

# *Magnets: A First Look*

## Teacher's Guide

**Grade Level:** K-2

**Curriculum Focus:** Science

**Lesson Duration:** Four class periods

### Program Description

*Magnets: A First Look*—Children are fascinated by magnets. They enjoy discovering what kinds of things magnets attract, testing the strength of different magnets, and seeing how magnets move things around or push things apart. This program provides an introduction to magnets and their properties, magnetic attraction, strength of force, the magnetic forces of the Earth, and how compasses work. Throughout the program, students are provided with opportunities to explore a variety of problems that promote learning about magnets and encourage young viewers to engage in the scientific process.

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### Discussion Questions

- What kinds of things do magnets attract? Why won't a magnet pick up a penny or a quarter?
  - If a steel paper clip is put in a glass container, will a magnet held outside of the glass attract the paperclip? Why or why not?
  - How is the Earth like a magnet? How does a compass use the Earth's magnetic fields?
  - If you put the north pole of one magnet near the north pole of another magnet, why will they push each other away? What happens if you put the north pole of one magnet near the south pole of another? Why?
  - How does an electromagnet work? How are electromagnets different from other magnets?
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### Lesson Plan

#### *Student Objectives*

- Predict materials that magnets will attract and materials magnets will not attract.
- Test materials to discover those that magnets attract and those that magnets do not attract.
- List properties of magnets.
- Describe how a compass works.
- Describe how an electromagnet works.
- Create and illustrate a magnet facts booklet.

## Materials

- *Magnets: A First Look* video
- Computer with Internet access
- A selection of bar, horseshoe, wand, and disc magnets; one small wand or horseshoe magnet per student
- Materials for recreating program demonstrations: magnets, iron and steel nails, screws or nuts, small boxes with lids, steel pins, buttons, marbles, steel paper clips, string, ball bearings, iron filings, square of glass
- A variety of everyday items made of materials that a magnet will and will not attract, including various metals other than iron or steel (Procedures 1 and 2)
- A variety of items such as a plastic cup, glass jar, sheets of paper, thin piece of plywood, sheet of tinfoil, book, coins, and a ceramic container. (Procedure 6)

## Procedures

1. Before students view the program, set up a display of everyday items made of materials that a magnet will and will not attract. Ask students to share what they know about magnets. Once students have offered their responses, show them a variety of magnets (horseshoe, bar, disc, wand) and demonstrate how a magnet works, using each type with steel paper clips and plastic buttons. Ask students to predict which of the items in your display will be attracted to the magnet and which will not. Place the items into two separate piles without testing student predictions. Tell students to keep their predictions in mind while they watch the program.
2. After students view the program, have them take another look at the items categorized in Procedure 1. Ask students whether they now think any items should be moved from one pile to another. Why? Test each item, and then discuss the accuracy of student predictions.
3. Ask students to explore the classroom to find any magnets located there. Help them discover classroom magnets such as magnetic letters or numbers, a magnetic paper clip holder, a magnetic bulletin board, magnetic cupboard latches, and so on.
4. Provide each student with a magnet and a large piece of paper divided into two columns. Permit them to walk around the room and gather five small items and bring them back to their desks. Have students use their magnets to test the items. Are any attracted to the magnet? Ask students to record their findings on the piece of paper by drawing the items that are attracted to the magnet in the left hand column and the items that are not in the right hand column. Display completed charts.
5. Magnet Facts – Ask students to brainstorm what they learned about magnets in the program. Record these facts on the board. Facts should include the following:
  - Magnets attract iron and steel.
  - A magnet does not have to touch something to attract it.
  - A magnet can attract something through another material, such as paper or glass.

