

Magnets and Magnetic Fields

Lesson 5

1 Day

Feb 11-8:47 AM

Objective - Describe the magnetic field of a magnet.

Explain how the poles of a magnet attract and repel.

Key Questions - What makes a magnet attract some materials and not other materials?
What is a magnetic field?

Feb 11-9:05 AM

Materials Needed

For each student

- 2 student pages

For the class

- North, South, East, West signs
- aluminum foil

For each group of 4

- 2 bar magnets
- 15-20 paper clips
- 2 iron nails, small
- 2 washers
- 2 pieces of fishing line, 50 cm

Teacher provides

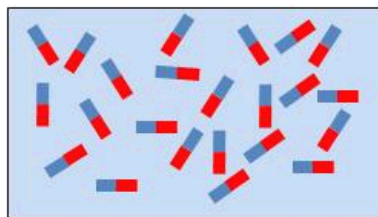
- tape

Advanced prep needed

Feb 11-12:18 PM

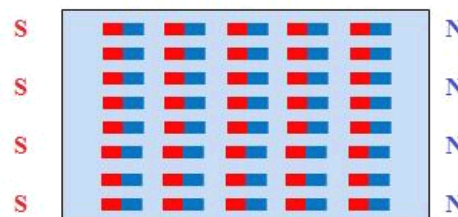
Iron and nickel are magnetized materials. They are charged and polarized with a negative and positive pole. In a magnet, the majority of the molecules are aligned; the negatively charged atoms are aligned in one direction and the positively charged atoms are aligned in the opposite direction. In nonmagnetic materials, the molecules are not arranged in any particular order.

MAGNETIC MATERIALS



Magnetic Domains in Random Position

Effect of Magnetization

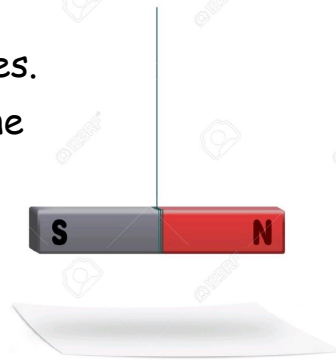


Magnetic Domains Aligned in Same Direction

www.electronicsterms.com

Feb 11-10:37 AM

Watch the magnet on the fishing line as it moves.
Why has it settled in one position? Can someone come up and gently move the magnet? Does it settle in the same place?



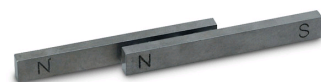
Let's try the same thing from a different part of the classroom.
What happens?

What is going on?

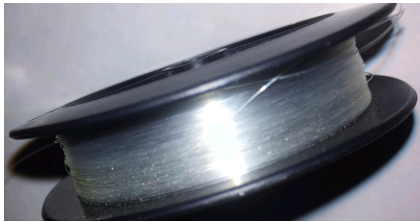
Feb 11-12:17 PM

In your groups of 4 you will get two magnets, 15-20 paper clips, iron nails, washers, and aluminum foil pieces.

You have 5 minutes to explore these materials.



Mar 4-9:52 AM

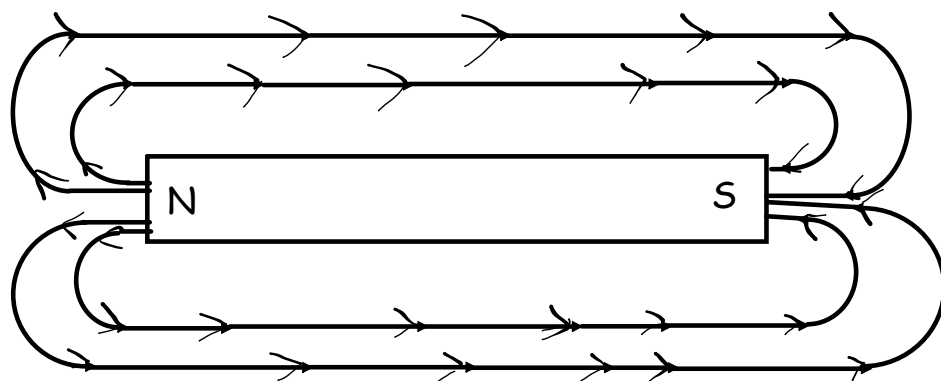


Hang your magnets on the fishing line and explore the interaction between the two hanging magnets.

1. Draw a picture of the bar magnet that demonstrates what part of the magnet is the strongest.
2. What materials were attracted to the magnet? Explain why some materials are attracted to magnets and others are not.

Mar 4-12:14 PM

1. Draw a picture of the magnetic field of a bar magnet. Label the poles of the magnetic field.




Mar 4-12:59 PM

Movement of electrons move out from one pole and the concentration of electrons and the poles makes the magnetic attraction **stronger** at the ends of the magnet.

 <https://www.youtube.com/watch?v=uj0DFDfQajw>

Video demonstration of magnetic field.

 <https://www.youtube.com/watch?v=8llkHQtaOlg>

Classroom demonstration of magnetic field.

Mar 6-10:37 AM

Why are some objects attracted to a magnet and other objects are not?

 <https://www.youtube.com/watch?v=oHMSgKKi3jc>

 <https://www.youtube.com/watch?v=ak8Bh9Zka50>

What are the main metals that are attracted to magnets?

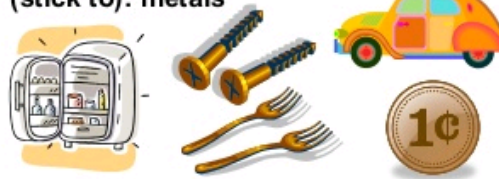
Iron, Nickel, Cobalt, Steel, or an Iron alloy

Mar 6-10:52 AM

Magnets

- Magnets are usually metallic objects that attract each other and some other objects.
- Some objects are attracted by magnets while some are not.
- Magnets have two parts: a north pole and a south pole.
- The north pole of one magnet attracts the south pole of another magnet (opposites attract).
- Similar poles of two magnets repel each other (alike repels).

Some things magnets are attracted to (stick to): metals



Some things magnets are **NOT** attracted to:



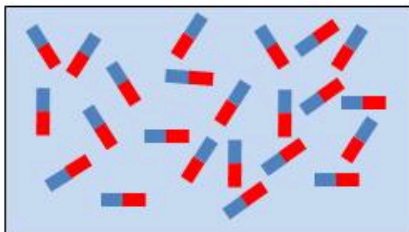
Opposite poles attract (come together):

Like poles repel (push apart):

Mar 6-11:08 AM

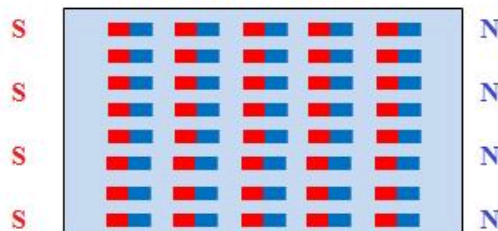
Arrangement of molecules in a magnetized material and non-magnetized material.

MAGNETIC MATERIALS



Magnetic Domains in Random Position

Effect of Magnetization



Magnetic Domains Aligned in Same Direction

Mar 6-11:14 AM

Glue definitions in notebook and draw a picture for each definition

Magnet - A magnet is a material that has the ability to attract iron, steel or an iron alloy.

Magnetic Field - A magnetic field is the magnetized area that surrounds a magnet or magnetic object.

Pole - A pole is the area on a magnet where the pull or attraction is the strongest. The ends of a bar magnet are the magnetic poles.

Mar 6-11:20 AM