ACTIVITY 2

What Does a Magnet Attract?

OBJECTIVES

The students investigate a variety of objects to determine which are attracted to a magnet and which are not. They then discuss the materials that these objects are made of.

The students

- guess which objects will be attracted to a magnet
- observe that metal objects made of iron and steel are attracted to a magnet
- observe that metal objects made of aluminum, copper, and brass are not attracted to a magnet
- observe that nonmetal objects are not attracted to a magnet

SCHEDULE

About 30 minutes

VOCABULARY

magnetic
nonmagnetic

MATERIALS

For each student

1 Activity Sheet 1

For each team of four

1 bag magnetic/nonmagnetic objects
2 magnets, small

Done!

PREPARATION

1. Make a copy of Activity Sheet 1 for each student.
2. Each group of four students will need one bag of magnetic/nonmagnetic objects and two small bar magnets.

Ready at tables!

BACKGROUND INFORMATION

Objects are either ***magnetic*** or ***nonmagnetic.*** A magnetic object is attracted to a magnet; an object that is not magnetic is not. Most, but not all, metals are magnetic. Iron has the strongest magnetic attraction of the metals. Nickel and cobalt, and alloys or mixtures made of iron and these metals, such as steel, are also magnetic. Aluminum, copper, and gold are not magnetic, thus, the saying, "Everything that sticks to a magnet is metal, but not all metals stick to magnets."

The two areas of a magnet where the force of the magnet is the strongest are called the magnet's ***poles.*** All magnets have a north and a south pole. The poles of a bar magnet are located on either end of the magnet.

The reason that magnetic materials are attracted to magnets is this: In the presence of magnets, the atoms that comprise a magnetic object align in such a way as to make the object a temporary magnet itself, complete with poles. One pole of the magnet is attracted to the opposite pole of the magnetic object. As a result, they stick together. In objects that are nonmagnetic, the atoms of the object are unaffected by the presence of the magnet. As a result, no poles are formed, and the magnet is not attracted to the object.

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▼ **Activity Sheet 1**

What Does a Magnet Attract?

Object Tested	Will it be attracted to the magnet?	Attracted	Not attracted
1. aluminum nail (light gray)	Predictions		✓
2. balloon (deflated)	will vary.		✓
3. button			✓
4. can lid (steel)		✓	
5. copper strip			✓
6. cork stopper			✓
7. metal washer		✓	
8. paper clip		✓	
9. paper fastener (brass)			✓
10. plastic foam			✓
11. plastic spoon			✓
12. scallop shell			✓
13. steel nail (dark gray)		✓	
14. wooden cube			✓

Guiding the Activity

Additional Information

1. Explain to the students that they will test a variety of objects to determine which are attracted to a magnet and which are not. First of all, however, they are to examine the objects and guess which ones they think will be attracted to the magnet and which ones will not be.

2. Divide the class into teams of four and distribute **Activity Sheet 1** to each student.

   Distribute one bag of assorted magnetic and nonmagnetic objects and two magnets to each team. Have students examine the objects and record their guesses on the activity sheet. Then, explain that they are to use a magnet to test each of the objects to determine which objects are attracted to the magnet and which are not. After each object is tested, the students should put a check mark in the appropriate column on Activity Sheet 1.

Safety Note: *Tell students not to blow up the balloons in the bags. They are to be used in the activity uninflated.*

Safety Note: *Tell students to handle the nails in the bags with care because the points are sharp.*

As the students are working, walk from team to team to make sure they share investigative tasks. Each student should have an opportunity to work with a magnet.

Guiding the Activity

Additional Information

3 After students are finished testing the objects, write the headings *Magnetic* and *Nonmagnetic* on the board. Explain that, in this instance, the word **magnetic** is used to describe something that is attracted to a magnet.

Ask, **What do you think nonmagnetic means?**

In this instance, **nonmagnetic** *describes something that is not attracted to a magnet.*

Have each team name one or two objects and the heading under which the objects belong. Write the objects on the board. Do this until all 14 objects are listed under the headings.

