

GCSE Combined Science: Trilogy

Worksheet: Magnetic fields

TIME 30 min	TOTAL 30 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Magnetic fields

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

0 1 . 1

Where is the magnetic field of a bar magnet strongest?

Tick (✓) **one** box.

Exactly halfway between the poles

☐

At the poles

☐

Far from the magnet

☐

It is the same strength everywhere

☐

[1 mark]

0 1 . 2

What happens to magnetic field lines as they get closer together?

Tick (✓) **one** box.

The field gets weaker.

☐

The field gets stronger.

☐

The field direction reverses.

☐

Nothing changes.

☐

[1 mark]

0 2

0 2 . 1

Which **two** metals are magnetic materials?

Tick (✓) **two** boxes.

Aluminium

☐

Cobalt

☐

Copper

☐

Nickel

☐

Zinc

☐

[2 marks]

0 2 . 2

In which direction do magnetic field lines point outside a bar magnet?

Tick (✓) **one** box.

From the north pole to the south pole

☐

From the south pole to the north pole

☐

Towards both poles

☐

Away from both poles

☐

[1 mark]

0 2 . 3

What is meant by the **magnetic field** of a magnet?

.....

.....

[1 mark]

0 2 . 4

A plotting compass is placed on a table, far away from any magnets.

In which direction does the north end of its needle point?

.....

.....

.....

.....

[1 mark]

0 3

0 3 . 1

State the direction of the magnetic field lines outside a bar magnet.

.....

.....

.....

.....

[1 mark]

0 3 . 2

The direction of the magnetic field at any point is the direction of the force that would act on a north pole placed at that point.
Explain why two magnetic field lines can never cross each other.

.....

.....

.....

.....

[2 marks]

0 4

A student can investigate the magnetic field pattern around a bar magnet using either iron filings sprinkled onto paper over the magnet, or a small plotting compass moved around the magnet.

0 4 . 1

Describe what the iron filings show, and explain one way in which this is less informative than using a plotting compass.

.....

.....

.....

.....

.....

.....

[3 marks]

0 5

A plotting compass is placed on a table, far away from any magnets. The compass needle points north.

0 5 . 1

Explain why the compass needle points north.

[2 marks]

0 5 . 2

Explain how the behaviour of compasses provides evidence that the Earth's core is magnetic.

[2 marks]

0 5 . 3

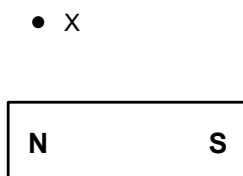
The compass is moved close to the north pole of a bar magnet. Describe and explain what happens to the compass needle.

[2 marks]

0 6

Figure 1 shows a bar magnet with a point X marked above its north pole.

Figure 1



0 6 . 1

Draw the magnetic field pattern around the bar magnet. Show at least four field lines, including their direction, and show the lines closer together near the poles than further away.

[3 marks]

0 6 . 2

State the direction of the magnetic field at point X.

.....

.....

[1 mark]

0 6 . 3

A small plotting compass is placed at point X. State the direction in which the north end of the compass needle points, and explain your answer.

.....

.....

.....

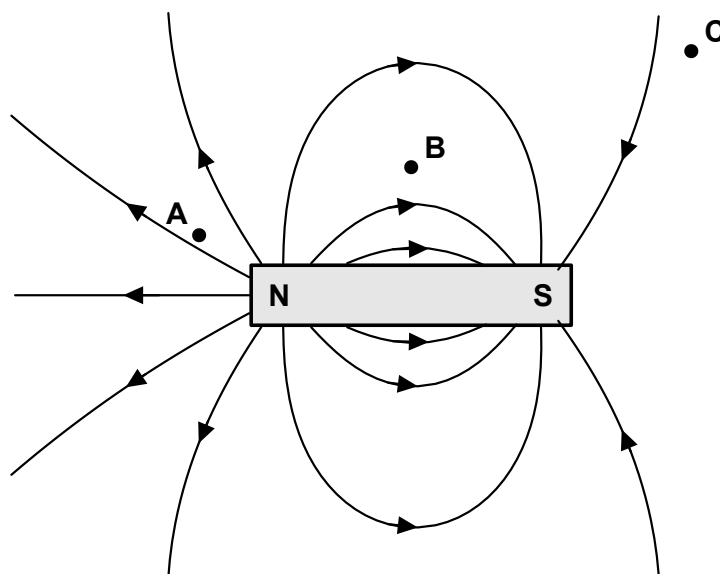
.....

[2 marks]

0 7

Figure 2 shows the magnetic field pattern around a bar magnet.

Figure 2



0 7 . 1

At which point, A, B or C, is the magnetic field strongest?
Give a reason for your answer.

