

# 6.1 Magnetism

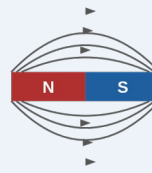
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## 1. KEY VOCABULARY

TERM	MEANING
Magnetic field	The region around a magnet where it exerts a force.
Field line	A line showing the direction of the magnetic field.
Permanent magnet	Keeps its magnetism (e.g. steel).
Induced magnet	Becomes magnetic only while in a magnetic field (e.g. iron).
Magnetic material	Iron, steel, nickel or cobalt.

## 2. A BAR MAGNET'S FIELD

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Field lines run from N to S outside the magnet · closer lines = stronger field.

### MAGNETIC MATERIALS

**Magnetic materials:**  
iron, steel, nickel, cobalt — attracted to magnets.

**Permanent magnet:**  
keeps its magnetism (e.g. steel).

**Induced magnet:**  
a material that becomes a magnet only while in a magnetic field (e.g. iron) — then loses it.

**Like poles repel · unlike poles attract.**  
A plotting compass lines up along the field.

## 3. POLES & FIELD LINES

**Field lines run from N to S** outside the magnet.  
**Closer lines = a stronger field.** The field is strongest at the poles.  
**Like poles repel; unlike poles attract.**

## 4. PERMANENT vs INDUCED MAGNETS

**Permanent magnet:** keeps its magnetism — made from a hard magnetic material such as steel.  
**Induced magnet:** a soft material like iron that becomes magnetic in a field, then loses it when removed.

## 5. PLOTTING THE FIELD

A plotting compass placed near a magnet lines up with the field. Moving it around and marking each position traces out the field lines and shows their direction.

## 6. THE WHY

**Why iron is used for induced magnets:** it magnetises and demagnetises easily — ideal for electromagnets that need to switch on and off.  
**Why field lines never cross:** the field can only point one way at any point in space.

## 7. COMMON EXAM MISTAKES

- ✗ "Field lines go from S to N outside the magnet."
- ✓ Outside the magnet, field lines go from N to S.
- ✗ "All metals are magnetic."
- ✓ Only iron, steel, nickel and cobalt are magnetic.
- ✗ "Steel makes the best electromagnet core."
- ✓ Iron is used — it magnetises and demagnetises easily.

## 8. SELF-CHECK · cover & quiz

Can you...

1. Sketch the field around a bar magnet, with arrows?
2. State the rule for like and unlike poles?
3. Explain the difference between permanent and induced magnets?
4. Name the four magnetic materials?
5. Describe how to plot a magnetic field with a compass?