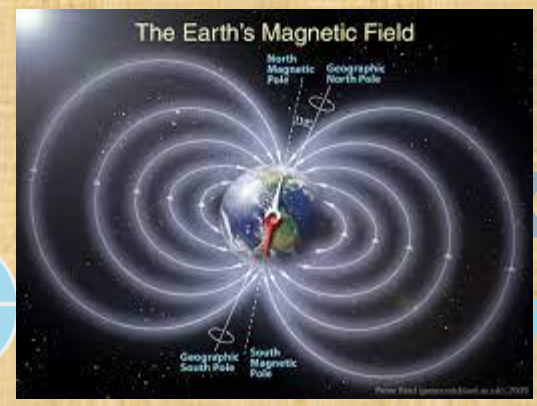
CHAPTER 02

Playing with Magnets

Earth is a large magnet:

The Earth is a large magnet. The Earth's core is made up of mostly iron which gives the Earth its own magnetic field with a north magnetic pole and a south magnetic pole.



A magnetic compass will use Earth's magnetic field in order to navigate north, east, west and south. Then ends of a compass needle always point toward earth's north and south magnetic poles.

For instance, if you attach a bar magnet to a piece of wood and float it in a bowl of water, it will slowly turn in the water until the magnet's North Pole points towards the Earth's North Pole.

Magnetic compass:

Magnetic compass is a device used to locate the direction of a place. It always rests in a north-south direction and very helpful as navigators in ships, submarines, aero planes etc.

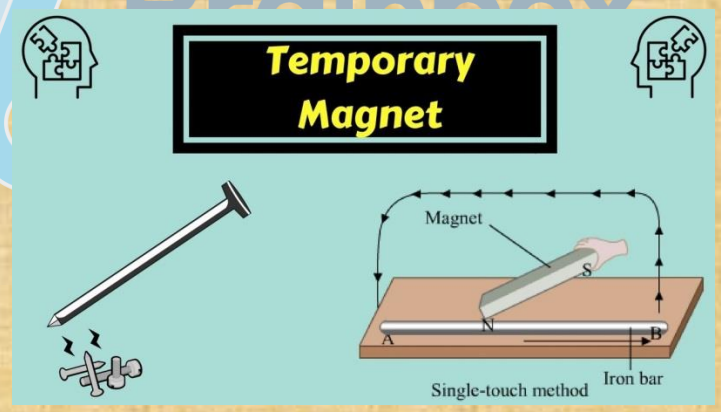
The first magnetic compasses were needles that were magnetized on a piece of lodestone and then attached to straw so that they would float in a bowl of water or simply hung by a thread. It would always align itself in north-south direction.

A magnetized needle is pivoted inside the box in such a way that it can rotate freely and line up with the Earth's magnetic field. The compass also has a dial with directions marked on it. The compass is kept at the place where we wish to know the direction. Its needle indicates the North-South direction when it comes to rest. The compass is then rotated until the north and south marked on the dial are exactly below the two ends of the needle. They are widely used in boating, hiking, surveying and other activities etc.

Birds don't need a compass to know which way is North because they can see the Earth's magnetic fields: "Scientists already suspected birds' eyes contain molecules that are thought to sense Earth's magnetic field.

Did you know that you can easily turn common items like paperclips and iron nails into temporary magnets?

A temporary magnet acts like a permanent magnet when it is within a strong magnetic field. However a temporary magnet loses it's magnetism when the magnetic field disappears.



For example, take an iron nail and place it on a table. Make sure that the nail neither attracts nor repels iron pins or iron filings. Take a bar magnet and place one of its poles near one edge of the nail. Without lifting the bar magnet, move it along the length of the iron nail till you reach the other end. Then lift the bar magnet, bring it to the first end of the nail and move along

the length again. Repeat this process 20-30 times. Always move the magnet in one direction, don't drag the magnet back and forth.

Now remove the bar magnet and bring some iron filings or alpins close to the nail. What do you notice? The iron filings or alpins get attracted by the nail. Thus you have succeeded in making your own magnet by magnetizing the nail.

Magnetic induction:

Take a safety pin and bring it close to an alpin.

Does it attract the alpin? Why?

Bring the safety pin close to one pole of a bar magnet and see how it gets attached to the magnet. Now bring an alpin and touch it to the safety pin.

Does safety pin attract the alpin? Why?

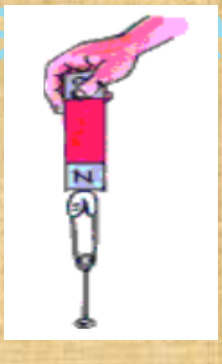
In the above two cases, we notice that the safety pin acts as a magnet when it is in contact with another magnet. Magnetic property is induced in safety pin due to the bar magnet. **Magnetic property possessed by a magnetic substance due to the presence of a magnet near it, is called magnetic induction.**

• If the safety pin is not in contact with the bar magnet, can it attract the alpin?

• What happens if we place the bar magnet very close to the safety pin but not touching it? Let us find out.

Take a bar magnet in one hand and a safety pin in the other hand, hold them in such a way that they are close to each other but not in contact.

(b) Ask your friend to bring an alpin and touch the safety pin. You will notice that the alpin will stick to the safety pin. This shows that due to magnetic induction safety pin acts as a magnet.



About magnets:

- Magnets attract other magnets and some metals.
- Like poles of a magnet repel each other.
- Unlike poles of a magnet attract each other.

- If a magnet hangs freely it will come in a north-south direction when it comes to rest.
- All the magnets have two poles – the north and the south poles.
- The magnetic force is more potent at the poles. It is weaker at the middle.