

Chapter 7.3: Magnetism

1. Introduction to Magnetism

- **Definition:** Magnets enable objects like button magnets to stick to surfaces such as whiteboards.
- **Natural and Man-Made Magnets:** Magnets exist naturally as lodestones and are also made from materials like iron, steel, cobalt, and nickel.

Example Sentence: Button magnets stick to whiteboards due to the magnetic properties of the materials they are made from.

2. Properties of a Magnet

- **Attracts Magnetic Materials:** Magnets attract materials like iron and steel.
- **Has Poles:** North and South poles.
- **Like Poles Repel, Unlike Poles Attract:** North repels North, South repels South; North attracts South.
- **Freely Suspended Magnet Shows North-South Direction:** Aligns with the Earth's magnetic field.

Example Sentence: Magnets have distinct properties such as attracting magnetic materials and having north and south poles.

3. Magnetic Field

- **Definition:** The area around a magnet where magnetic force is exerted.
- **Observation:** Steel balls closer to the magnet are more strongly attracted.

Example Sentence: The magnetic field around a magnet influences objects like steel balls, attracting them closer to the magnet.

4. Characteristics of Magnetic Field Lines

- **Originate from North Pole and End at South Pole.**
- **Field Lines Never Cross:** They do not intersect.

- **Closer Where Field is Stronger:** Field lines are denser where the magnetic field is stronger.

Example Sentence: Magnetic field lines originate from the north pole and terminate at the south pole of a magnet.

5. Electromagnet

- **Definition:** A type of magnet with temporary magnetic effect when electric current flows through it.
- **Example:** Electric bell uses an electromagnet.

Example Sentence: Electromagnets are used in various devices, such as electric bells, to create temporary magnetic fields.

6. Pattern and Direction of Magnetic Field

- **Shape of Conductor:**
 - **Straight Wire:** Magnetic field lines are concentric circles.
 - **Coiled Wire:** Magnetic field lines are also concentric circles but denser.
- **Strength of Magnetic Field:** Stronger near the conductor, weaker as it moves away.
- **Direction of Magnetic Field:** Determined by the direction of electric current.
 - **Right-Hand Grip Rule:** Thumb points in the direction of current, and fingers curl in the direction of the magnetic field.

Example Sentence: The pattern of magnetic field lines depends on the shape of the conductor and the direction of the current flowing through it.

7. Applications of Magnets and Electromagnets in Daily Life

- **Compass Needle:** Shows direction by aligning with Earth's magnetic field.
- **Credit/Debit Cards:** Use magnetic strips to store information.
- **Magnetic Locks:** Use electromagnets to lock doors automatically.

Example Sentence: Magnets and electromagnets have various applications in daily life, such as in compasses and credit card strips.