AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 6.7.1.1

Poles of a magnet

Past-paper questions

Tier	**Higher**
Question groups	**4**
Available paper years	**2020–2024**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

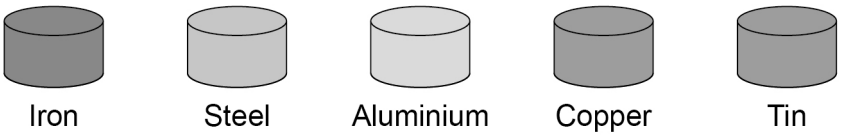
6.7.1.1 Poles of a magnet

Question 01

November 2020 | 8464/P/2H | Original Q1

0 1 **Figure 1** shows five different metal samples.

Figure 1



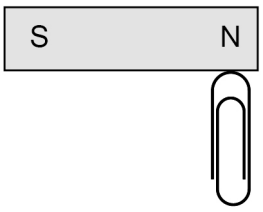
0 1 . 1 A student placed a magnet close to each metal sample.

Describe what happened.

[2 marks]

Figure 2 shows a paper clip being attracted to a permanent magnet.

Figure 2



0 1 . 2 The paper clip in **Figure 2** is not a permanent magnet.

Explain what would happen if the paper clip was removed and brought close to the south pole of the permanent magnet.

[2 marks]

6.7.1.1 Poles of a magnet

Question 01 · continued

0 1 . 3 Write down the equation that links gravitational field strength (*g*), mass (*m*) and weight (*W*).

[1 mark]

0 1 . 4 The student added more paperclips to one end of the magnet.

The maximum number of paperclips the magnet could hold was 20

Each paper clip had a mass of 1.0 g

gravitational field strength = 9.8 N/kg

Calculate the maximum force the magnet can exert.

[3 marks]

Force = _____ N

8

6.7.1.1 Poles of a magnet

Question 02

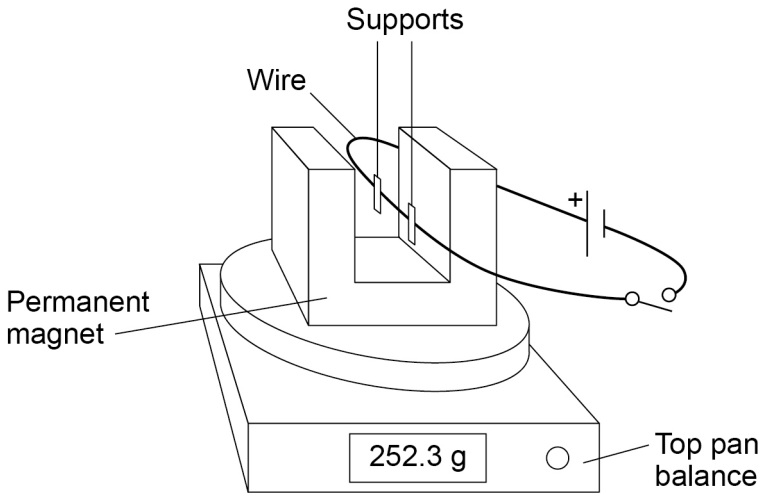
November 2020 | 8464/P/2H | Original Q7

0 7 A student clamped a wire between the poles of a permanent magnet.

The student investigated how the force on the wire varied with the current in the wire.

Figure 13 shows the equipment used.

Figure 13



The top pan balance was used to determine the force on the wire.

0 7 . 1 When the switch was closed the reading on the top pan balance increased.

Explain why the increased reading showed that there was an upward force on the wire.

[2 marks]

6.7.1.1 Poles of a magnet

Question 02 · continued

0 7 . 2 **Table 3** shows the readings on the top pan balance with the switch open and with the switch closed.

Table 3

Switch	Mass in grams
Open	252.3
Closed	254.8

Explain how the values in **Table 3** can be used to determine the size of the force on the wire.

[2 marks]

