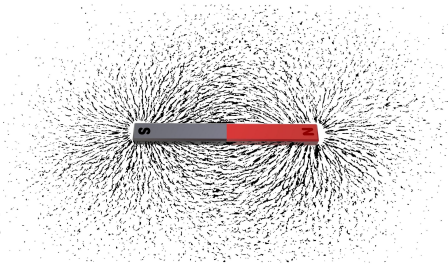
Magnets

Reflect

Imagine that you could push and pull things without touching them. You could even move things located on the other side of a wall! The power allows you to pull and push objects. However, this force acts only on things made of certain materials, such as iron. The power is called **magnetism**. This would allow you to have the force put out by a magnet.



Look at how the iron filings are attracted to the magnet.

magnetism – a force between certain kinds of objects

attract – cause something to move closer

repel – cause things to move away

What is magnetism?

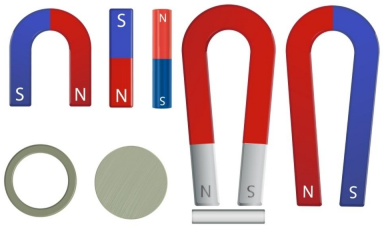
Magnetism is a force we can observe that occurs between two magnets or between a magnet and something magnetic. This force can be a push or pull.

What are magnets?

Magnets are items that create magnetic fields to attract other objects. A magnetic field is an invisible force around the magnet. Magnets **attract** to certain metals and help objects stick together. Other times, magnets will push each other apart, or **repel** one another.

Magnets are especially attracted to the metals iron and steel. Aluminum and copper are metals that will not stick to magnets. An object that sticks to a magnet is *magnetic*. Iron nails, screws, and safety pins are magnetic.

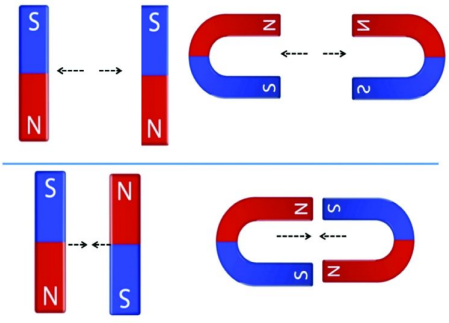
If an object is not magnetic, a magnet will not act on it, or cause a push or pull. Nonmagnetic objects will not attract to a magnet. Wood and plastic objects are not magnetic.



Notice that these magnets all look different, but all have an N for north pole and an S for south pole labeled on them.

Magnets have different ends.

One end is called the north pole, and the other end is called the south pole.



Magnets demonstrate pushing and pulling. Opposite poles attract each other, or pull toward each other. The north pole of one magnet will attract to the south pole of another magnet. Opposite poles (north and south or south and north) attract.

Like poles repel each other, or push apart. Poles that are the same (north and north or south and south) will repel, or *push* each other away. North poles of magnets only pull on south poles. Two north poles will push each other away. Two south poles will also push each other away.

What Do You Think?

What do you think would happen if we did not have magnets? Magnets are very useful to us because of their property to attract and repel certain materials.

Do you think we really use magnets that much? The answer is yes! Magnets are all around us. You use items every day that have magnets, and you may not even realize it.

Magnets are in everyday items such as the following:

- **Appliance doors**: Magnets keep your refrigerator door shut.
- **Microwaves**: Magnets help generate the energy that heats your food.
- **Handbags or wallets**: These often have magnetic clasps to keep them closed.
- **Shower curtains**: Magnets hold the curtain in place inside the bathtub.

Magnets are also used in doorbells, computers, compasses, power locks, cars, speakers, and phones.

Many different household items use magnets, such as the refrigerator, a purse fastener, and shower curtains.