The paper clip, metal washer, can lid, and steel nail should be listed under the Magnetic *heading. The other ten objects should be listed under the* Nonmagnetic *heading.*

Magnetic	Nonmagnetic	
can lid	aluminum nail	paper fastener
steel nail	balloon	plastic foam
metal washer	button	plastic spoon
paper clip	copper strip	scallop shell
	cork stopper	wooden cube

▲ *Figure 2-1. The completed lists.*

4 When the lists are complete (see Figure 2-1), ask, **What properties do the magnetic objects have in common?**

They all are made of metal.

Are all of the metal objects attracted to the magnet?

No. The light gray nail, the copper strip, and the paper fastener are not attracted to the magnet. Point out that these metal objects are made of aluminum, copper, and brass, respectively.

Ask, **Are any of the nonmetallic objects attracted to the magnet?**

Students should say that none of the nonmetallic objects are attracted to the magnet.

Explain that the metal items made of iron and iron-based metals (like steel) are attracted to the magnet. Items made of other materials are not attracted to the magnet.

ACTIVITY 3

Can the Force Go Through It?

OBJECTIVES

Students discover that a magnetic force is not only invisible, it can also travel through many different materials.

The students

- guess which objects will "block" the force of magnetism
- place objects made of different materials between a magnet and a magnetic object
- investigate which materials allow the magnetic force to pass through them

SCHEDULE

About 25 minutes

VOCABULARY

magnetism

Will continue with materials

MATERIALS

For each student

1 Activity Sheet 2

For each team of four

1 pc aluminum foil square
1 pc cloth, flannel, square
1 bag magnetic/nonmagnetic objects
2 magnets, small

PREPARATION

1. Make a copy of Activity Sheet 2 for each student.
2. Each team of four will need two small magnets, a bag of magnetic/nonmagnetic objects, a small square of flannel cloth, and a small square of aluminum foil.

BACKGROUND INFORMATION

In general, a magnetic force, or ***magnetism,*** can penetrate thin layers of nonmagnetic materials. However, thick layers of nonmagnetic materials, such as plastic, foam, and rubber, may appear to block the magnetic force, but it is actually the thickness of the material that keeps the magnetic object out of range of the magnet's field of force.

On the other hand, strongly magnetic materials, such as iron nails, can pull, distort, or redirect a magnet's force, effectively "blocking" it.

▼ **Activity Sheet 2**

Can the Force Go Through It?

Object Tested	Do you think it will block the force?	Did it block the force?
1. aluminum foil square	Predictions will vary.	
2. aluminum nail (light gray)	The magnet was able to pick up	
3. balloon (deflated)	the paper clip through the	
4. button	aluminum foil square, the cloth	
5. can lid (steel)	square, and the plastic bag.	
6. cloth square (flannel)		
7. copper strip		
8. cork stopper		
9. finger	Answers will vary for the other	
10. metal washer	items tested. Only the objects	
11. paper fastener (brass)	that are thick enough to prevent	
12. plastic bag	the magnet from getting close	
13. plastic foam	enough to the paper clip will	
14. plastic spoon	appear to block the force. A few	
15. scallop shell	of the magnetic materials may	
16. steel nail (dark gray)	also "block" the force.	
17. wooden cube		

(4)

