

Exploring Magnets

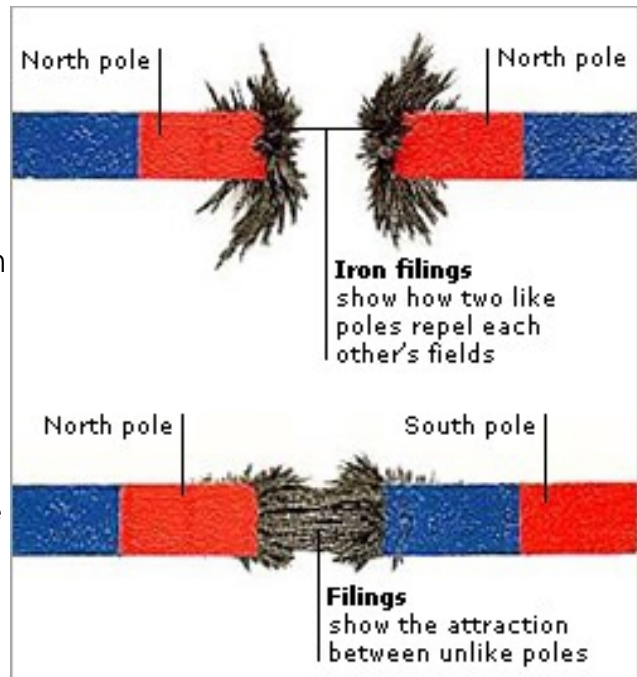


Name: _____

What is a Magnet?

A magnet is an object that can push or pull things using a force called magnetism. You can't see this force. When electrons in an object all line up and face the same direction, one end of a magnet gets a positive charge and the other end gets a negative charge (we call the ends the north and south poles).

The two ends attract each other. All magnets have two poles. The pull of a magnet is its very strongest at the poles. The pole of one magnet can pull or push the pole of another magnet. The north pole of one magnet will attract the south pole of another. Two north poles or two south poles will repel each other, or push each other away.



Magnets in many shapes, sizes, and strengths

Magnets come in many sizes and shapes. There are horseshoe magnets, round magnets, bar magnets, and many other shapes too. There is a kind of mineral called magnetite that is magnetic. It can come in any shape. Even the earth is one big magnet.



Some magnets are stronger than others. Strong magnets have strong magnetic fields and can attract objects from far away. Weaker magnets have weaker magnetic fields and they can only attract objects that are close. The magnets that stick to our fridges are very small, but there are also huge magnets attached to heavy machinery that pick up scrap metal in junkyards.

Layers of Learning

Magnet Exploration

What will a magnet attract? If something is magnetic, a magnet will stick to it. Find at least 3 things around the house that are magnetic and 3 things that are not. (Be careful! Magnets can ruin things like televisions, computers, CD's, and other electronic equipment. Don't touch magnets to these things!)

Magnetic	Not Magnetic

Will a magnet attract silverware?

A plastic ball?

Wood?

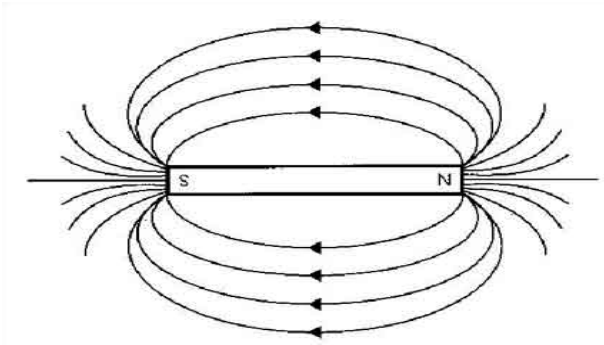
Paper?

A key?

What do things that magnets attract have in common?

Magnetic Field Experiment

All magnets have a magnetic field. That's the space around a magnet in which the magnet can attract, or pull in, objects.



Hold a paper clip near a magnet. What happens to the paper clip? Draw a picture of what happened.

Now move the paper clip further away. How far away does it need to be before the paper clip is outside the magnetic field and won't be attracted by the magnet anymore? Draw a picture and measure the distance (The answer will vary depending upon the strength of the magnet.)

How far away was the paperclip when it left the magnetic field? _____

Layers of Learning

Magnetic Levitation Exploration

You can make objects levitate using the force of magnetism.

Try this:

1. Place a bar magnet on the edge of a table, with just a bit hanging over the edge.
2. Tie a string onto a paper clip.
3. Hold the string so the paper clip comes near the magnet, but does not touch it.
4. The paper clip should stand straight out in the air, toward the magnet.

What happened?

Now try this:

1. Get ring-shaped magnets.
2. Get a wooden dowel, small enough for the ring magnets to fit around.
3. Holding the dowel vertically, one end resting on a table, place the ring magnets one at a time on the dowel, making sure that North and South poles are facing each other, so the magnets repel, instead of attract.

What happened?

