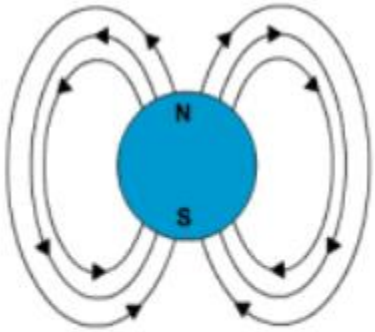
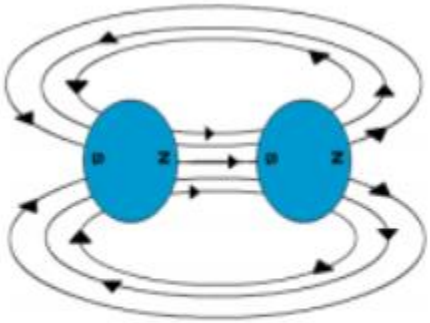
Magnetism

Recommended for Grades 3-8

Magnetism is a force that acts at a distance and creates an invisible field called a magnetic field. A magnetic field strongly attracts special materials like iron, nickel, and cobalt. What a magnetic field actually consists of is somewhat of a mystery, but we do know it is a special property of space.



Magnetic Field



Force attracts N to S

Properties of magnets:

- Magnets are objects or materials that attract certain metals, such as iron, nickel, and cobalt.
- A magnet can also attract or repel another magnet. When placed near each other, opposite poles attract and like poles repel each other.
- Magnets come in various shapes.

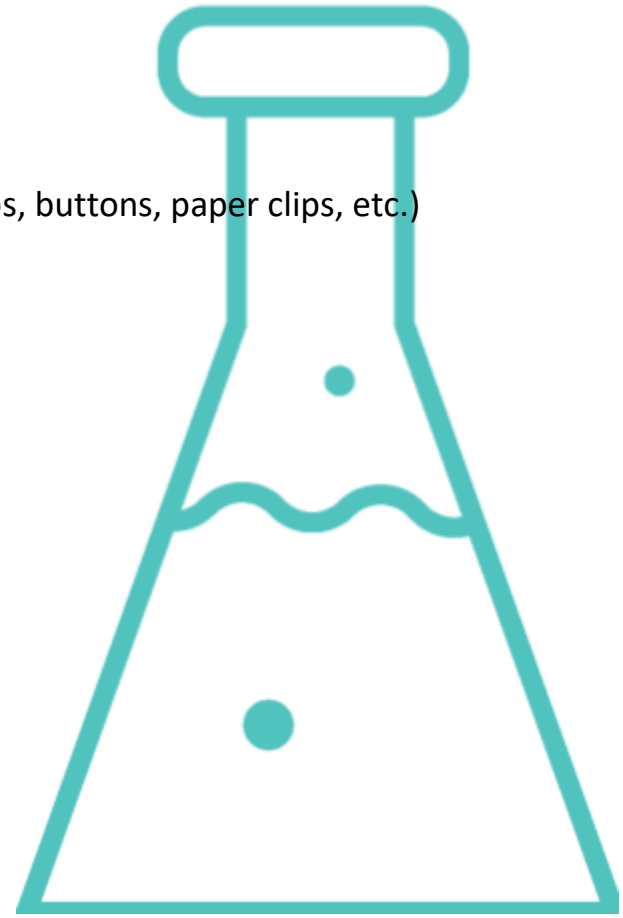
Thank you to the WIN Chapter at Oak Ridge National Lab, Tennessee for lesson plan development.

HERE ARE THE ACTIVITIES WE'LL DO AS WE INVESTIGATE MAGNETISM:

- A DIFFERENT KIND OF COMPASS
- THE DANCING COBRA
- EXPLORING MAGNETISM

THINGS YOU WILL NEED:

1. Horseshoe magnet
2. Adhesive magnet (1 inch)
3. Popsicle stick
4. Cotton thread (8 inches)
5. Modeling clay
6. Lead pencil with eraser
7. Test bag with assorted small objects like chips, buttons, paper clips, etc.)
8. Small bowl of water
9. Straight pin



A Different Kind of Compass

YOU WILL NEED:

- Modeling clay (for stand)
- Sharp pencil with an Eraser
- Horseshoe magnet

WHAT TO DO:

1) Roll the clay into a ball and flatten it to make a sturdy stand.
2) Push the eraser end of the pencil into the clay stand.
3) Carefully balance the magnet on the pencil lead.

WHAT HAPPENED:

The magnet gradually positions itself into a north – south direction. The Earth is a magnetic ball with north and south magnetic poles. The magnet positioned itself in a north-south direction because magnetic metals and liquids buried within the earth's core have turned it into a giant magnet that naturally attracts all compasses and magnets. These great magnetic forces are concentrated at its north and south magnetic poles.

The Dancing Cobra

YOU WILL NEED:

- Cotton thread (8 inches)
- Straight pin
- Horseshoe magnet

WHAT TO DO:

1) Make a loop in the thread and tie it around the head of the pin.
2) Hold the end of the thread with the pin attached.
3) With the other hand, lift the pin with the magnet.
4) When you get the pin to an upright position, carefully lift the magnet from the pin so it is slightly suspended in midair.
5) Move the magnet slowly in circles and watch the pin and thread, or cobra, follow the movements.

WHAT HAPPENED:

The pin and thread float suspended in the air slightly below the magnet and follow its path as you move it around. Gravity is the force that pulls everything downward toward the middle of our planet. The pin seems to be slightly overcoming gravity, floating below the magnet while not touching it. This is proof that the magnet's attraction can pass through air and, over a short distance, can "balance" the force of gravity.

Exploring Magnetism

YOU WILL NEED:

- Popsicle stick
- Adhesive magnet
- Magnetic pickup data sheet
- Bowl of water
- Test materials bag

WHAT TO DO:

1) Make your predictions: For each material, record whether you think it will be attracted to the magnet or not.
2) Make a magnet wand by removing the adhesive backing from the magnet and sticking it on one end of the popsicle stick.
3) Bring your magnet wand close to each of the items. Record what happens.
4) Record any similarities or differences that you see between the items that are attracted to the magnet. Do the same for items that are not attracted to the magnet.
5) Drop the metal items in a small bowl of water and use your horseshoe magnet to see if it will pick them up in water. Do magnetic forces work in water?

WHAT HAPPENED:

Some of the items you test will be attracted to the magnet and will stick to it; some of the items you test will not be attracted to the magnet. We call items that are attracted to the magnet MAGNETIC. These items are always made of iron, steel, nickel or cobalt. All the items that will stick to the magnet are metals or they contain metals.