reflect

Look at this picture. The bug sticks to the refrigerator door. Why does the bug stick to the door? We know it's not a real bug, so something else must be making the bug stick there.

Magnets stick to certain things. A magnet gives off a **force** you can't see. The force pulls things made of iron to the magnet. The refrigerator door is made of iron. The bug has a magnet attached to its bottom. The magnet in the bug sticks to the door.

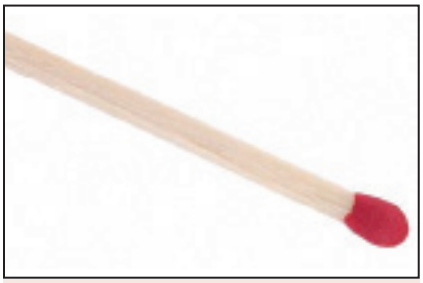
force: a push or a pull

look out!

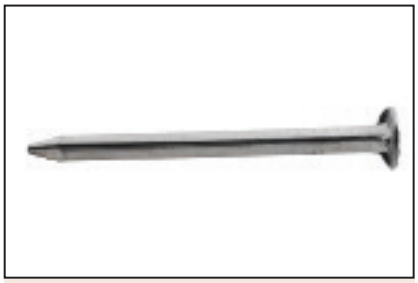
Magnets stick to certain things only. Magnets stick to objects made of iron. Magnets also stick to objects made of steel. Steel and iron are both metals. But magnets do not stick to all metals. For example, magnets don't stick to aluminum foil or copper pennies. Magnets also don't stick to objects made of plastic or wood.

This picture shows another magnet. The paper clips stick to the magnet because they are made of steel.

Below are some pictures of other objects. Circle each object that would stick to a magnet.



Wooden Matchstick



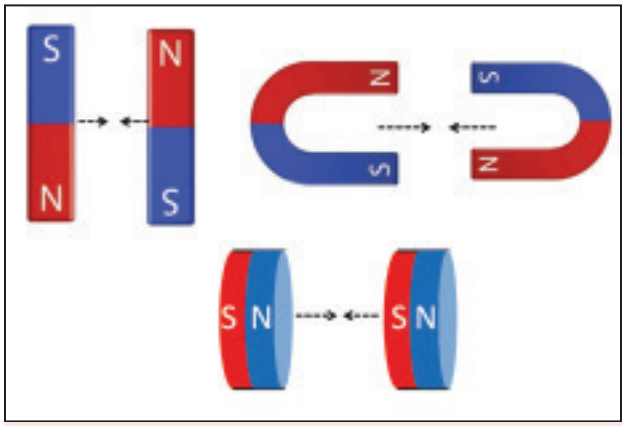
Iron Nail

Plastic Blocks

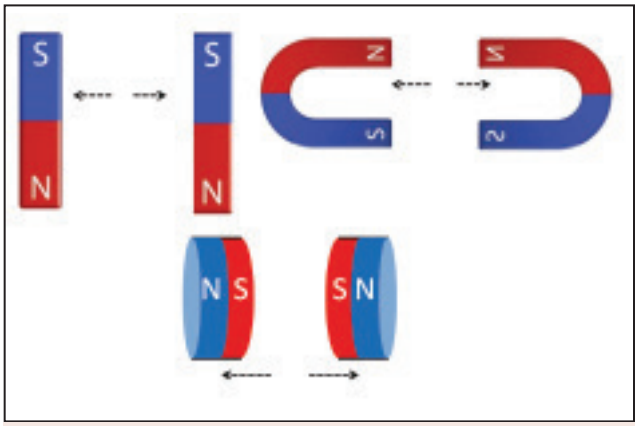
MAGNETS

Magnets can pull and push.
What happens when two magnets come near each other? Sometimes they pull together. Sometimes they push apart.

This picture shows many magnets. Do you see the letters "N" and "S"? The letter "N" means **n**orth pole. The letter "S" means **s**outh pole. A *pole* is an end. Every magnet has two poles.



If the poles are different, the magnets pull together. A north pole pulls toward a south pole. A south pole pulls toward a north pole.



If the poles are the same, the magnets push apart. A north pole pushes away a north pole. A south pole pushes away a south pole.

try now

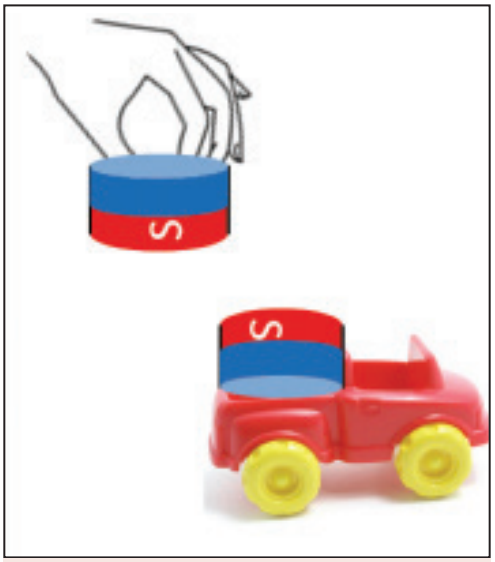
Find two magnets. Slowly push one magnet toward the other magnet. Watch what happens. Now turn one of the magnets halfway around. Bring the magnets together again. Watch what happens. Could you make the magnets pull together and then push apart?

You can make predictions about magnets. You can predict whether a magnet will pull an object if you know what the object is made of. You can also use magnets to do work for you.