Question 7 continues on the next page

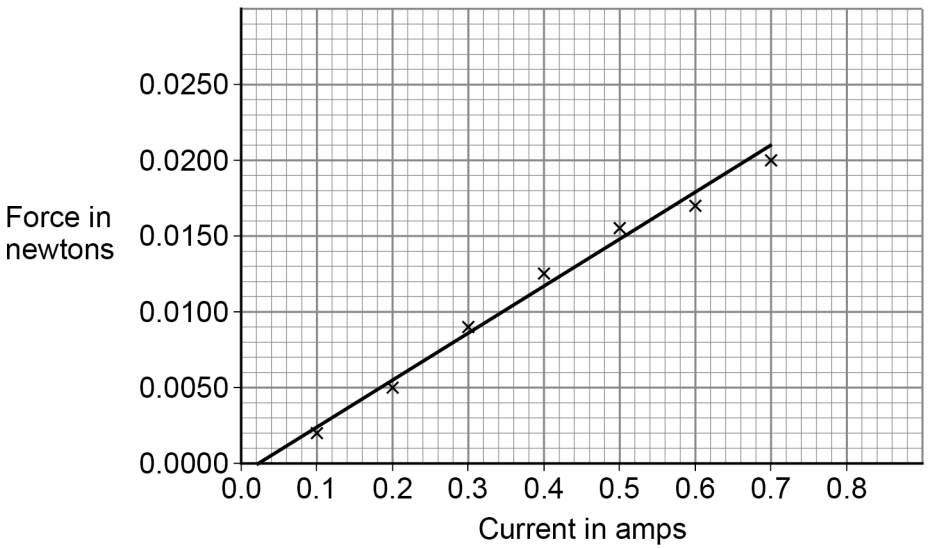
6.7.1.1 Poles of a magnet

Question 02 · continued

0 7 . 3 The student varied the current in the wire and calculated the force acting on the wire.

Figure 14 shows the results.

Figure 14



The length of the wire in the magnetic field was 0.125 m

Determine the magnetic flux density.

[4 marks]

Magnetic flux density = _____ T

8

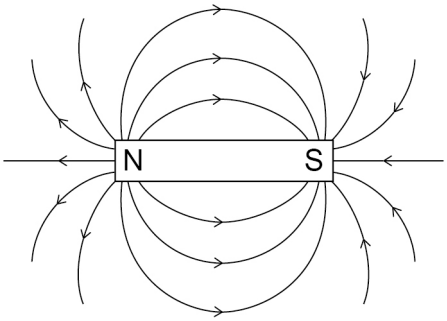
6.7.1.1 Poles of a magnet

Question 03

November 2021 | 8464/P/2H | Original Q4

0 4 **Figure 4** shows the magnetic field pattern around a permanent magnet.

Figure 4



0 4 . 1 Where is the magnetic field of the magnet the strongest?

[1 mark]

0 4 . 2 How does **Figure 4** show that the strength of the magnetic field is not the same at all places?

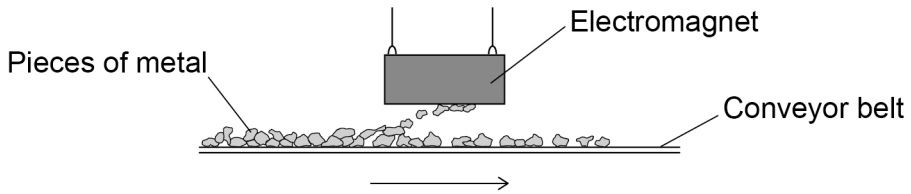
[1 mark]

6.7.1.1 Poles of a magnet

Question 03 · continued

Figure 5 shows an electromagnet being used to separate iron and steel from non-magnetic metals.

Figure 5



0 4 . 3 Explain **one** reason why an electromagnet is used instead of a permanent magnet.

[2 marks]

0 4 . 4 Pieces of iron and steel are attracted to the electromagnet.

Name **two** other metals that would be attracted to the electromagnet.

[2 marks]

1 _____

2 _____

0 4 . 5 The design of the electromagnet **cannot** be changed.

Give **two** ways the force exerted by the electromagnet on a piece of iron or steel could be increased.

[2 marks]

1 _____

2 _____

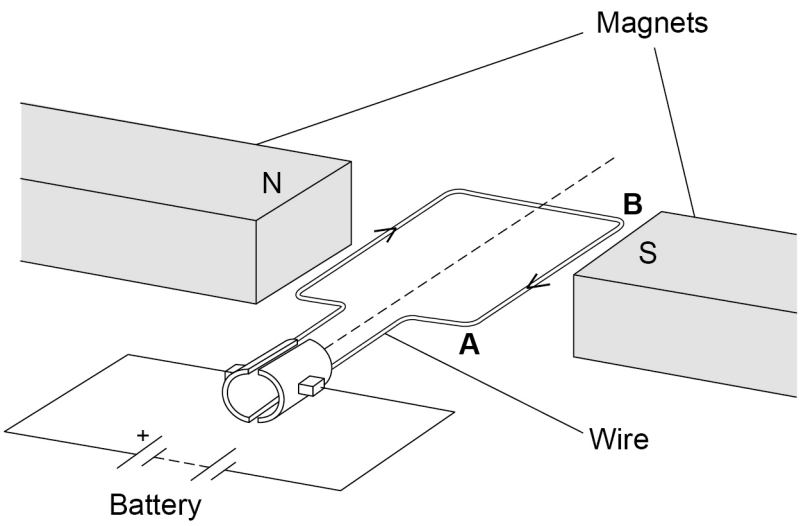
6.7.1.1 Poles of a magnet

Question 03 · continued

The conveyor belt that moves the pieces of metal is driven by an electric motor.

Figure 6 shows a simple electric motor.

Figure 6



6.7.1.1 Poles of a magnet

Question 03 · continued

0 4 . 6 The length of the wire **AB** in the magnetic field is 120 mm.

There is a current of 4.0 A in the wire. The length of wire **AB** experiences a force of 0.36 N.

Calculate the magnetic flux density between the magnets.

