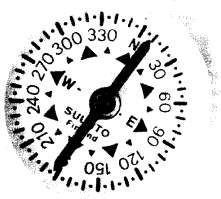
6th – Fun with Magnets

- Magnets are made of materials that attract objects made of certain substances like iron, cobalt, and nickel.
- Magnets come in various shapes and sizes (Fig. 12.1). They can be found as horseshoe, ring, cylindrical, or bar shape.
- Not all objects are attracted to magnets. Objects that are attracted by a magnet are said to be magnetic, e.g., iron and nickel. Objects that are not attracted by a magnet are said to be non-magnetic, e.g., wood and plastic.
- When magnetic materials (like iron filings) are brought close to a magnet, they do not stick evenly to all parts of the magnet. They stick more on certain parts of the magnet. These are called the poles of the magnet.
- Magnetic forces are the strongest at the poles. For example, the two ends of a bar magnet are its poles.

Poles of a Magnet

- There are two types of poles in every magnet, irrespective of its shape. These are, by convention, called the North Pole (N) and the South Pole (S) .
- The two poles cannot exist independently. That is, they always come in pairs. If we break a bar magnet in the middle, we would
- get two pieces, each having a North Pole and a South Pole. We could go on breaking the magnet into smaller pieces, and every time we would get both the poles in each piece.
- Today, we use magnets for various purposes. In ancient times, the primary use of a magnet was to find directions. A magnet is allowed to move freely, it comes to rest in a direction very close to the Earth's North-South direction.



The compass is rotated till the 'north' marking coincides with the end of the needle pointing north.

- This property of a magnet was used to find directions on the surface of the Earth by travelers. An instrument with a magnet that is used to find directions is called magnetic compass.
- It has a small magnetic needle at its centre. This needle can rotate freely and always points in the Earth's North-South direction. Different directions (north, south, east, and west) are marked on the compass.
- Earth's geographical poles and the magnetic poles are not the same. The magnetic pole found deep inside the northern hemisphere of the Earth is a south type magnetic pole. Hence, Earth's magnetic north pole is geographic south pole.

Attraction and Repulsion

- When two magnets are brought close to each other, they are either pulled towards each other, or pushed away from each other. When the magnets are pulled towards each other, they are said to attract each other. When they are pushed away from each other, they are said to repel each other.
- Whether the magnets attract or repel depends on which poles of the magnets are facing each other.

- When like poles of the magnets (N-N or S-S) are brought close to each other, they repel. This is called repulsion.
- When unlike poles of the magnets (N-S or S-N) are brought close to each other, they attract. This is called attraction.

Types of Magnets

- There are two types of magnets: temporary and permanent. Magnets that retain their magnetic properties only for a short period of time are called temporary magnets. Magnets that retain their magnetic properties for a long period of time are called permanent magnets.

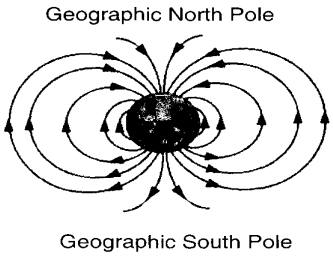


Fig. 12.4 Earth is a giant bar magnet.

- Temporary magnets are usually made of iron, cobalt, or nickel. These materials behave like magnets only when they are near a strong magnet. They quickly lose their magnetic property if the influence of the strong magnet is removed.
- Permanent magnets are made from mixtures of iron, cobalt, or nickel with other materials. These make strong magnets and retain their magnetic properties for a long time.
- A magnet can lose its properties due to the following activities:
  1. Dropping from a height 2. Hitting with a hammer 3. Applying heat
  4. Improper storage can also cause loss of magnetic properties.
- Bar magnets should be stored in pairs, with unlike poles alongside each other. A horseshoe magnet should be stored with a piece of soft iron kept across its poles.

Uses of Magnets

Magnets have several uses:

- Credit cards, ATM cards, and identity cards have a strip of magnetic material that stores information.
- Television and computer monitors use magnets.
- Computer hard discs and audio and video cassettes have magnetic material that store information.
- Magnets are used in picking up substances made of iron from scrap yard.

Demagnetization: A magnet loses its magnetism, that is, it gets demagnetized, if it is hammered or if it falls from a height. Heating the magnet above certain temperature also demagnetizes it.

Magnetic Field: We have seen that magnetic force acts from a distance. Obviously, there must be some influence of the magnet passing through space. This influence reduces as we go further away from the magnet.

- This can be verified by placing a compass needle near a magnet. The needle gets deflected due to the effect of the magnet.
- If you move the compass needle above, below and to the side of the magnet, the needle gets deflected all around the magnet. Take the needle further and further away, the influence of the magnet becomes weaker and weaker, until at some distance away it is not felt at all.
- Thus, here is a region around the magnet where its magnetic influence can be felt. This region is called the magnetic field of the magnet.

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