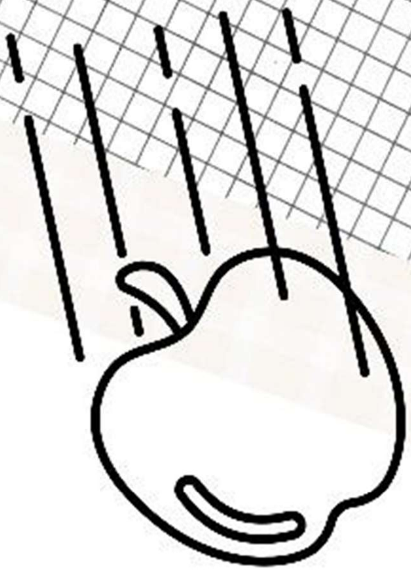
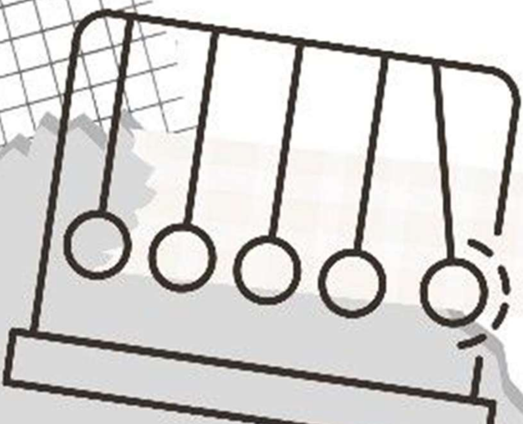


Physics



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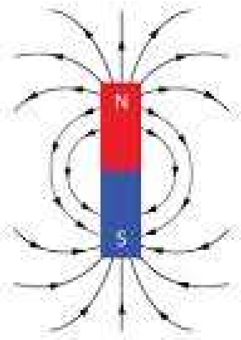
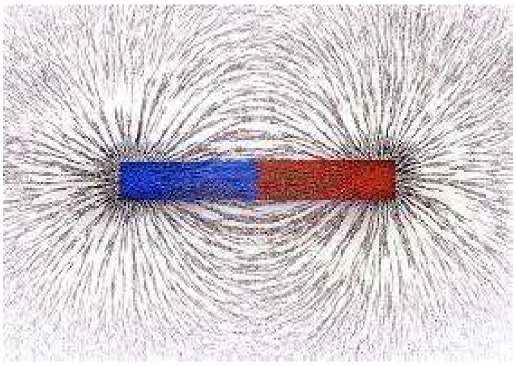
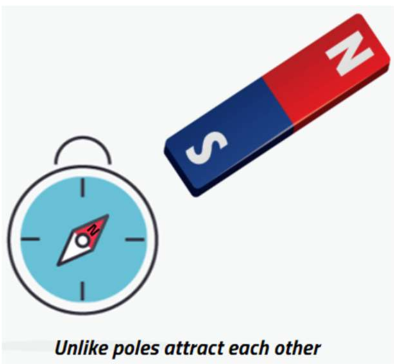
INVESTIGATORY PROJECT







INTRODUCTION

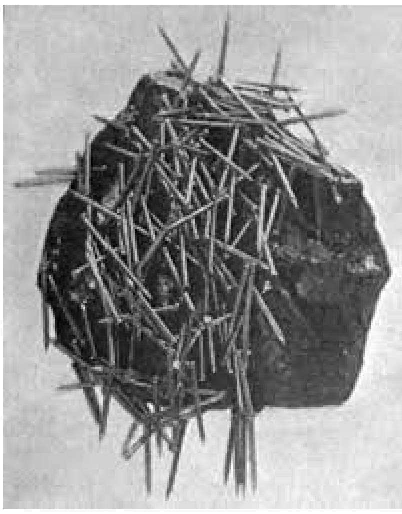
- What is magnet?

Magnet is defined as an object which is capable of producing magnetic field and attracting unlike poles and repelling like poles.

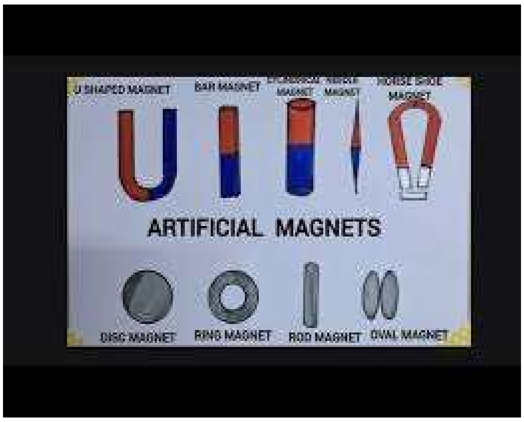
Magnets are classified in two types on the basis of how they achieve their magnetism and how long they retain their magnetic abilities.

1. <u>Natural magnets</u>: Natural magnets are minerals or metals that generate a stable magnetic field without artificial inducement . All natural magnets are permanent. Many natural elements like loadstones are naturally magnetic.

2.<u>Artificial magnets</u>: An artificial magnet is a magnetised piece of iron (or other magnetic material) made artificially they are formed by wrapping current-carrying conductor around the soft iron core. Artificial magnets are required because natural magnets have an odd irregular shape and they are not magnetically very strong. Artificial magnets can be given desired shape and made very strong.



(Natural magnet)



(Artificial magnet)

AIM

To study effects of various materials on the bar magnet.