Guiding the Activity

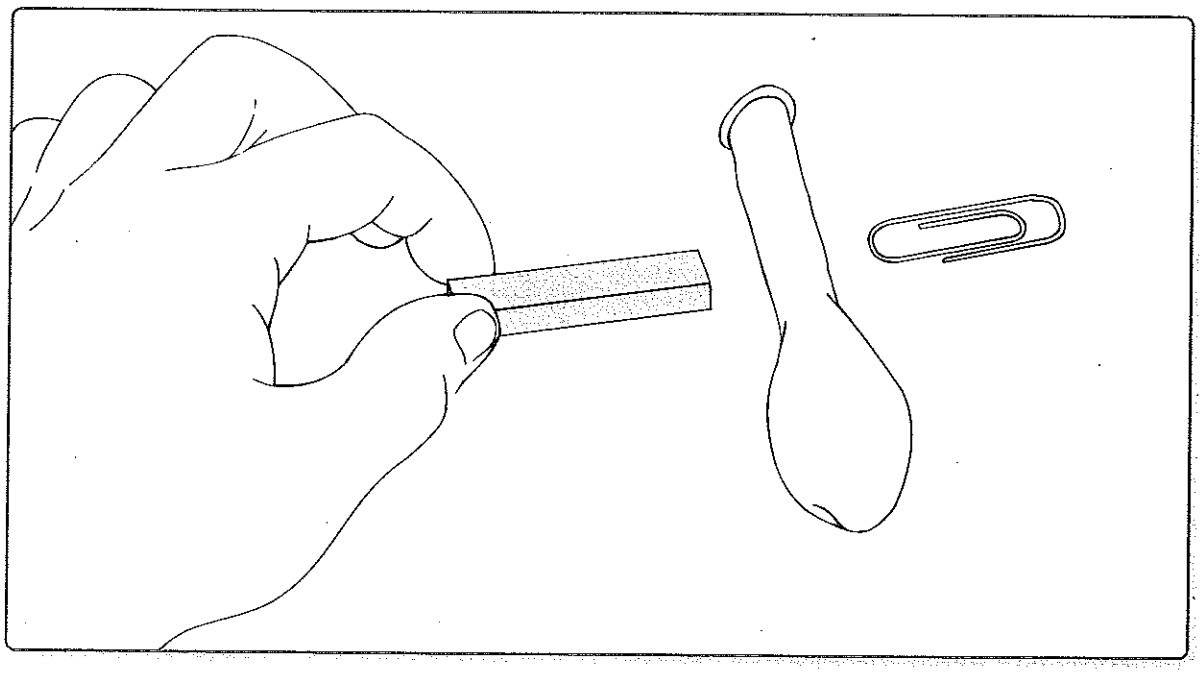
Additional Information

1. Divide the class into teams of four students each, and distribute **Activity Sheet 2** to each student. Write the word *magnetism* on the board. Tell students that, in this activity, they will experiment with different objects to see if they can "block" the force of a magnet to attract objects. This force is called **magnetism.**

   In the first column of the activity sheet, have students record their guesses regarding which objects will "block" the force and which will not.

2. Distribute two magnets, a flannel cloth square, an aluminum foil square, and a bag of assorted magnetic and nonmagnetic objects to each team.

   Tell students to wrap the flannel cloth square around the magnet and attempt to pick up the paper clip with the magnet. Have them record their results. Repeat the investigation, first with the square of aluminum foil wrapped around the magnet, and then with the magnet inserted into the plastic bag emptied of its magnetic and nonmagnetic contents.



▲ *Figure 3-1. "Blocking" the force.*

Guiding the Activity

When students have finished testing with these three materials, have them place the paper clip and magnet flat on a nonmetallic desk and slowly move the magnet toward the paper clip until the clip is drawn to the magnet. Repeat this exercise, each time placing a different object between the magnet and the paper clip to see if the magnetic attraction is interrupted (see Figure 3-1). Give the teams time to experiment with all of the objects from the bag to see which ones, if any, block the magnetic force.

Additional Information

As the teams work, check again that they are sharing the investigative tasks. Make sure each student records information as well as works with the objects.

3 When the investigation of all of the objects is complete, invite the students to discuss their findings. If there is disagreement, have the groups repeat that part of the investigation. Then ask, **Did any objects appear to block the force of magnetism?**

Students should understand that when a magnetic object (such as the steel nail) was placed between the magnet and the paper clip, the force of the magnet was pulled, distorted, or redirected by the magnetic object, resulting in little force passing through it. However, the force was able to pass through thin, nonmagnetic objects, such as air, paper, and aluminum foil. Thick, nonmagnetic objects, such as the wooden cube, may have appeared to block the force, but it was actually just the thickness of the object that kept the paper clip outside the range of the force of the magnet.

4 Ask, **What do you think causes one material to be magnetic and another material to be nonmagnetic?**

Accept all responses to this question, and give students plenty of time to discuss them. Then explain that it has to do with the way the atoms inside the material either align or do not align when brought near a magnet's force.

Reinforcement

Encourage students to identify and test classroom objects made of materials that they think would or would not "block" a magnetic force.

Science Journals

Have students place their completed activity sheets in their science journals.

Cleanup

Return all materials to the kit.