

Exercise walk-through

Simple phenomena of magnetism ■ 4.1

eXercise

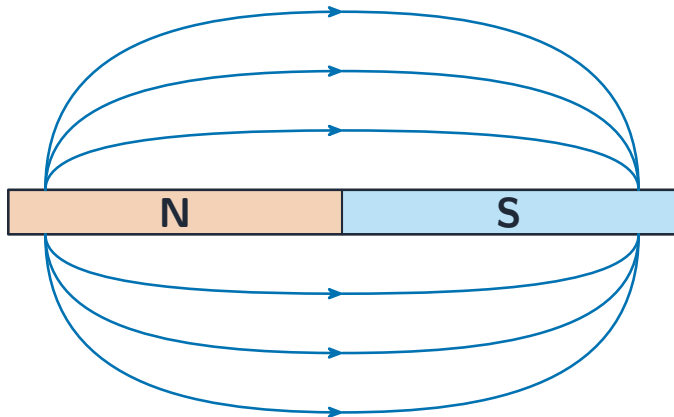
You must be able to

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

Method — Fields and materials

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

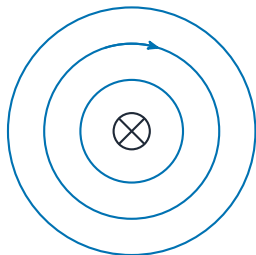
Method — Fields and materials



A bar magnet with field lines from the N pole to the S pole

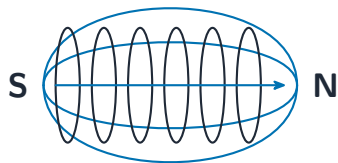
Method — Fields and materials

straight wire



current into page;
field is circles round it

solenoid (coil)



field like a bar magnet

A straight wire's circular field beside a solenoid's bar-magnet field

Practice 2.1 ■ 1 mark

State what happens when the N pole of one magnet is brought near the N pole of another.

Solution 2.1

Method: Fields and materials

Worked steps

they repel (push apart) **B1**.

Practice 2.2 ■ 1 mark

State which is better for a permanent magnet: soft iron or steel.

Solution 2.2

Method: Fields and materials

Worked steps

steel **B1**.

Exam-style 3.1 ■ 1 mark

Magnetic field lines around a bar magnet point:

- 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

Solution 3.1

Method: Fields and materials

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

Worked steps

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

Exam-style 3.2 ■ 2 marks

A piece of soft iron is placed next to a magnet.

- (a) Explain why the iron becomes magnetised.
- (b) State why soft iron, not steel, is used for the core of an electromagnet.

Solution 3.2

Method: Fields and materials

Worked steps

- (a) the magnet's field induces magnetism in the iron **M1**; the near end gains the opposite pole, so the two attract **A1**.
- (b) soft iron magnetises and demagnetises easily **M1**; so the electromagnet can be switched on and off (loses its magnetism when the current stops) **A1**.

Exam-style 3.3 ■ 2 marks

Describe how you could show the magnetic field pattern of a bar magnet using iron filings.

Solution 3.3

Method: Fields and materials

Worked steps

place paper over the magnet and sprinkle iron filings on top **M1**; tap gently — the filings line up along the field lines, showing the pattern **A1**.