

# Magnetic Field Due to a Current-Carrying Conductor

Chapter 12: Magnetic Effects of Electric Current · Topic 1

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## Key Concept

A solenoid (a long coil of wire) carrying current produces a magnetic field similar to that of a bar magnet, with distinct north and south poles, and this field can be significantly strengthened by inserting a soft iron core, creating an electromagnet. The strength of an electromagnet's field depends on the current strength, the number of coil turns, and the core material — this principle underlies the design of devices like electric bells, loudspeakers, and MRI machines.

## Quick Revision Notes

- A current-carrying wire produces a magnetic field with circular field lines around it.
- The right-hand thumb rule determines the direction of the magnetic field from current direction.
- A solenoid produces a magnetic field like a bar magnet, with north and south poles.
- Electromagnet strength depends on current, number of coil turns, and the core material.

## Practice Questions

- 1 State the right-hand thumb rule.
- 2 Explain how inserting an iron core strengthens a solenoid's magnetic field.
- 3 Name one device that relies on the magnetic effect of electric current.