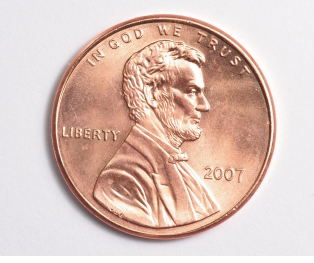
Look Out!

Have you ever considered that all metals are magnetic?
If you have, look out, because in fact, they are not.

Nails, safety pins, and paper clips are made of iron. They are all magnetic.

Iron is the most common metal to which a magnet's force is attracted. Iron is often mixed with other metals, but it will not affect the magnetic attraction. Nickel and cobalt are other common magnetic elements.

Aluminum and copper are nonmagnetic and will not attract to magnets. Plastic and glass are not magnetic as well; that is why you cannot secure a magnet to a window. Glass does not contain magnetic elements. We often see magnets coated with plastic to make them look pretty on the refrigerator. The magnet under the plastic has a force strong enough to attract through the plastic to the refrigerator. It is not the plastic covering that is magnetic.



Aluminum foil and copper pennies do not stick to magnets. Even though they are metals, they are not magnetic.

These plastic keys are nonmagnetic.

What Do You Think?

Getting Technical: Take a Ride on a Magnetically Levitated Train.

If you lived in China or Japan, you could take a ride across the country on a train lifted and run by magnets. The magnets are powered by electricity. They are called *electromagnets*. These "bullet" trains can move as fast as 300 miles per hour. They are lifted by magnetic fields on either side of the guideway. The guideway is the place where the train is set. The train actually hovers—or *levitates*—over the track during its entire journey. That's why it is called a maglev train. The magnets also move the train along the track.

The United States does not have a maglev train system yet. One company is working with a university in Virginia to build a test track. Several other states are also researching whether they should install one.

Part I: Draw a picture to match the given description. Be sure to label the north and south poles of each magnet.

1. One magnet is attracted by the other.

2. These magnets repel one another.

Part II: Put a check next to the letter if the force of a magnet can be used.

A. Picking up a box of spilled paper clips.
B. Stapling a paper.
C. Clicking a pen to write.
D. Sharpening your pencil.
E. Putting a note on the teacher's filing cabinet.
F. Using a can opener.
G. Picking up a spilled roll of dimes.

Part III: Complete the statement below.

All metals _____ (**ARE / ARE NOT**) magnetic.

Try Now

How could you find out if an item in your classroom was magnetic or not?
Use a magnet and see if the item attracts the magnet.

If there is a whiteboard in your classroom, there may be magnets holding up papers. If this is the case, what does that tell us about the whiteboard?

_____
_____
_____

Ask your teacher for magnets with the poles labeled N (north) and S (south).

1. Try to push the **same** poles together. Describe what happened.
   _____
   _____
   _____

2. Try to push the **opposite** poles together. Describe what happened.
   _____
   _____
   _____

3. Can you think of a new way you could use magnets in your classroom?
   _____
   _____
   _____

Connecting With Your Child

Observing Magnetism

To help your child further explore magnetism and magnets, here is an activity you can do together.

The strongest magnet should attract the greatest amount of iron. Gather several different sized refrigerator magnets, or any other magnets you have, and a handful of paper clips. You will use the paper clips to test which magnet is the strongest. If you do not have any paper clips, other small, magnetic objects will work.

Take the different magnets one at a time and see which magnet picks up the most paper clips at once. Make a data table similar to this one below to record your observations. See the example in the first line.

Create a graph of your results to make the data easy to read.

Magnet Description	Number Held: Trial 1	Number Held: Trial 2	Number Held: Trial 3	Average Number Held:
Heart on refrigerator	5	4	6	5

Here are some items to discuss with your child:

1. Did you see magnetism with your own eyes? Describe what happened.
2. Did you observe magnets attract and repel?
3. Which magnet held the most paper clips?
4. What characteristics did you see that made this magnet the strongest?
5. If you were to put two of the magnets you used together and they repelled, what does that tell you about the poles and forces of the magnets?