

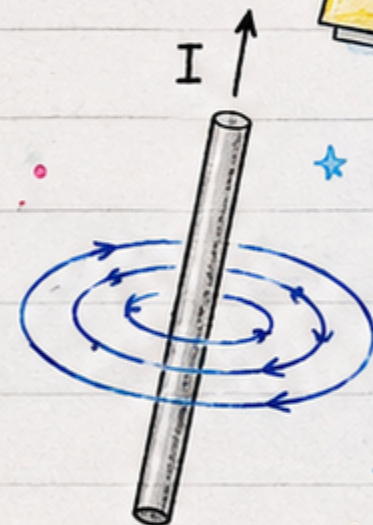
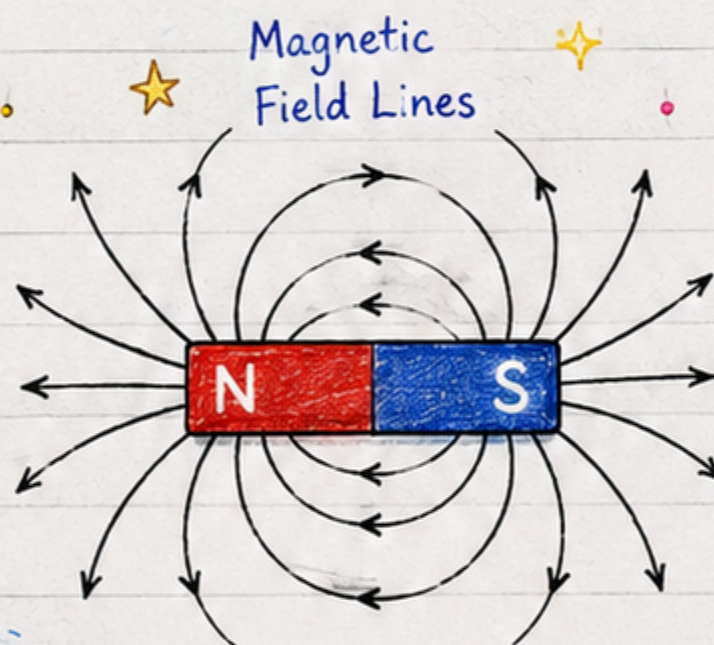
CHAPTER 12 - MAGNETIC EFFECTS OF ELECTRIC CURRENT

Class Science Notes

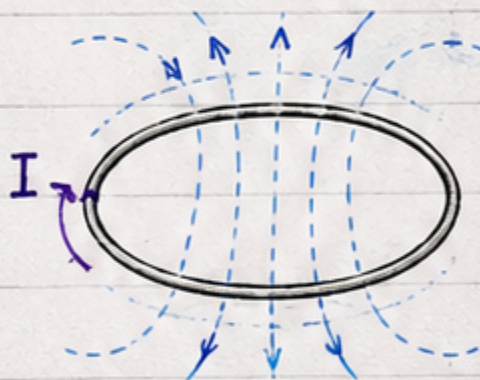
Physics
is
fun! ♥



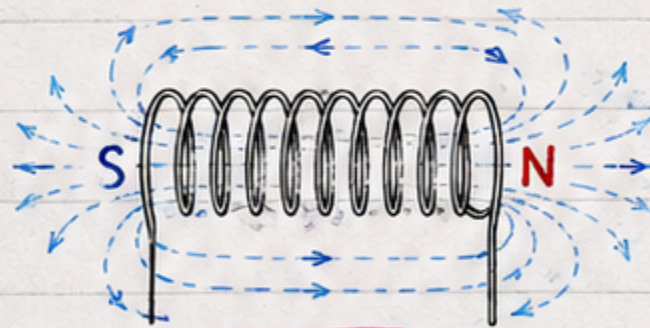
Compass Needle



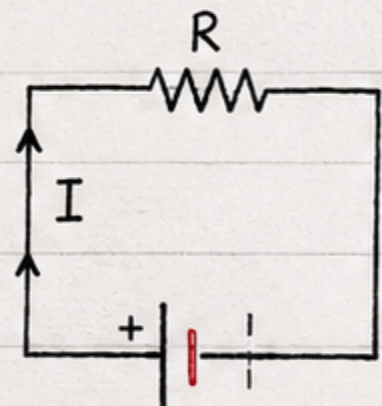
Current
Carrying
Wire



Circular Loop



Solenoid



Electric
Circuit

Quote

"Electricity and magnetism are intimately linked to each other."

Hans Christian Oersted (1777 - 1851)

Discovered compass needle deflection due to electric current in 1820.





Chapter Overview

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Page No.: _____

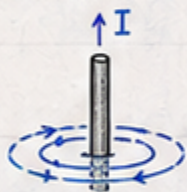


Oersted observed compass needle deflection near current carrying wire.



2. Current Carrying Conductor

- A conductor carrying current produces magnetic field around it.
- Field lines are concentric circles around the wire.