.....

.....

.....

.....

[2 marks]

0 7 . 2

A plotting compass is placed at point B.
In which direction does the north end of the compass needle point?

Tick (✓) **one** box.

Towards the left of the page

Towards the right of the page

Towards the top of the page

Towards the bottom of the page

☐

☐

☐

☐

[1 mark]

0 7 . 3

Describe how the strength of the magnetic field changes with distance from the magnet.

.....

.....

[1 mark]

0 7 . 4

The magnet is turned round so that its north pole is on the right.
Describe how the field pattern changes.

.....

.....

[1 mark]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: Magnetic fields · 30 marks

Question 1 (2 marks)

01.1 [1 mark]

Correct: At the poles

01.2 [1 mark]

Correct: The field gets stronger.

Question 2 (5 marks)

02.1 [2 marks]

Correct: Cobalt; Nickel

02.2 [1 mark]

Correct: From the north pole to the south pole

02.3 [1 mark]

Answer: The region around a magnet where another magnet or a magnetic material experiences a force.

- the region around a magnet where a force acts on another magnet or on a magnetic material (1)
-

02.4 [1 mark]

Answer: North (along the Earth's magnetic field)

- north / along the Earth's magnetic field (1)
-

Question 3 (3 marks)

03.1 [1 mark]

Answer: From the north pole to the south pole.

- from the north pole to the south pole (1)

03.2 [2 marks]

Answer: At a crossing the field would point in two directions at once, but a north pole there can only be pushed one way, so the field has one direction at every point and lines cannot cross.

- if two field lines crossed, the field at the crossing point would have two different directions at once (1)
- but a north pole (or a plotting compass) placed there can only experience a force in one direction, so the field has only one direction at each point (1)

Question 4 (3 marks)

04.1 [3 marks]

Answer: Filings reveal the shape of the field lines but not their direction; a compass shows direction too, since the needle points along the field.

- the iron filings become magnetised and line up along the field lines, showing the overall shape of the field pattern (1)
 - however, the filings do not show which way along each line the field points (from north to south) (1)
 - a plotting compass shows this missing information, because the compass needle points in the direction of the field at that point (1)
-

Question 5 (6 marks)

05.1 [2 marks]

Answer: The needle is a small magnet that lines up with the Earth's magnetic field.

- the compass needle is a small (bar) magnet (1)
 - it lines up with / points in the direction of the Earth's magnetic field (1)
-

05.2 [2 marks]

Answer: Compasses everywhere line up with a field shaped like that of a bar magnet, so the Earth itself must be magnetic inside.

- compasses all over the Earth line up with a magnetic field (with a pattern like that of a huge bar magnet) (1)
 - so the Earth must produce its own magnetic field, which comes from inside the Earth (its core) (1)
-

05.3 [2 marks]

Answer: The north end of the needle points away from the magnet, because near the magnet its field is much stronger than the Earth's and points away from its north pole.

- the needle turns so that its north end points away from the magnet's north pole (its south end points towards it) (1)
 - close to the magnet, the magnet's field is much stronger than the Earth's field / the needle points along the magnet's field (which points away from a north pole) (1)
-

Question 6 (6 marks)

06.1 [3 marks]

Answer: At least four curved field lines from N to S, not crossing, with arrows from N to S, closer together near the poles.

- at least four field lines drawn as curves from the N pole, curving round to the S pole, without crossing (1)
- arrows on the field lines showing direction from the N pole to the S pole (outside the magnet) (1)
- lines drawn closer together near the poles (where the field is stronger) and more spread out further away (where it is weaker) (1)

06.2 [1 mark]

Answer: Away from the N pole (outward, roughly upward).

- away from the N pole (outward / roughly upward, since field lines point away from a north pole) (1)

06.3 [2 marks]

Answer: The same direction as the field at X (away from the N pole), because a compass needle's north end always points in the direction of the magnetic field at its location.

- the same direction as the field at X (away from the magnet's N pole, e.g. upward/outward) (1)
 - because the direction of a magnetic field at a point is defined as the direction in which a compass's north pole points there (1)
-

Question 7 (5 marks)

07.1 [2 marks]

Answer: A: the field lines are closest together there.

- A (1)
- the field lines are closest together at A / A is closest to a pole (1)

Notes: The reason mark depends on choosing A.

07.2 [1 mark]

Correct: Towards the right of the page

07.3 [1 mark]

Answer: It gets weaker further from the magnet.

- the field becomes weaker as the distance from the magnet increases (1)
-

07.4 [1 mark]

Answer: Same shape, but every field line points the opposite way.

- the shape of the pattern is the same but the direction of the field lines (arrows) is reversed (1)
-