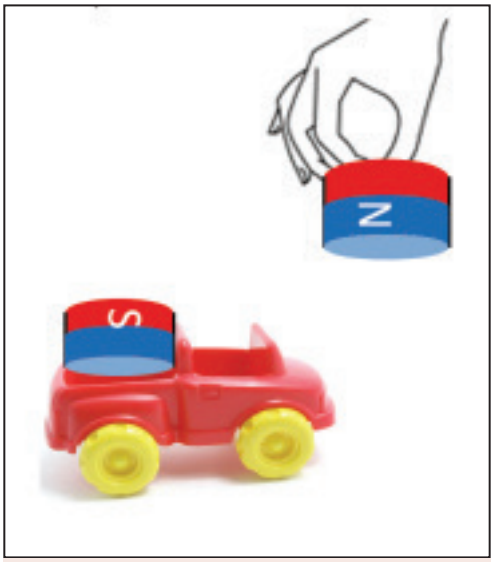
Look at the toy train. Each car has a magnet at each end. The magnets hold the cars together. They stick because a north pole and a south pole are touching. The cars would not stay together if the same poles were touching.

what do you think?

How can you use magnets to have a race?



Will the magnet push or pull the car? Draw an arrow to show where the car will move.



Will the magnet push or pull the car? Draw an arrow to show where the car will move.

MAGNETS

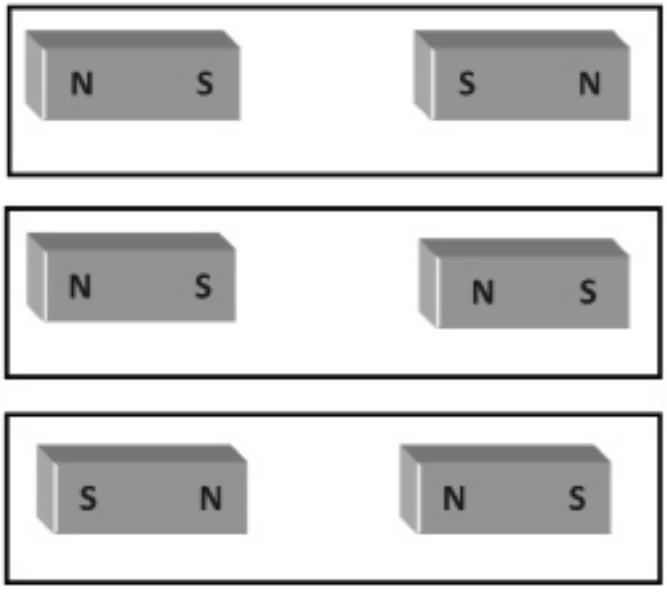
Looking to the Future: Electricity from Wind
You may have seen windmills. Today people use windmills to make electricity. The wind spins the windmill. When the windmill spins, it causes magnets to move past wires. This helps to make electricity.

People think there may be other ways to get electricity from wind. For example, you could place little magnets on strips of plastic. When the strips move back and forth, you can make electricity.

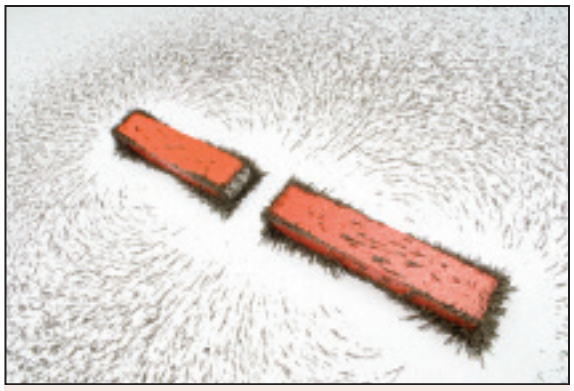
Spinning windmills make electricity.

What Do You Know?
Here are three pairs of magnets. Will they pull together or push apart?

- Write PULL between the magnets if you think they will pull together.
- Write PUSH between the magnets if you think they will push apart.



connecting with your child



Iron filings line up with magnetic lines of force.

Magnetic Lines of Force

Your child has learned that magnetic force is invisible. This activity presents evidence that magnetic force exists, even though it is invisible. It will also show your child the patterns that force lines form around a permanent magnet.

When a magnetic object such as iron is placed in a magnetic field, it takes on some of the properties of the magnet and becomes a temporary magnet. In this demonstration, you will allow small iron filings to become magnetized. These filings will then orient themselves along the magnetic force lines radiating from the permanent magnet. You will need these materials:

- A thin, ridged sheet of any material except iron or steel. The area of the sheet should be at least as large as a standard sheet of paper.
- Iron filings. These can be obtained from a metalworking shop or you can make them yourself. To make them, apply a rasp, file, or belt sander to any soft iron object, like a large nail.
- A permanent magnet. Any shape will work, but only a bar magnet will produce the patterns in the photograph above.

Spread the filings evenly over the surface of the sheet. Hold the sheet at waist level while the student slowly raises the magnet up to the center of the underside of the sheet. Observe and discuss the pattern of magnetic lines of force produced. Explain that the poles of the magnet are the centers from which the lines radiate. You can spread out the filings and do it again to observe similar patterns.

Here are some questions to discuss with your student:

1. How did the magnet change the iron filings?
2. How would another permanent magnet arrange itself if you laid it on top of the sheet?
3. Could you use aluminum filings or wood shavings for this experiment? Why or why not?