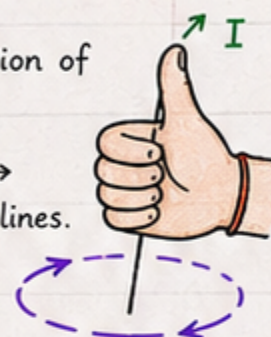
1. Magnetic Field & Field Lines

- Region around a magnet or conductor where magnetic force is experienced.
- Field lines show direction (from N to S outside magnet).



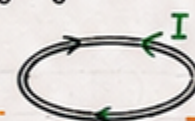
3. Right-Hand Thumb Rule

- Hold the conductor in the right hand.
- Thumb $\rightarrow$ direction of current (I)
- Curled fingers $\rightarrow$ direction of field lines.



4. Circular Loop

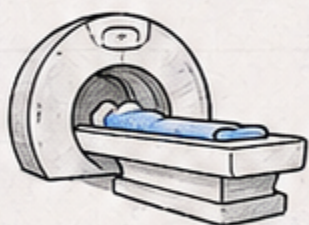
- A current carrying circular loop acts like a bar magnet.
- Direction by right-hand curl rule.



Magnetic Effects of Electric Current

9. MRI & Medicine

- Strong magnets and radio waves used in MRI machines.
- Helps in medical imaging of internal body parts.



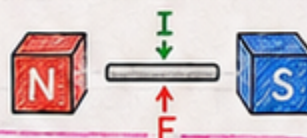
8. Fleming's Left-Hand Rule

- Used to find direction of force on a conductor.
- F - Forefinger $\rightarrow$ Field (B)
- L - Middle finger $\rightarrow$ Current (I)
- M - Thumb $\rightarrow$ Motion / Force (F)



7. Force on Conductor

- A current carrying conductor in magnetic field experiences a force.
- Direction by Fleming's Left-Hand Rule.



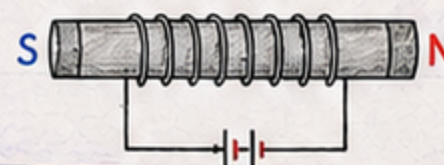
5. Solenoid

- A long coil of wire carrying current.
- Behaves like a bar magnet.



6. Electromagnet

- A current carrying solenoid with a soft iron core.
- Magnetism can be turned ON / OFF.



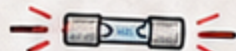
10. Domestic Electric Circuits

- Electric current in homes flows through a closed circuit.
- Appliances work using safe and controlled current.



11. Electric Fuse & Safety

- Fuse protects circuit from overloading.
- Melts and breaks the circuit when current exceeds safe limit.



Key Idea

Electric current produces magnetic effects which have many applications in daily life.

Memory Box

- Current $\rightarrow$ Magnetic Field
- Magnetic Field $\rightarrow$ Force
- Force $\rightarrow$ Motion / Work





12.1 Magnetic Field and Field Lines

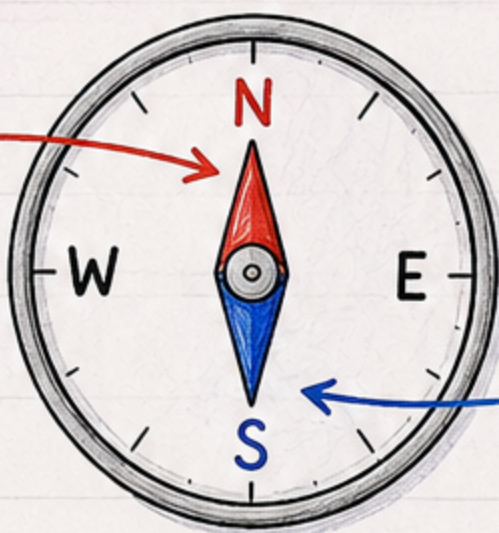
A current carrying conductor produces a magnetic field around it.

Compass Needle



North Pole

- End pointing towards north
- North seeking pole



South Pole

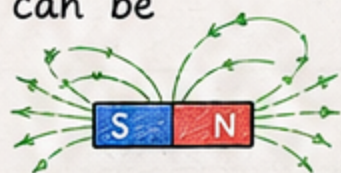
- End pointing towards south
- South seeking pole

POLE INTERACTIONS

Poles	Situation	Result
	Like Poles	Repel
	Unlike Poles	Attract

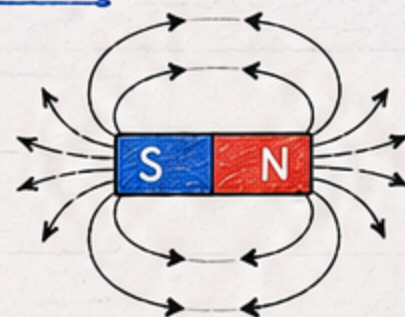
Magnetic Field

Region surrounding a magnet in which force of magnet can be detected.



Magnetic Field Lines

Lines along which iron filings align themselves around a magnet.



Key Points

- ★ A compass needle aligns in the magnetic field.
- ★ Magnetic field is invisible but its effect can be detected.
- ★ Field lines never intersect each other.