APPARATUS REQUIRED

1. A Bar magnet
2. Iron fillings
3. Compass
4. Paper

THEORY

<u>Bar Magnet</u>: A bar magnet is a rectangular piece of an object, made up of iron, steel or any other ferromagnetic substance or ferromagnetic composite, that shows permanent magnetic properties. It has two poles, a north and a south pole such that when suspended freely, the magnet aligns itself so that the northern pole points towards the magnetic north pole of the earth.

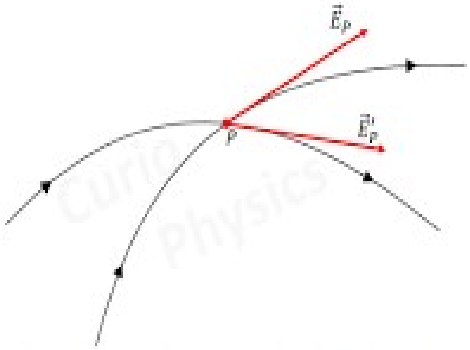
<u>Properties of Bar Magnet</u>: A bar magnet has properties similar to any permanent magnet.

- It has a north pole and a south pole at two ends. Even if you break a bar magnet from the middle, both the pieces will still have a north pole and a south pole, no matter how many pieces you break it in.

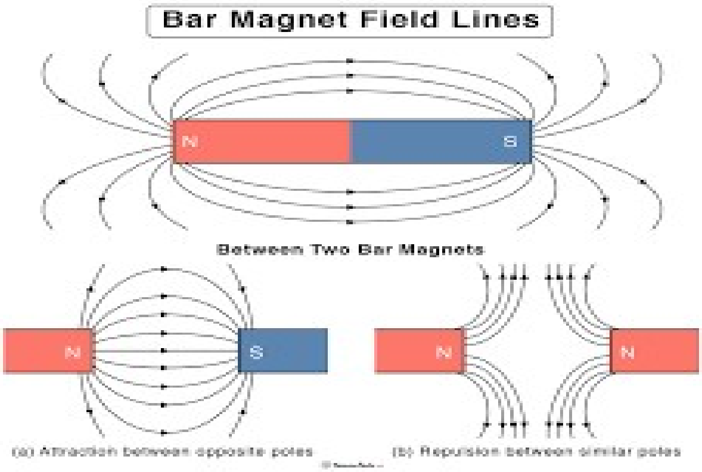
- Its magnetic force of it is the strongest at the poles.
- If this magnet is suspended freely in the air with a thread, it will not come to rest until the poles are aligned in a north-south position. A Mariner's Compass uses this property to determine direction.
- If two bar magnets are placed close to each other, their unlike poles will attract and like poles will repel each other.
- A bar magnet will attract all ferromagnetic materials such as iron, nickel and cobalt.

Magnetic field lines around magnet: The magnetic field lines can be defined as imaginary lines that can be drawn along the magnetic field that is acting around any magnetic substance. The magnetic field lines possess certain properties,

- The magnetic field lines of a magnet form continuous closed loops.
- The tangent to the field line at any point represents the direction of the net magnetic field B at that point.
- The larger the number of field lines crossing per unit area, the stronger the magnitude of the magnetic field B.
- The magnetic field lines do not intersect.



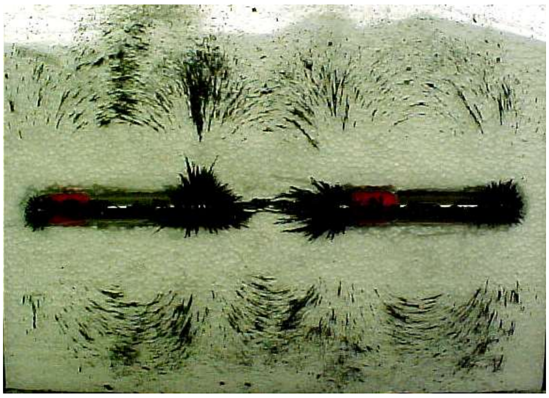
Two directions of Electric Field Intensity at a single point is not possible
Hence Electric field lines never cross each



PROCEDURE

- <u>Effect with Iron fillings:</u>

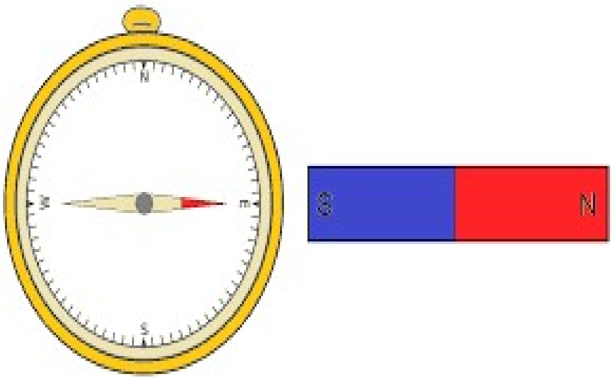
  Sprinkle iron filings on a piece of paper over two magnets, when magnets are facing each other with attractive poles and with repulsive poles. This allows you to see different iron filing patterns (magnetic field patterns) for the different magnet orientations.



- <u>Effect with Compass:</u>

  When a bar magnet is brought near a compass, the compass needle deflects due to the interaction between the magnetic fields of the two objects. The direction the needle deflects depends on which pole of the bar magnet is closer to the compass,

- North pole: The south side of the compass needle is drawn to the north pole of the magnet. The red tip of the compass will move away from the magnet.
- South pole: The north side of the compass needle is drawn to the south pole of the magnet. The red tip of the compass will point towards the magnet.



RESULT

A. The first experiment shows that the like poles repel and opposite poles attract each other.

B. The second experiment shows that the maximum magnetic strength is near the poles.

PRECAUTIONS

1. Use a magnet labelled as north and south poles on it.
2. See that the compass is working well and its needle shows the correct direction.

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