- A magnet will attract and push away (repel) another magnet.
  - Magnets have two poles.
  - The poles of a magnet are called north and south.
  - Like magnetic poles repel.
  - Opposite magnetic poles attract.
  - The force of a magnet is strongest at its poles.
  - The space around a magnet is called a magnetic field.
6. Magnet Facts Booklet— After creating a list such as the one above, have students copy and illustrate each fact on a separate piece of paper. Once pages are completed, have students staple them together to create their own magnet facts booklet. (Note: This activity may need to be modified for very young students.)
  7. Home Inspection— Lend each student a small wand or horseshoe magnet to use at home. Ask students to test items around the house, keeping a list of items tested and making a note whether the attraction was weak, strong, or nonexistent. Have students share and discuss their findings. Did students expect some items to be attracted which were not? If so, what were they? Did any items surprise students by being attracted to the magnet? If so, which ones? Were some items more strongly attracted to the magnet than others? Which items? Why would some items be more strongly attracted to a magnet than others?
  8. For this activity have students work in small, supervised groups. Provide students with several magnets of different strengths, along with paper clips and a variety of items such as a plastic cup, a glass cup, a sheet of paper, a thin piece of plywood, a wooden or metal ruler, a sheet of tinfoil, a book, coins, and a ceramic dish. Take each item in turn and place it between one of the magnets and the paper clips. Move the magnet. Record the results on the board or a piece of paper. Do the paper clips move when the magnet moves? Does the movement of the paper clips depend on the strength of the magnet? Through how many pages of the book is each of the magnets able to attract? Are any of the magnets able to attract through metals? Put water in the glass jar or ceramic dish and place paper clips in the water. Can the magnet attract the paper clips through water?
  9. On small slips of paper, write questions based on information gathered in this program and from the above activities. Create at least one question per student. Put a small steel paper clip on each slip of paper, fold each paper twice, and place them all in a basket or box. Using a stick, a piece of string, and a small horseshoe magnet, make a fishing pole and have each student “fish” for a question which he or she must read aloud and answer. (Note: Test for strength of magnet and placement of clip for best results. Modify this activity for younger students by reading the questions to them once the questions have been “caught.”)

## Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- 3 points: Students were attentive and highly engaged in class discussions; participated fully in program-related activities and the home inspection assignment; produced a neat, well-illustrated magnet facts booklet that demonstrated clear understanding of the topic.
- 2 points: Students participated in class discussions; participated sufficiently in program-related activities and the home inspection assignment; produced a satisfactory magnet facts booklet that demonstrated adequate understanding of the topic.
- 1 point: Students participated minimally in class discussions; participated minimally in program-related activities and the home inspection assignment; produced an unsatisfactory magnet facts booklet that demonstrated poor understanding of the topic.

## Vocabulary

### **attract**

*Definition:* To draw objects nearer

*Context* A magnet attracts objects made of iron or steel.

### **compass**

*Definition:* A device that uses a magnetic needle to determine direction

*Context:* The magnetic north arrow of a compass always points to the Earth's magnetic north.

### **electromagnet**

*Definition:* A temporary magnet made by passing an electric current through a wire coiled around an iron bar

*Context:* An electromagnet can be made stronger by adding a stronger electrical current to the wire coil.

### **magnet**

*Definition:* An object that has a magnetic field and is able to attract iron and steel

*Context:* Every magnet has at least one north pole and one south pole.

### **magnetic field**

*Definition:* The area around a magnet where it exerts a magnetic force

*Context:* A magnet's magnetic field is strongest near its poles.

### **north pole**

*Definition:* The pole of a magnet that is attracted to the Earth's north magnetic pole

*Context:* The north pole of one magnet will push away the north pole of another magnet.

### **pole**

*Definition:* The place on a magnet where the magnetic force is strongest

*Context:* If you break a bar magnet in two, each new piece will have a north pole and a south pole.

### **south pole**

*Definition:* The pole of a magnet that is attracted to the Earth's south magnetic pole

*Context:* The south pole of one magnet will be attracted to the north pole of another magnet.

## **Academic Standards**

### **National Academy of Sciences**

The National Academy of Sciences provides guidelines for teaching science in grades K–12 to promote scientific literacy. To view the standards, visit this Web site:

<http://books.nap.edu/html/nses/html/overview.html#content>.

This lesson plan addresses the following national standards:

- Science as Inquiry: Abilities necessary to do scientific inquiry; Understanding about scientific inquiry
- Physical Science: Properties of objects and materials; Light, heat, electricity, and magnetism
- Earth and Space Science: Properties of earth materials

### **Mid-continent Research for Education and Learning (McREL)**

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K–12 Education addresses 14 content areas. To view the standards and benchmarks, visit

<http://www.mcrel.org/compendium/browse.asp>.

This lesson plan addresses the following national standards:

- Science – Physical Sciences: Understands the structure and properties of matter; Understands the sources and properties of energy; Understands forces and motion
- Science – Nature of Science: Understands the nature of scientific inquiry
- Life Skills – Thinking and Reasoning: Effectively uses mental processes that are based on identifying similarities and differences; Understands and applies basic principles of hypothesis testing and scientific inquiry; Applies basic trouble-shooting and problem-solving techniques
- Language Arts – Viewing: Uses viewing skills and strategies to understand and interpret visual media

## Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the DiscoverySchool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit <http://school.discovery.com/teachingtools/teachingtools.html>.

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## *Credit*

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