Magnetic Fishing

Organizing Topic Investigating Magnets and Metals

Overview Students "catch" as many fish as they can during a "magnetic fishing expedition."

Related Standards of Learning 2.2a, b

Objectives

The students should be able to

- predict which materials will be attracted to magnets, test their predictions, and create a chart that shows the results, classifying materials as to whether or not they are attracted to magnets.

Materials needed

Per class:

- Assortment of magnetic and nonmagnetic objects

Per group:

- Fifteen commonly found small magnetic and nonmagnetic objects
- Make-believe pond
- Make-believe boat
- String
- Popsicle sticks
- Block or ring magnets with holes in the middle
- "Magnetic Fishing" data sheets (p. 60)

CAUTION!

Keep magnets at least two feet away from computers, TVs, VCRs, computer discs, videotapes, audio tapes, video cameras, watches, and credit cards.

Do not store magnets near compasses! Magnets may damage your compasses.

Store bar magnets in their boxes, north pole to south pole. Do not throw them randomly into a box. Improper storage may weaken the magnetic fields of the bar magnets.

Do not drop magnets. Sharp impacts may cause magnetic field strength to weaken.

Instructional activity

Content/Teacher Notes

All objects that are attracted by a magnet contain one or more of three metals — iron, nickel, or cobalt. Some objects, like a plastic-covered paper clip, may look nonmagnetic but prove to be magnetic when tested. Other objects — including U.S. coins — look magnetic, but turn out to be nonmagnetic when tested. (Some countries, including Canada, still use magnetic material in some of their coins.) An appropriate conclusion for your students to reach after this activity is that metallic objects are more likely to be magnetic than nonmetallic objects, but further tests of the metallic object are necessary to be sure that they are attracted by magnets.

Procedure

1. Divide the students into groups of two to four students, and provide each group with the materials needed to go on a magnetic fishing expedition.
2. Have the students place the teacher-selected magnetic and nonmagnetic objects in their "pond."
3. Tell the students they are going to go fishing with a magnetic fishing pole. Ask them to predict which objects in their pond they will be able to catch with a magnet. Have them sort the objects into two piles: those they think they will catch (magnetic) and those they will not catch (nonmagnetic).
4. Have students record this information on their data sheets under "Predictions."
5. Pass out the magnets, string, and popsicle sticks, and have the students make "fishing poles."

6. Tell the groups to go fishing. Tell them to put the objects that they catch into their boat and leave the ones that they could not catch in the pond.
7. Have students record their results on their data sheets under "Experiment."
8. Discuss the results as a class. Are the results different from those they expected?
9. Add some math! Make sure they count both the magnetic and nonmagnetic things.

Observations and Conclusions

1. Ask the students: Do the things that are attracted to the magnet have anything in common? Discuss their responses.
2. In their groups and then as a whole class, have the students come up with a general rule to explain what kinds of things are attracted to magnets.

Sample assessment

- Assess the "Magnetic Fishing" sheets.

Follow-up/extension

- Give each group some additional things to put into their ponds, making sure to provide objects that are metal yet nonmagnetic. Have them follow the same procedure as before: predicting, testing, and discussing the results. This should help students come to the conclusion that not all metallic things are magnetic and that things need to be tested with a magnet before you can tell if they are magnetic. Tell students that the most common ingredient needed to make something magnetic is iron. Depending on the ability of your class, you may want to tell them that nickel and cobalt are the other two magnetic metals. Iron, nickel and cobalt are *elements*, that is, they contain only one kind of atom. We use the word *nickel* to mean both the element nickel and the U.S. five-cent coin, which originally contained much of the element nickel. The coin is actually a mixture of metals, but the mixture has changed over the years and no longer contains enough nickel to make the coin respond to a magnet.

Resources

- *Physical Science SOLutions: Grade K–6.* Science Museum of Virginia, Virginia Department of Education. http://www.smv.org/pubs/PSSolutionsTOC2.pdf. This lesson is adapted from this source.
- *Outstanding Science Trade Books for Students K–12.* National Science Teachers Association (NSTA). http://www.nsta.org/ostbc.
- *Search for Literature: Literature for Science and Mathematics*. California Department of Education. http://www.cde.ca.gov/ci/sc/ll/ap/searchlist.asp. Web site with searchable database.

Name: _____

Magnetic Fishing

Predictions:

Magnetic	Nonmagnetic

Experiment:

Magnetic	Nonmagnetic

Magnetic Fishing

continued

Conclusions:

1. **Do the things that are attracted to the magnet have anything in common?**

2. **Were your predictions correct? _____ Explain.**

3. **As a group, come up with a general rule that explains what kind of things are attracted to magnets. Write it below.**