Magnetism and Sea Turtles

Earth is one giant magnet. Many scientists believe that the magnetic field of earth is what helps animals find their way as they migrate. It may guide geese as they fly long distances. Loggerhead sea turtles seem to know where to go. They begin life as eggs. When they hatch on sandy Florida beaches they race to the ocean. They start swimming and follow a certain path around the Atlantic ocean (without their parents!). They likely know where to go by using the earth's magnetic field to guide them. As the turtles swim they feel changes in the earth's magnetic field and know which direction to swim in. The turtles swim for months across the ocean. They make a giant loop from Florida, northeast through the Atlantic to near the Mediterranean Sea, and then head south along Africa, finally returning back west to Florida.

Draw the path loggerhead turtles take through the Atlantic Ocean:



It takes between five and ten years for the turtles to finish their journey! They swim over 8,000 miles!! The journey helps them stay alive because the path they travel is warm and has plenty of food. Scientists are tracking loggerhead turtles with radios to learn more about them, but most are convinced that it's because of the earth's magnetic field that loggerhead turtles can find their way.

Look up a picture of a loggerhead turtle on the internet and draw one:



More Magnet Fun

Make a Magnet Boat (or car):

1. Get a small block piece of clay and shape it into a boat.
2. Let it dry or bake it according to instructions on the package.
3. Glue a small round magnet to the bottom.
4. Place your boat on a table and using a second magnet and holding it under the table, make your boat race around without touching it.

Magnetic Tower

1. Use a magnet to hold up one paper clip, suspended underneath
2. Keep adding paper clips, one at a time, until the magnet will hold no more.
3. Have a contest with your siblings to see how many paper clips you can suspend from the magnet.

Make a Magnet

1. You need a straight pin or a needle and a magnet.
2. Rub the magnet along the pin, in one direction, over and over, about 30 times
3. Now your pin is a magnet. Use it to pick up other pins.

By rubbing the pin over and over with a magnet, you make all the electrons line up just the way you want them. But this is a temporary magnet, it won't last too long before the electrons go back to their old positions.

Magnetic MacGyver Moment

In case you don't recall, MacGyver was a TV show from a few decades ago. It was probably the coolest TV show ever. MacGyver continually got into hot spots and had to use his ingenuity and duct tape to get out of them. In one episode, the bad guys had poisoned MacGyver, then thrown the antidote, in a small metal vial, down into a gutter beneath the street. There was no way MacGyver could reach it, and the poison was working fast. So MacGyver, being MacGyver, found a long steel bar and banging one end hard and repeatedly on the ground he made a magnet, retrieved the metal vial, and lived for another episode.

You too can make a steel bar into a magnet. Try it. Bang it hard on the ground, preferably concrete, over and over until it will pick up nails and other metal objects. Like other magnets, you're lining up those electrons, but this too is a temporary magnet and the electrons will return to their natural position in a few minutes.

Rescuing A Paperclip

Fill a glass with water and drop a paper clip inside the glass. Take a magnet and place it outside the glass. See if you can pull the paper clip to the side of the glass and all the way up to the top without getting wet!

Additional Layers To Explore

1. Go fishing with magnets. Cut out some simple fish and attach a paper clip to each of the mouths of the fish. Now attach a magnet to the end of a string that is tied on to a stick at the other end. You may want to make several stick fishing poles so several kids can fish at the same time. See how many fish you can catch with your magnetic fishing pole.
- Find out about how compasses work using the earth's magnetic field.
 - Pretend you are the navigator on Christopher Columbus' ship. Write a simulated journal about your journey and what your job is. How do magnets help you do your job?
 - Make a model train in the style of a maglev train. There is no engine pulling a maglev train. Magnets make it move. There are strong magnets on the bottom of the train. The tracks have magnets too. The magnets on the train and track attract and repel each other to move the train.
 - Have some fun with words. Synonyms are words that have the same meaning. Come up with synonyms for these words -- attracts, repels. Now write a sentence with each of the words and each of the synonyms. A multiple-meaning word is a word that has more than one meaning or definition. Write 2 sentences for each of these words, each one using a different meaning of the word -- point, field, iron. If you need help you may need to use a thesaurus.
 - Astronauts wear space boots that are magnetized. While they are inside their spacecraft their boots are attracted to the metal floor, allowing them to walk around without floating about in the absence of adequate gravity. Imagine you are an astronaut and write about all you are seeing on a space voyage.
 - Make a list of as many jobs as you can that somehow use magnets in their profession.
 - Find at least 5 magnets in your home (they may be built in, like the ones that hold the door of the fridge shut!)
 - Learn about electromagnets and describe how they are different than other magnets.
 - Using a set of magnetic letters, practice your spelling words, write your name, or spell out words about magnets.
 - The story is told of a man who found "magic rocks" by walking over the rocks wearing shoes with iron nails in them. The rocks magically stuck to his shoes. Write a journal entry about what you would do if you found magic rocks like this. (The rocks were not really magic at all. They were magnetite, a natural mineral that is magnetic. These magic rocks were used by the early Chinese and Viking explorers for navigation.)