

Magnets and Magnetic Fields

Q1.(2018)

A solenoid can be used to produce a magnetic field.

Which of the following **increases** the magnetic field strength produced?

- A Decreasing the current
- B Decreasing the number of turns
- C Increasing the current
- D Removing magnetic material from the core

Your answer

[1]

Q2.(2019)

This question is about magnetic forces.

Which of the following would cause repulsion?

- | | | |
|---|----------------|-------------------|
| A | <div>N S</div> | <div>S N</div> |
| B | <div>N S</div> | <div>N S</div> |
| C | <div>S N</div> | <div>copper</div> |
| D | <div>S N</div> | <div>iron</div> |

Your answer

[1]

Q3.a(2019)

A teacher shows her class some magnets.

(a) Fig. 12.1 shows the magnetic field around a bar magnet.

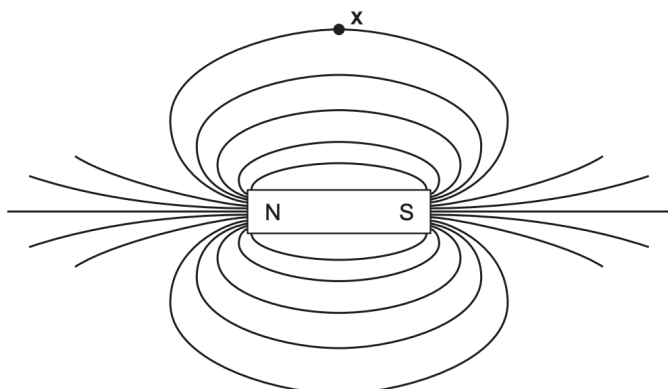


Fig. 12.1

(i) What is the direction of the magnetic field at X?

Draw an arrow **on the diagram** in Fig. 12.1 to show your answer.

[1]

Q3.b(2019)

Where is the magnetic field **strongest** around the bar magnet?

..... [1]

Q3.c(2019)

A compass points towards 'magnetic north'.

What does this tell us about the Earth?

.....

..... [1]

Q3.d(2019)

The teacher wraps a coil of insulated wire around a soft iron core as shown in Fig. 12.2.

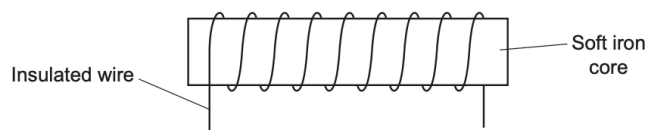


Fig. 12.2

(i) Describe what the student needs to do to create a magnetic field.

.....

..... [1]

Q3.e(2019)

The student changes the number of turns in the coil. He records the number of steel pins that the magnetic field can pick up.

Number of turns in coil	Number of steel pins picked up
5	0
10	1
15	2
20	2

The student concludes 'The more turns, the stronger the magnetic field'.

Explain if his conclusion is true. Use the results in the table in your answer.

.....

 [2]

Q4.(2020)

Which action increases the strength of an electromagnet?

- A Decreasing the current.
- B Decreasing the number of turns of wire.
- C Increasing the number of turns of wire.
- D Using a copper core.

Your answer ☐

[1]

Q5.(2020)

This question is about magnetic fields.

(a) Fig. 17.1 is a diagram of the magnetic field around a bar magnet.

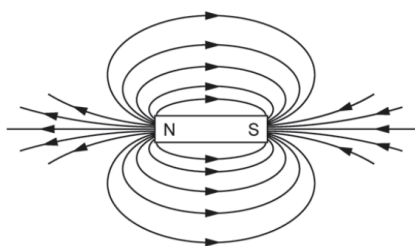


Fig. 17.1

The field lines give information about magnetic forces.

State **two** pieces of information Fig. 17.1 gives you.

- 1.....

- 2.....

[2]

Q6.(2020)

A student has a permanent magnet and three metal blocks marked **A**, **B** and **C**, as shown in Fig. 17.2.



Fig. 17.2

- One block is a permanent magnet.
- One block is a piece of copper.
- One block is a piece of iron.

Explain how the student can use the permanent magnet to identify block **A**, **B** and **C**.

.....

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.....

..... [3]

Q7.a(2020)

Fig. 17.3 is a picture of a dipping compass.

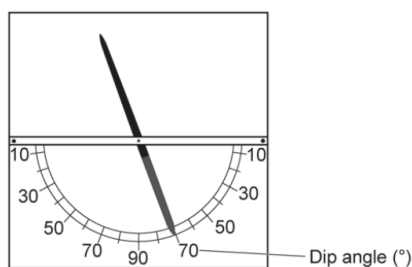


Fig. 17.3

The dip angle can be measured at different distances from the Earth's North pole.

The graph in Fig. 17.4 shows how the dip angle varies with distance from the Earth's North pole.

