Magnets in a Bag

Science 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 materials made of iron.

Objective 1:
Investigate and compare the behavior of magnetism using magnets.

Objective 2:
Describe how the magnetic field of Earth and a magnet are similar.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
2. Manifest Scientific Attitudes and Interests

Content Connections:
Language Arts VII, VIII

Science Standard III

Objectives 1 & 2

Connections

Background Information

We know that magnets have forces that draw iron and steel objects toward them. We also know that magnets have poles usually referred to as *North* and *South.* Opposite poles attract each other and like poles repel. North ends attract South ends, South ends attract North ends. North ends repel North ends and South ends repel South ends. If they are close enough, depending upon the strength of the magnet, they will come together with great force and must be treated with care.

There are unseen magnetic fields around magnets. North and South polarized ends of magnets are where the strong pulling and repelling occurs. Bar, ring, disc, and horseshoe magnets each have different, distinctly shaped magnetic fields. Lines within these fields and the patterns they create are referred to as *magnetic field lines.* These lines seem to flow away from the North end of a magnetic field and return again to the South end.

Earth has a magnetic field very similar to a bar magnet, with magnetic field lines flowing away from the North and returning in an oval pattern to the South Pole. The magnetic North and South Poles are not the same as the true North and South poles as depicted on globes and maps. The North Magnetic Pole is slowly drifting across the Canadian Arctic. The Geological Survey of Canada keeps track of this motion by periodically conducting magnetic surveys to determine the Pole's location. The most recent survey, completed in May 2001, determined an updated position for the Pole and established that it is moving northwest at approximately 40 km per year.

Invitation to Learn

Duct tape a strong magnet under a table or sheet of cardboard or poster board. Ask the students what the forces are around a magnet. Slide paper clips along the table/cardboard until they are attracted to the magnet. Explore the patterns.

Instructional Procedures

Materials

For each group:

- ❑ Bar magnet
- ❑ Horseshoe magnet
- ❑ Disc or ring magnet
- ❑ 8 oz. bottle of vegetable oil
- ❑ Two clear Ziploc baggies
- ❑ 1tbs. Iron filings
- ❑ Box of large paperclips

1. Have students pour vegetable oil into one Ziploc bag.
2. Mix in iron filings.
3. Zip the first bag closed and place it inside the second bag; zip the second bag closed. *(Clear bags are best. The kind with white labels on the side work, too, however the labels make the magnetic lines of a force field difficult to see.)*
4. Gently shake the bags up until the iron filings are equally distributed in the vegetable oil.
5. Place a bar magnet as flat as possible on a smooth, hard surface.
6. Place the shaken plastic bag on top of the bar magnet.
7. Observe the lines that occur. *(You may want to gently tap the top of the bag and loosen some of the iron particles to move in the liquid.)*
8. Label and draw the pattern that occurs.
9. Repeat this procedure for horseshoe, disc, and ring magnets.
10. Compare and contrast the patterns.
11. Students record the results in a science journal.
12. *Clean up:* Have students pour their oil from the Ziploc bags through a funnel back into the original bottles and label them. *(Make sure they label them, CONTAMINATED, and only good for detecting magnetic fields.)*

    Note: Ziploc bags are great for freezers and short-term storage, but oil left in Ziploc bags overnight makes a mess.

Possible Extensions/Adaptations/Integration

- Have students write down and describe what happened and how they think these patterns were formed.
- Allow students to hypothesize if the position of the magnet affects the appearance of the magnetic field?
- Partner special needs students responsibly to assure success during this activity.

Assessment Suggestions

- Assess writing using the *Science Writing Rubric* (p. 3-34).
- Students create compare and contrast drawings to assess accuracy.
- Have students compare and draw the patterns created by a bar, horseshoe, ring, and disc magnet.

Additional Resources

Books

Usborn Science Activities- Vol. 1, by Joan and Maurice Martin (Usbom Publishing Ltd, Usborn House, 83-85 Saffron Hill, London, ECl N 8RT, England. Copyright 1992, www.edcpub.com or www.ubah.com); ISBN 0-7460-0698-5

Usborn Science Activities-Science With Magnets, by Joan and Maurice Martin (Usbom Publishing Ltd, Usborn House, 83-85 Saffron Hill, London, ECl N 8RT, England. Copyright 1992, www.edcpub.com or www.ubah.com); ISBN 0-7460-1259-4

World Book, Young Scientist-Light & Electricity-Magnetic Power, by Hemesh Alles (World Book Inc., 525 West Monroe Street, Chicago, Illinois 60661. Copyright 1992); ISBN 0-7166-2791-4

The World Book Student Discovery Encyclopedia- Vol. M, (World Book Inc., 233 N. Michigan Ave., Chicago, Illinois 60601. http://www.worldbook.com, 1-800-975-3250. Copyright 2000); ISBN 0-7166-7400-9

Web site

Fifth Grade USOE SciberText:
http://www.usoe.k12.ut.us/curr/science/core/5th/sciber5/index.htm

Video

The Magic of Magnetism, (100% Educational Videos; 4921 Robert J. Matthews Pkwy, El Dorado Hills, California 95762 http://www.schooJvideos.com/index.cfm)· VHS Product #lOlOS, DVD Product #S 1401

Family Connections

- Have students teach their parents about magnetic fields.
- Allow students to check out magnets and bottles of CONTAMINATED oil to test the hypothesis mentioned in the
- arents.