Paper Clip Walk

Summary

A magnet is used to make a paper clip "walk" on a paper plate. Students investigate how many paper plates through which the magnetic field will still pass.

Time Frame

1 class periods of 30 minutes each

Group Size

Individual

Materials

For Each Student:

- Paperclip
- Magnet
- Paper plate

Background for Teachers

Magnetism will pass through materials that are not magnetic, such as paper plates. When students are allowed to manipulate magnets and objects, they soon discover that they can make the objects move without actually touching the objects. Moving the object around on a paper plate or the table without touching it with the magnet is often an exciting discovery.

As students test the strength of the magnet by stacking their paper plates together to see how many paper plates a paper clip is still attracted through, make sure that they understand that the paper plates are not blocking the magnetic field when the magnet will no longer hold the paper clip. The thickness of the paper plates has moved the magnet and paper clip far enough apart that the magnetic attraction is no longer strong enough to hold the paper clip, but it is still passing through the paper.

Intended Learning Outcomes

- Observe simple objects, patterns, and events and report their observations.
- Demonstrate a sense of curiosity about nature.

Instructional Procedures

- Discuss magnetic force.
  - What will it pass through?
  - Can you feel magnetic force in the air?
  - Can you feel magnetic force if you place a magnet on each side of your finger?
- Instruct students to place a paper clip on the paper plate and then pick up the paper clip with the magnet from the plate.
- Predict whether the magnetic force will pass through the paper plate if they put the magnet under the plate instead of over it.
- Test the prediction by holding the plate with one hand and moving the magnet slowly underneath the plate.
- Observe the paper clip as it moves around on top of the plate.
- Make the paper clip move around the bumpy part (edge) of the plate.
- Holding the plate vertically in one hand, make the paper clip move up and down on the tilted

paper plate.
As a class, predict how many paper plates can be stacked together before the force of the magnetic field will no longer affect the paper clip.
Test the prediction by adding one student's paper plate at a time. As each student adds his/her plate to the pile, continue testing until the paper clip can no longer be held or moved by the magnet.
Help students conclude that the thickness of the paper plates has moved the magnet and paper clip far enough apart that the magnetic attraction is no longer strong enough to hold the paper clip, but it is still passing through the paper.
This can also be done by measuring the distance between a magnet and a paper clip when the attraction diminishes, and then comparing this distance with the thickness of the paper plates.

Extensions

Experiment with other materials to see what magnetic force will pass through, such as rice, cloth, cardboard, aluminum foil, etc.
Use a small amount of iron filings (can be obtained from a chemical supply house) in a zip-bag to show that the magnetic field passes through solid objects. Experiment by placing different magnets under layers of paper, tin foil, cardboard, etc. Lay the plastic bag of iron filings on top of the layers. Observe the magnetic field pattern created in the plastic bag.
Place small drops of paint randomly on a paper plate and add a small amount of iron filings to the plate. Move the iron filings around on the plate and through the paint by moving the magnet around the bottom of the plate to create a design.

Assessment Plan

Have students plan and conduct a simple experiment to show a magnetic field passing through another type of material. (See Extension #1 for ideas and suggestions.)

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