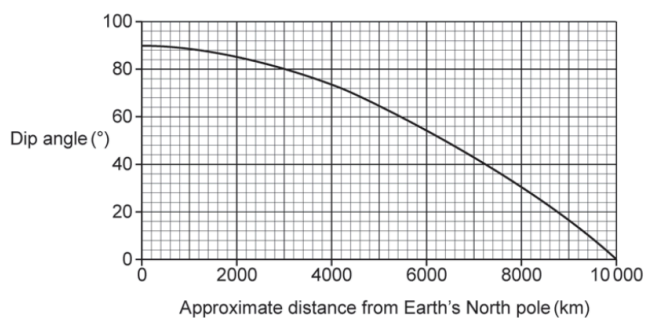


Fig. 17.4

- (i) Describe the relationship shown in the graph in Fig. 17.4.

.....

.....

..... [2]

Q7.b(2020)

London is approximately 4200 km from the North pole.

Use the graph in **Fig. 17.4** to estimate the dip angle in London.

Dip angle = ° [1]

Q7.c(2020)

The actual value of the dip angle in London is 66° , with an uncertainty of $\pm 3^\circ$.

Is the value you obtained in part (c)(ii) accurate? Explain your answer.

.....
..... [1]

Q7.d(2020)

The dipping compass gives important information about the Earth.

Describe what the dipping compass tells us about the Earth.

.....
..... [1]

Q8.(2020)

The graph in Fig. 17.5 shows how the magnetic field strength around a straight wire decreases with distance from the wire.

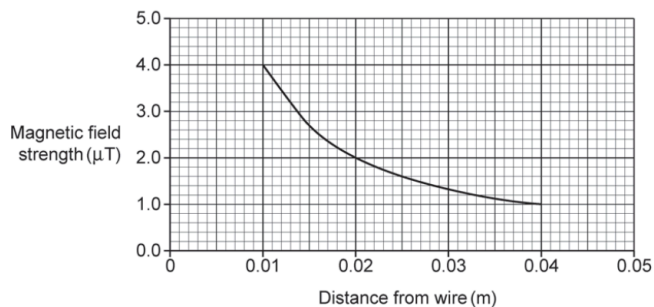


Fig. 17.5

Two students are discussing the graph in Fig. 17.5. This is what they say:

Student X: 'As distance doubles, field strength is multiplied by 0.25.'

Student Y: 'As distance doubles, field strength is multiplied by 0.75.'

Use the graph in Fig. 17.5 to evaluate each statement.

.....

.....

.....

..... [2]

Q9.(2021)

This question is about forces.

Which diagram shows attraction?

- A

N	S
---	---

S	N
---	---
- B

+	+	+	+	+	+
---	---	---	---	---	---

+	+	+	+	+	+
---	---	---	---	---	---
- c

S	N
---	---

S	N
---	---
- D

S	N
---	---

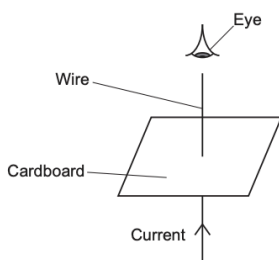
Paper

Your answer

[1]

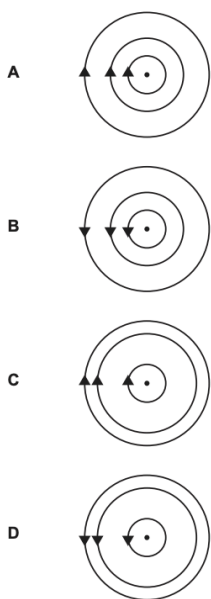
Q10.(2021)

A magnetic field is produced around a current-carrying wire.



A student views the magnetic field from above, as shown by the eye in the diagram.

Which diagram shows the magnetic field around the wire?



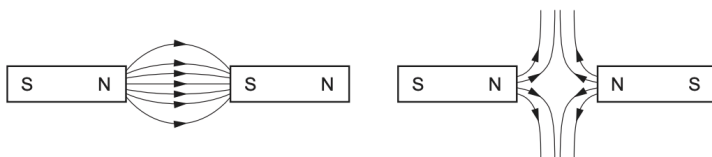
Your answer

☐

[1]

Q11.(2022)

The diagrams show the magnetic field lines around the bar magnets.



Which answer is **correct**?

- A N poles repel S poles.
- B The direction of the magnetic field lines is N to S.
- C The magnetic field is stronger further from the bar magnet.
- D The poles are at the centre of the bar magnet.

Your answer

☐

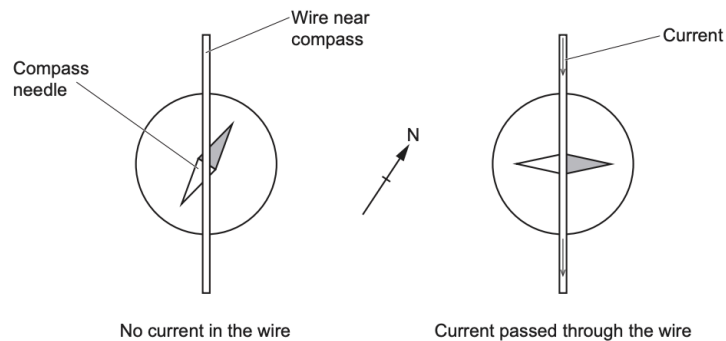
[1]

Q12.a(2022)

In 1820, a scientist called Oersted did an experiment with a compass.

