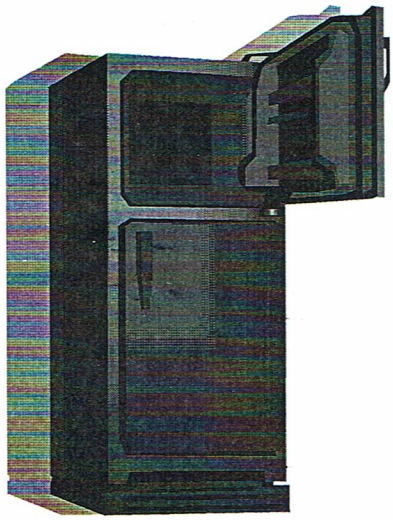
Making It Stick

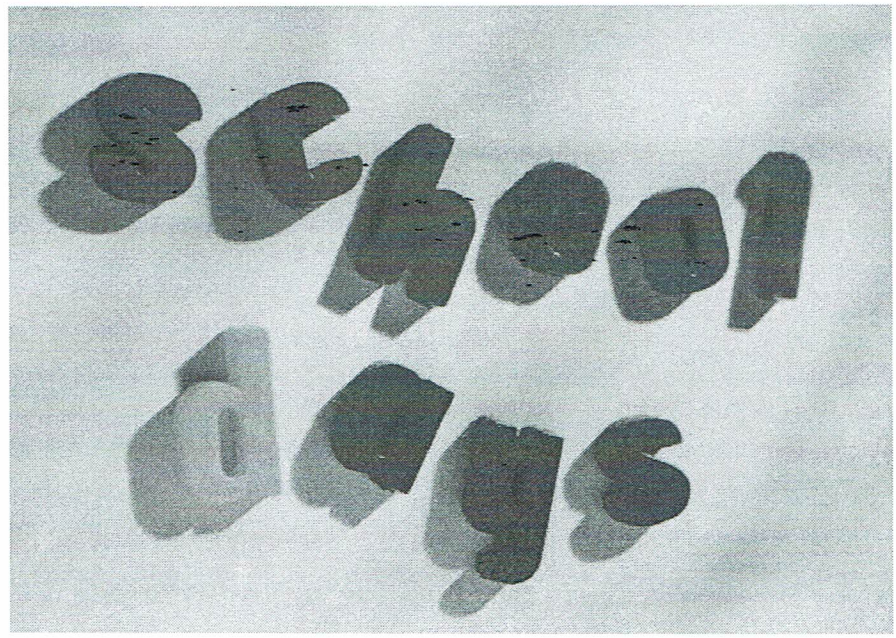
Magnets Lesson 1



Can you think of a time when you moved something without touching it? It sounds impossible, but with magnets it happens. Magnetic marbles and other magnetic toys move each other or stick together.

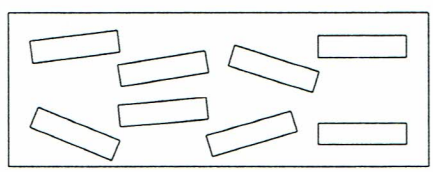
You can't exactly see what happens to make the magnets stick together, but you can see the effects. Have you ever wondered how the pull gets from one magnet to another or to the refrigerator? The magnets you use most are probably the ones that hold up your papers on your refrigerator.

Like static electricity, magnets exert a force, and you can observe how this force interacts with objects around you.

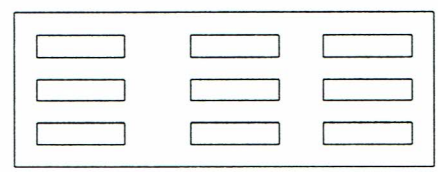


Just the Facts

- Ancient Greeks and Chinese knew about **magnetism** over 2,000 years ago.
- They hung thin pieces of **magnetite** so it could swing freely from a thread. The hanging stone made a simple direction finder.
- Magnetite became known as **lodestones** or "leading stone."
- Objects attracted by a magnet contain **iron** or **steel**.
- Magnets have two unlike **poles**. They are given the names north and south.
- Unlike poles **attract** and like poles **repel**.
- The iron's magnetism comes from the **electrons**.
- **Magnetic force** can pass through other solid objects.
- The **earth** is a huge magnet.
- There are two ways to magnetize an iron nail *(a **temporary magnet**)*:
  1) Stroke the nail with a magnet. Each stroke should be in the same direction and with the same pole of the magnet.
  2) Place the flat head of a nail on one end of a magnet for a few minutes.
- The reason a nail can become a temporary magnet is due to a change in the nail that we can not see. The nail is made up of tiny particles that we can not see. These particles are not lined up in any special way. But, when we stroke the nail with the magnet, the tiny particles line up all in a row.

