

Investigation Two – Push and Pull Magnets

Standard III Students will understand that magnetism can be observed when there is an interaction between the magnetic fields of magnets or between a magnet and material made of iron.
Objective 1 Investigate and compare the behavior of magnetism using magnets.
Intended Learning Outcomes 1. Use science process and thinking skills 2. Manifest scientific attitudes and interests.

Standard III

Objective 1

Background Information

None

Pre-Assessment/Invitation to Learn

Demonstrate to the students the “flying” paperclip. (A paper clip attached to a string taped to the table is suspended in mid-air by a bar magnet attached to a ring stand). Ask questions like: Why is the paper clip suspended in mid-air? How many other things can you attach to a string and suspend with a magnet? Does using other magnets alter the experiment? How about a temporary magnet? A lodestone?

Instructional Procedure

1. Demonstrate to the students by placing a magnet beneath a sheet of paper and placing a paper clip on top, you can pull the paper clip with the magnet.
2. Have the students experiment with the different magnets beneath the paper, pulling the paper clip along the top of the paper. Ask questions like: Do both ends of the magnet behave the same way? Would thicker paper allow the magnetic force to pass through?
3. Repeat the original experiment replacing the single sheet of paper with thicker paper.
4. Repeat the original experiment, replacing the paper with different materials such as the aluminum foil, the plastic wrap, the cookie sheet, the plywood, and the glass pane.
5. Make sure the students record their results in their journals or in some sort of graphic organizer.
6. Have students go to the Internet to research magnets.
7. Have students compare and contrast their findings with their Experimental findings.

Materials

- Various types of permanent magnets (horseshoe, circular, bar, disk)
- Various types of temporary magnets (magnetized nail, knitting needle)
- Various natural magnets (lodestones)
- Paper, tag board, cardboard, wax paper, aluminum foil, plastic wrap
- Cookie sheet, plastic cutting board, plywood, a glass pane (taped around all the edges for safety)
- Paper clips, thumbtacks or other iron objects to move about with the magnets
- String
- Tape
- Ring stand

Curriculum Extension

Language –

- Create a Venn Diagram comparing permanent, temporary and natural magnets. (Standard 8, Objective 6)
- Write a 5-paragraph essay explaining the different magnet types and their pulling/pushing abilities. (Standard 8, Objectives 1-4)
- Read excerpts from the book, The Secret Life of Dilly McBean by Dorothy Haas; a story about a boy with magnetic powers. Discuss the inferences and conclusions students got from the text. (Standard 7, Objective 5)

Fine Arts –

- Drop several different colors of paint onto a sheet of paper using an eyedropper or a brush. Place several small ball bearings or BBs on the paper. Carefully drag them from beneath with a magnet creating an interesting design. Try using other iron objects, such as paper clips or straight pins. (Standard 2, Objective 2)

Assessment Suggestion

- Have the students design their own types of toys to demonstrate the difference between magnet types and their abilities to pull or push iron objects without touching them. Suggestions: fishing poles with various magnets attached to pick up iron objects from a bucket; a paper racetrack where student-designed cars with paper clip bottoms are pulled around with magnets beneath the track; a homemade version of an “Etch-A-Sketch” using iron filings and acetate sheets.

	Multiple Choice	Constructed Response	Performance Test
Unit Test	1, 2		Using Magnets

Resources

Books:

- Gardner, Robert. Science Projects about Electricity and Magnets.
- Levine, Shar, and Leslie Johnstone. The Magnet Book.
- Farndon, John. Science Experiments, Magnets. New York: Benchmark Books.
- Gibson, Gary. Playing with Magnets. Brookfield, Connecticut: Copper Beech Books.
- Riley, Peter. Magnetism. New York: Grolier Publishing. ISBN: 0-531-14506-9
- Magnets (Science Alive Series). New York: Crabtree Publishing Co. ISBN: 0-7787-8563-3

Web sites:

- www.askjeevesforkids.com (search magnets)
- www.sciencemadesimple.com/magnets
- www.exploratorium.edu/snacks/magnetism
- www.howstuffworks.com/magnets