- He placed a wire near a compass.
- He passed a current through the wire.

The diagram shows his experiment. The direction of magnetic north is also shown.



(a) Magnetic fields are produced by currents in wires.

Describe how the diagram shows this.

.....
..... [1]

Q12.b(2022)

A teacher repeats the experiment.

- The current in the wire is 5.0A.
- The current is in the wire for 30 seconds.

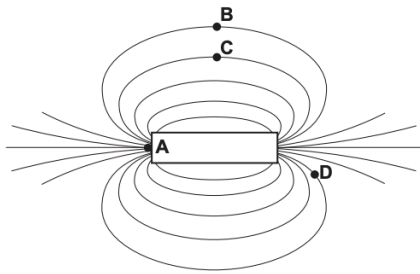
Calculate the charge flowing through the wire.

Use the equation: charge flow = current $\times$ time

Charge flow = C [2]

Q13.(2023)

At which point is the magnetic field the **weakest**?



1

[1]

An electromagnet can be made from a coil of wire and a soft iron core.

A student investigates how the strength of an electromagnet varies with the number of turns.

Fig. 14.1

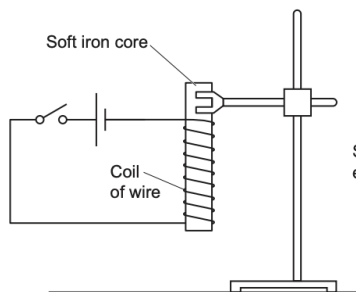
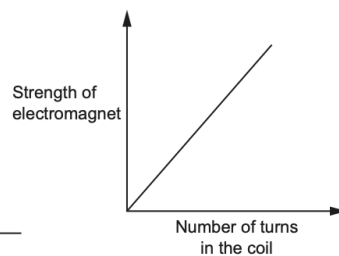


Fig. 14.2



Explain what the graph in **Fig. 14.2** tells us.

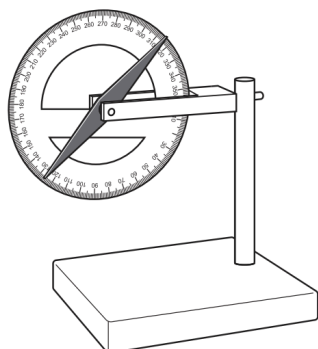
[6]

Q15.a(2024)

This question is about magnetic fields.

Fig. 11.1 shows a diagram of a measuring instrument.

Fig. 11.1



Name this measuring instrument.

..... [1]

Q15.b(2024)

What information does the instrument in **Fig. 11.1** give us about the core of the Earth?

.....
..... [1]

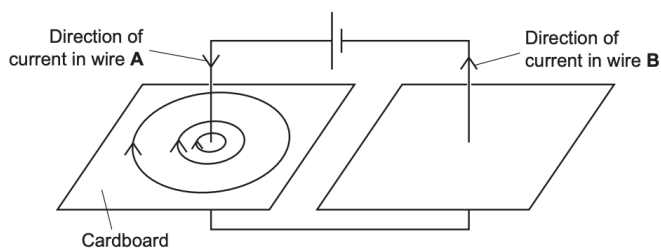
Q16.a(2024)

Fig. 11.2 shows a diagram of an electrical circuit containing two straight wires, **A** and **B**.

Each wire passes through a piece of cardboard.

The magnetic field is shown around wire **A**.

Fig. 11.2



Describe how you can use iron filings to show the shape of the magnetic field pattern around wire **B**.

.....
..... [2]

Q16.b(2024)

Draw the shape and direction of the magnetic field pattern around wire **B** on Fig. 11.2.

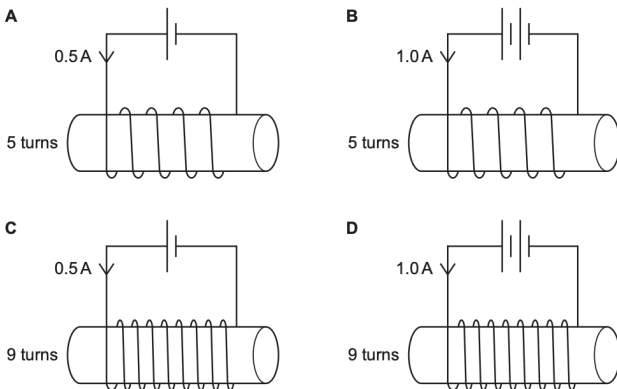
[3]

Q17.(2024)

Solenoids can be used to produce magnetic fields.

Fig. 11.3 shows the current and the number of turns of wire in four different solenoids **A**, **B**, **C** and **D**.

Fig. 11.3



The solenoids are all made of the same material using wires of equal thickness.

Which solenoid has the strongest magnetic field?

Give a reason for your answer.

Solenoid

Reason

.....

.....

[2]