

Note to teachers:

The following unit is designed to supplement your teaching of concepts of electricity and magnetism. In most cases, the experiments can be conducted in any order. The pages are designed to be printed out and compiled into a booklet for each student or lab pair. I had the children create a booklet by folding a 12 x 18 inch piece of construction paper in half, and stapling the glossary, investigation instructions, and response sheets inside. They then glued the title page to the cover of the booklet. We spent 1 day completing each experiment. The unit vocabulary and key concepts were introduced prior to conducting the experiments.

A few basic supplies are needed to complete the experiments. In most cases, the same materials are used for each experiment. I found all materials at my local Radio Shack. These materials include:

- Batteries – We used D cell batteries.
- Battery holders – Be sure the battery holder is the correct size for your batteries. We used single-battery holders. For the “Electromagnet” experiment, a double-battery holder may be used. We used battery holders with 1 red and 1 black wire attached to the ends.
- Light bulbs – Be sure the light bulb is capable of supporting the voltage of the batteries you are using. (The clerk at the store where I purchased the materials was very knowledgeable about this and was able to assist me in choosing the correct size bulbs.)
- Light bulb holders – Again, be sure that the bulbs will fit in the holders. The light bulb holders referenced in these experiments have 2 screws to which wires can be attached.
- Insulated copper wires – Be sure that the wires are capable of supporting the voltage of your batteries (as a general rule, the larger the battery, the larger the bulb and wire should be).
- Alligator Clips – These are used to attach wires to the bulb holders. Some battery holders come with attached clips.
- Wire strippers – Although not referenced in the experiments, all wires must be stripped on each end to expose about $\frac{1}{2}$ inch of wire.
- Magnets – We used 1 inch donut shaped magnets.

The experiments do not contain diagrams because in most cases students are asked to draw a diagram of the completed experiment as a part of the “Results” section of the response sheets. However, for clarification purposes, diagrams of select experiment are included here for the teacher’s benefit.

LEVITATING MAGNETS

Problem:

Do magnets always attract one another?

Hypothesis:

I think _____
_____.

Materials:

- 3 or more donut shaped magnets
- Styrofoam half-sphere
- 1 sharpened pencil

Procedure:

- 1) Push the sharp end of the pencil into the Styrofoam half-sphere so that the pencil stands up.
- 2) Slide 1 donut shaped magnet onto the pencil, North pole facing downward.
Slide a 2nd magnet onto the pencil, South pole facing downward. *Observe* what happens.
- 3) Continue adding magnets, alternating the direction of the poles. *Observe* what happens.
- 4) Remove the magnets. Replace the magnets on the pencils, this time with all the poles facing the same direction. *Observe* what happens.

LEVITATING MAGNETS

Results:

Draw 2 pictures of the pencils and magnets. In the 1st picture, show what happened when the poles were facing in alternating directions. In the 2nd picture, show what happened when all the poles faced the same direction.

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Conclusion:

1) Why do the magnets levitate, or float, on the pencil? _____

2) What would happen if one of the magnets were placed upside down?

3) What uses or benefits could there be for magnetic levitation? _____

Remember: Opposites attract, likes repel!