

PHYSICS · CHAPTER 4

Moving Charges and Magnetism

A 1-page guide for parents · 90-second read.

EXPECTED MARKS**10 marks****TIME TO MASTER****9-11 hrs****HELPLINE****70330 05444****WHAT THIS CHAPTER IS, IN PLAIN ENGLISH**

This chapter shows that an electric current (moving charges) produces a magnetic field, and that a magnetic field in turn pushes on moving charges and on wires that carry current. Your child learns the Biot-Savart law and Ampere's law (two ways to find the magnetic field of a current), how a cyclotron speeds up particles, why two current-carrying wires attract or repel, and how a moving-coil galvanometer is turned into an ammeter or voltmeter. It is a formula-rich, numerical-heavy chapter worth about 8-10 marks.

5 QUESTIONS TO ASK YOUR CHILD

- Why can a magnetic field never change the **SPEED** of a charged particle?
- What is the magnetic field at the centre of a current loop of radius R ? (Answer: $\mu_0 I / 2R$.)
- Do two wires carrying current in the **SAME** direction attract or repel? (Answer: attract.)
- What does the cyclotron frequency depend on — and what does it **NOT** depend on?
- How do you turn a galvanometer into an ammeter? (Answer: add a low shunt in parallel.)

WEAK-SPOT INDICATORS

- Thinks a magnetic force can speed up a particle (it only changes direction)
- Gets the parallel-wire attract/repel rule backwards
- Cannot recall whether the shunt goes in parallel (ammeter) or series (voltmeter)
- Mixes up B at the centre ($\mu_0 I / 2R$) with B on the axis of a loop
- Applies Ampere's law to a low-symmetry case where it does not simplify

WHEN TO WORRY — AND WHAT TO DO

If your child cannot state $F = qv \times B$ and explain why it does no work, or keeps confusing the ammeter/voltmeter conversions, please book a free 15-min doubt-clearing call. This chapter feeds directly into Magnetism and Matter (Ch 5) and Electromagnetic Induction (Ch 6), so gaps here cost marks downstream.

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