

# 4.1 Simple phenomena of magnetism

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

**Total: 9 marks**

**KEY WORDS** magnet 磁体 • magnetic field 磁场 • magnetic material 磁性材料 • permanent magnet 永磁体  
• magnetism 磁学

## Objective

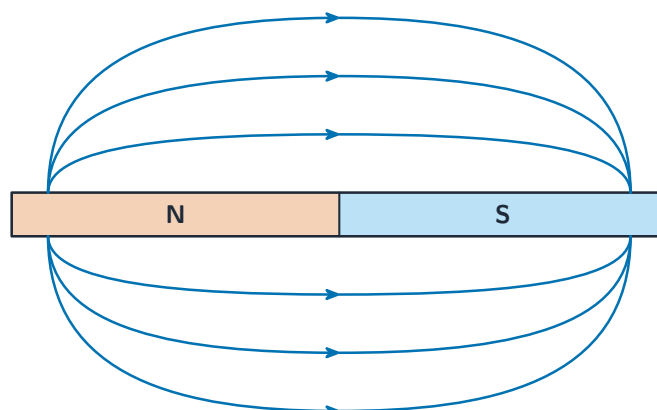
Build the skills to answer exam questions on **magnetism** 磁学 — poles and forces, **induced magnetism** 感应磁性, soft iron vs steel, and **magnetic fields** 磁场.

**You must be able to:**

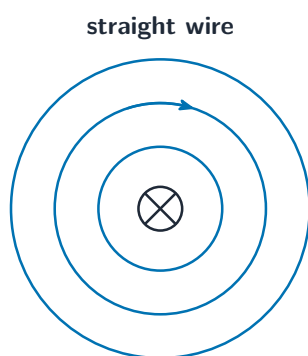
- use the rule of poles (like repel, unlike attract)
- compare soft iron (temporary) and steel (permanent) magnets
- draw and describe magnetic field lines

## 1 Worked examples

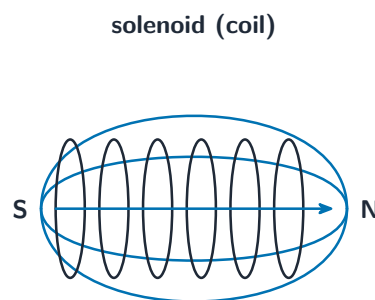
### ■ Fields and materials



*Field lines come out of the N pole and into the S pole; closer lines = stronger field*



current into page;  
field is circles round it



field like a bar magnet

*Soft iron magnetises easily but loses it (temporary); steel keeps its magnetism (permanent)*

- **like poles repel; unlike poles attract.**
- magnetic materials: iron, steel, cobalt, nickel.

## 2 Practice

**2.1** State what happens when the N pole of one magnet is brought near the N pole of another. [1]

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**2.2** State which is better for a permanent magnet: soft iron or steel. [1]

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## 3 Exam-style questions

**3.1** Magnetic field lines around a bar magnet point: [1]

- **A** from S to N outside the magnet
  - **B** from N to S outside the magnet
  - **C** into both poles
  - **D** out of both poles
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**3.2** A piece of soft iron is placed next to a magnet.

(a) Explain why the iron becomes magnetised. [2]

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(b) State why soft iron, not steel, is used for the core of an electromagnet. [2]

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**3.3** Describe how you could show the magnetic field pattern of a bar magnet using iron filings. [2]

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## Solutions

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**2.1** they repel (push apart).

**2.2** steel.

**3.1 B.** Field lines run from N to S outside the magnet.

**3.2** (a) the magnet's field induces magnetism in the iron; the near end gains the opposite pole, so the two attract.

(b) soft iron magnetises and demagnetises easily; so the electromagnet can be switched on and off (loses its magnetism when the current stops).

**3.3** place paper over the magnet and sprinkle iron filings on top; tap gently — the filings line up along the field lines, showing the pattern.