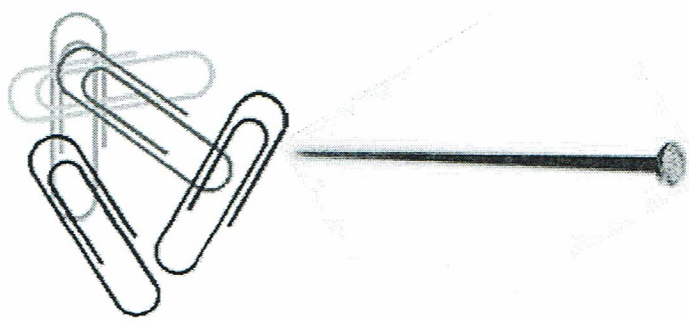


Non-magnetized molecules are not arranged in any particular order.



Magnetized molecules are arranged in an orderly manner.

- But, the particles of the nail do not stay lined up for a long time. The nail then becomes demagnetized.



Making a Magnet Experiment

A very long time ago, a mineral was found that had a special property. When it came in contact with certain metals, the mineral and the metals would stick together. At first, people thought this property was some kind of magic.

What people thought was a magic stone was really a magnet. A **magnet** is a piece of material or a device that attracts iron-containing materials and some other metals. A natural magnet is called a lodestone. **Lodestones** were the first magnets known to people.

A lodestone is not the only kind of magnet. Certain metals can be magnetized, or made into magnets. Iron, nickel, and cobalt can be magnetized. Most magnets are made of a mixture of these metals. Suppose you want to magnetize an iron nail. You can use a magnet to make a magnet. One way is to place the nail in contact with a magnet. After a while, the nail will become magnetized. Another way to magnetize the nail is to stroke the nail with the magnet. Each stroke must be made slowly in one direction. After many strokes, the nail will become magnetized.

Materials

Bar magnet, nail, paper clip, staples

Procedure

1. Rub the nail 50 times in one direction with the magnet. Hold as much of the nail (not just the tip) against the magnet as possible.
2. Touch the nail to the paper clip, and the staples.

Observations: _____

_____

_____

Conclusions: _____

_____

_____

How Magnets Behave Experiment

The places where the pull of a magnet is strongest are called **magnetic poles**. There are two kinds of magnetic poles, north (N) and south (S). The same poles (N to N or S to S) push away (**repel**) from each other, while opposite poles (N to S or S to N) pull toward each other (**attract**). Like magnetic poles of a magnet **repel** each other. Unlike magnetic poles **attract**.

Magnets can be different sizes and shapes. They can be made of different materials. But, all magnets behave alike. Materials not attracted by magnets are called non-magnetic. Such materials cannot be magnetized. Only magnetic materials can be magnetized. The most common magnetic materials are iron and steel. Other, less common magnetic materials are cobalt and nickel.

Magnetic forces cause magnets to attract or repel other magnets. Magnets can also attract certain other objects. Objects that are attracted by a magnet are called magnetic objects. The forces of attraction or repulsion are not the same throughout the magnet. Magnetic forces are greatest at the poles of a magnet.

Materials

two bar magnets

Procedure

1. Set up each magnet according to the directions below. Then write your observation (attracts or repels).

A. North to South Observation: _____
B. North to North Observation: _____
C. South to North Observation: _____
D. South to South Observation: _____

Conclusion

1. Describe the characteristics of unlike magnetic poles.

_____

_____

2. Describe the characteristics of like magnetic poles.

_____

_____

What Will a Magnet Attract

Directions: Predict which object will be attracted by the magnet by writing yes or no under the prediction section. After all of the predictions have been completed, test each object using a magnet.

Material	Prediction	Actual Results
nail		
marble		
paper clip		
rubber band		
pins		
brass fasteners		
penny		
nickel		
eraser		
crayon		
scissors		
pencil		
paper		

Conclusion

1. From your observations, it should be clear that certain materials are attracted by a magnet. Underline those materials which are attracted by a magnet.

   copper rubber iron paper wood steel

2. Materials attracted by a magnet are called _____.

3. Materials not attracted by a magnet are called _____.

4. Write down two other objects in the classroom that are nonmagnetic.

   _____ _____

5. Write a sentence about what you learned from this experiment.

   _____

Will a Magnet Work in Water?

Materials

magnet on a string, glass jar, metal objects, non-metal objects, water

Procedure

1. Tie string through the magnet. Place metal and non-metal objects in the jar and add water to fill the jar 2/3 full.

Predict: If you put the magnet into the water, what will you observe?

_____

_____

Try it!

Write your observations. What materials did the magnet attract? List them.

