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Benchmark 4 The Physical Setting

**4G Forces of Nature #2**

Without touching them, a magnet pulls on all things made of iron and either pushes or pulls on other magnets....

Resources

- How Stuff Works

# Magnets 1: Magnetic Pick-ups

## Purpose

Students will gain an understanding that certain materials are attracted to magnets and some are not.

## Context

This lesson is the first in a two-lesson series on magnets. Students should carry out many investigations in order to familiarize themselves with the pushes and pulls of magnets. By exploring magnets, students are indirectly introduced to the idea that there are forces that occur on earth which cannot be seen. This idea can then be developed into an understanding that objects, such as the earth or electrically charged objects, can pull on other objects. It is important that students get a sense of electric and magnetic force fields (as well as gravity) and of some simple relations between magnetic and electric currents (*Benchmarks for Science Literacy*, p. 93.) In later years, students will learn about gravitational force and how electric currents and magnets can exert a force as well.

Students at this level should have already discovered that magnets can make an object move without touching it. What they may not have paid attention to is the type of materials that move and do not move when near a magnet.

In Magnets 1: Magnetic Pick-ups, students will look at various objects, make predictions about whether they are magnetic, and then test their predictions. This exploration is an introductory activity to magnets and magnetism.

In Magnets 2: How Strong is Your Magnet?, students will discover how barriers and increased distance can vary the strength of a magnet.

## Planning Ahead

Materials:

- bar or horseshoe magnet
- brown paper lunch bag or zip type bag
- various objects to test:
  - wooden toothpick
  - penny
  - jewelry
  - plastic cup
  - paper clips
  - thread
  - needles or pins
  - rubber bands
  - elastic hair bands
  - tin can
  - glass

- aluminum foil
- crayon
- nail
- mitten
- paper
- school scissors
- tack
- staples
- bobby pin or barrette

- Methods of Classification and Magnetic Pickups student sheets

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### Motivation

Divide students into pairs and provide each pair with a bag of objects to test (students should not have magnets at this time). Tell students to empty their bags of materials and investigate what is inside. Ask students to study all the objects and then classify or group them based on what they know about the materials. Students may choose to sort by size, shape, material make-up, weight, or some other scheme. After students have had enough time to sort the objects, have them record their sorting method on the student sheet, Methods of Classification. Then ask students to think of another way to classify the objects and again, record their thoughts. Once students have determined two or three ways to classify the objects, have each group share one of its methods, and perhaps discuss which objects would fall under which categories. You may wish to record the various classification methods on the board.

Now hold up a bar or horseshoe magnet and ask students the following questions:

- What is this object?
- How are magnets used in our everyday lives?
- How do you know when something is a magnet?
- How can you tell if an object is magnetic or not?

Tell students that they will explore magnets and the types of objects that are attracted to them. Explain to students that they will make predictions about whether or not the objects in front of them are magnetic, and then discover if their predictions are correct.

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### Development

Before starting the lab, students will speculate on whether an object's weight, texture, or size affects its magnetism. You may want to do the first question from the Methods of Classification sheet together so that students understand what they are being asked. The discussion may be similar to the following:

Say to students: *Did any of you sort the object by weight? Heavy or light? Take a minute and classify the objects by weight. Perhaps decide which are heavy, light, or something in-between.*

Once students have finished, ask them:

- Will an object's weight affect whether or not it is attracted to the magnet?

Provide more explanation if needed. Then have students record their thoughts on the activity sheet Methods of Classification. Students should then continue and answer similar questions found on the student sheet. Once students have completed the questions, you many want to discuss their responses. Students will

revisit them again once the lab is complete to see if their thoughts have changed.

Distribute a bar or horseshoe magnet and the student sheet, Magnetic Pickups, to each group. The activity sheet is designed so that students can work independently if appropriate. You may want to reinforce that students will first record and make predictions for all the objects, then they will test each object for magnetism and record results.

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**Assessment**

Once students have recorded their predictions and results, they will reflect on their findings by answering questions on the Magnetic Pickups student sheet. Students should come to the conclusion that many metals are magnetic. You may wish to discuss more specifically that iron, steel, nickel, and cobalt are magnetic. Be sure to address that some metals (e.g., copper and aluminum) are not attracted to magnets.

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**Extensions**

Follow this lesson with the next one in the Magnets series: Magnets 2: How Strong is Your Magnet?

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Have students try the activity Iron in Cereal, from Whelmers-McREL's Accessible Science Series. In this activity, students pull iron out of cereal using a magnet. Students may not believe that there are metals in food we eat. This activity will surprise them and conger up interesting questions for discussion.

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Have students test to see if American and Canadian nickels are magnetic. Once they discover that American nickels are not, see if students can formulate an accurate reason why not.

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Write the words "Magna Doodle" on the board. Ask students if anyone is familiar with a Magna Doodle and then ask students to describe it. Once students have had time to share, walk around the room showing students a Magna Doodle. Allow students to look at or quickly try the toy and pen. Then ask students to think of a hypothesis for how a Magna Doodle works—if appropriate; allow students to record their thoughts in their science journals.

Students can also visit How Stuff Works to discover How Magna Doodle Works.

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What is attracted to magnets?, a resource from the Magnet Man website, offers many ideas and activities to further investigate magnets and magnetism.

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