Give the unit.

[5 marks]

Magnetic flux density = _____ Unit _____

Question 4 continues on the next page

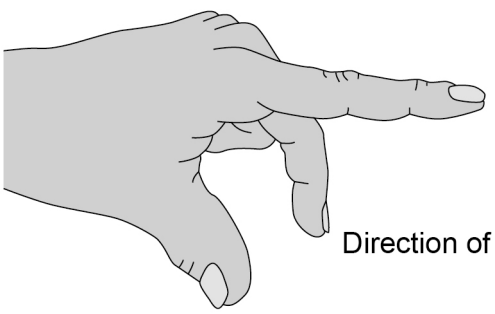
6.7.1.1 Poles of a magnet

0 4 . 7 Fleming's left-hand rule can be used to determine the direction of the force on wire **AB**.

Complete the labels on **Figure 7** to show Fleming's left-hand rule.

[2 marks]

Figure 7



Direction of _____

Direction of _____

Direction of _____

15

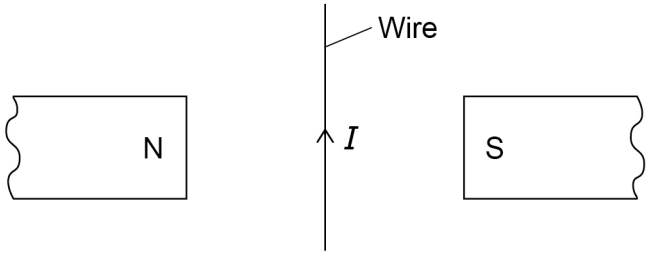
6.7.1.1 Poles of a magnet

Question 04

0 4 **Figure 6** shows two magnets and a wire.

There is a current in the wire.

Figure 6



0 4 . 1 A force acts on the wire in **Figure 6**.

What is the direction of the force on the wire?

[1 mark]

Tick (✓) **one** box.

- Into the page ☐
- Out of the page ☐
- To the left ☐
- To the right ☐

6.7.1.1 Poles of a magnet

Question 04 · continued

0 4 . 2 The length of the wire in the magnetic field between the magnets is 80 mm.

The current in the wire is 4.6 A.

The force on the wire is 0.092 N.

Calculate the magnetic flux density between the magnets.

Use the Physics Equations Sheet.

Give the unit.

[4 marks]

Magnetic flux density = _____ Unit _____

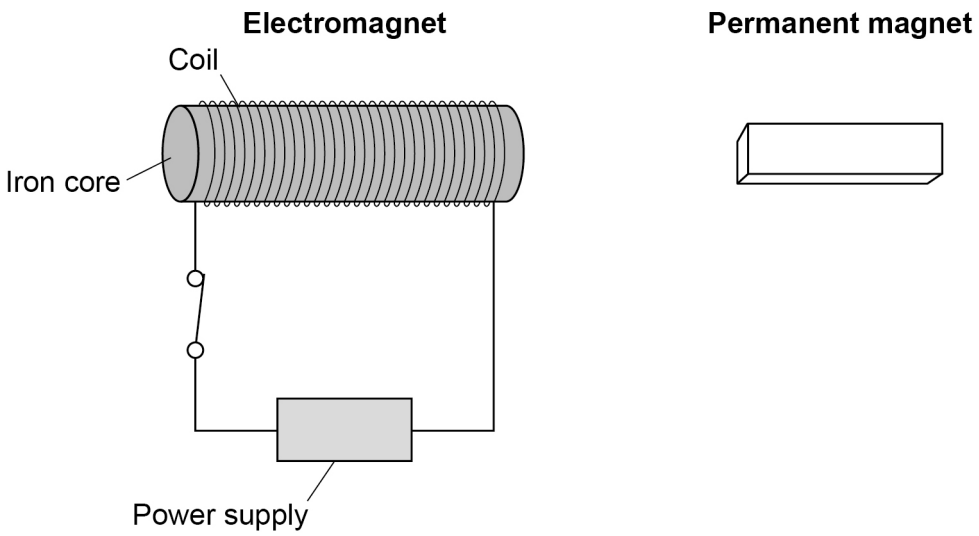
Question 4 continues on the next page

6.7.1.1 Poles of a magnet

Question 04 · continued

Figure 7 shows an electromagnet close to a permanent magnet.

Figure 7



0 4 . 3 The electromagnet exerts a force on the permanent magnet.

The permanent magnet exerts an equal and opposite force on the electromagnet.

Which law is this an example of?

[1 mark]

Tick (✓) **one** box.

Newton's first law ☐

Newton's second law ☐

Newton's third law ☐

6.7.1.1 Poles of a magnet

Question 04 · continued

0 4 . 4 Give **two** changes to the electromagnet that would increase the force exerted on the permanent magnet.

[2 marks]

1 _____

_____

2 _____

_____

0 4 . 5 Give **two** changes to the electromagnet that would reverse the direction of the force exerted on the permanent magnet.

[2 marks]

1 _____

_____

2 _____

_____

10