_____

_____

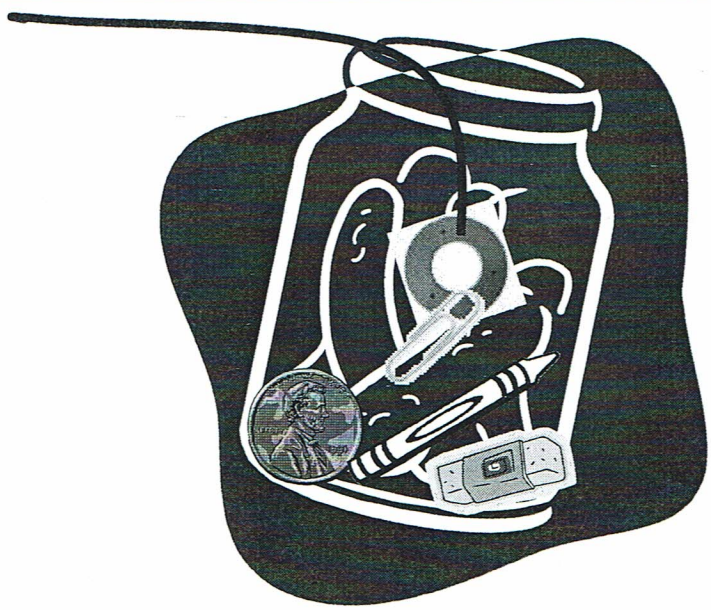
_____

Conclusion

_____

_____

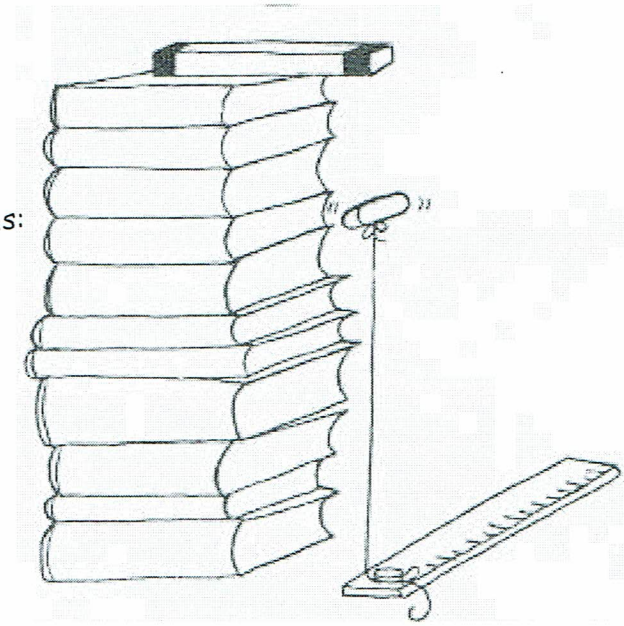
_____



Magnetic Force

Do the experiment described below and discover the invisible magnetic force. Use a partner to help you complete all the steps.

Start with: 5 thick books (a 10" stack)
bar magnet
15" piece of string
large paper clip
12" ruler
collection of the following test items:
small piece of paper,
bottle opener
large nail
small piece of cardboard
small piece of plastic wrap
tin can lid
small piece of thin glass
steel tacks
small piece of thick cloth
scissors



Step 1: Make a stack of books 10 inches high. Place the magnet on top of the stack of books so that one pole extends over the edge of the stack

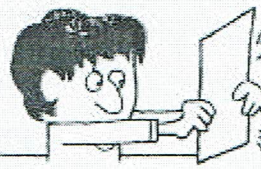
Step 2: Tie the 15 – inch piece of string to a large paper clip.

Step 3: Push a thumbtack halfway into the ruler. Then wind the string with the paper clip twice around the thumbtack. Leave about nine inches between the paper clip and the ruler

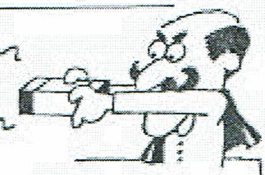
Step 4: While one student holds the paper clip one-fourth of an inch away from the magnet, another student pulls the loose end of the string tightly around the thumbtack. Then push the thumbtack into the ruler to secure the string. The student holding the paper clip may let go and the paper clip should remain suspended the by magnetic force of the bar magnet.

Step 5: Without touching the paper clip, pass the materials from the collection of testing items between the magnet and the paper clip. Record on the chart on the next page which items made the paper clip fall and which ones did not. (Each time the paper clip calls, carefully suspend it again as shown in Step 4.)

Name _____



WHAT WILL STOP THE FORCE?



In the appropriate columns below, record which items made the paper clip fall and which items did not.

Test item	Paper clip fell	Paper clip did not fall
1. paper		
2. bottle opener		
3. large nail		
4. cardboard		
5. plastic wrap		
6. tin can lid		
7. thin glass		
8. steel tack		
9. thick cloth		
10. scissors		

1. What is similar about all the items that made the paper clip fall?

_____

_____

2. What is similar about all the items that did not make the paper clip fall?

_____

_____

3. What conclusions can you make from this experiment?

_____

_____

_____

_____