting**

- If it doesn't spin:
  - Check to make sure that all of the insulation has been removed from the wire ends. Properly removed insulation leaves shiny copper on one end. Half of the other end should also have the shiny copper while the other half should be the color of the original insulation.
  - Make sure the battery is fresh and connected properly.

  **Caution:** Do not leave the motor connected to the batteries if the rotor is stalled. This motor consumes a lot of electricity and could drain the batteries quickly even if it does not spin.

- If it spins erratically, make sure that the tails on the coil are centered on the sides of the coil.