Magnetism and magnetic fields – 2021/20 GCSE Gateway Physics A

1. Nov/2021/Paper_J249/01/No.8

Which force is **not** a contact force?

A Air resistance

B Friction

C Gravitational

D Tension

Your answer ☐ **[1]**

2. Nov/2021/Paper_J249/01/No.16

A group of students investigate magnetic fields.

(a) **Fig. 16.1** shows the magnetic field around a bar magnet.

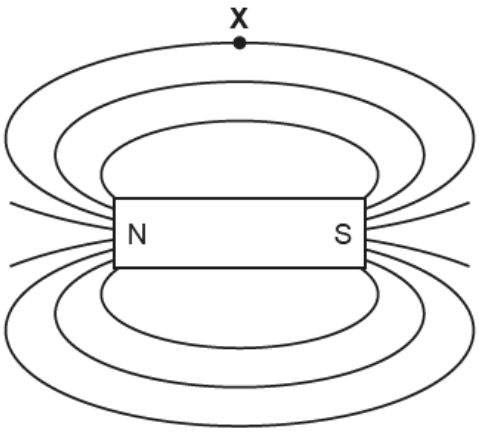
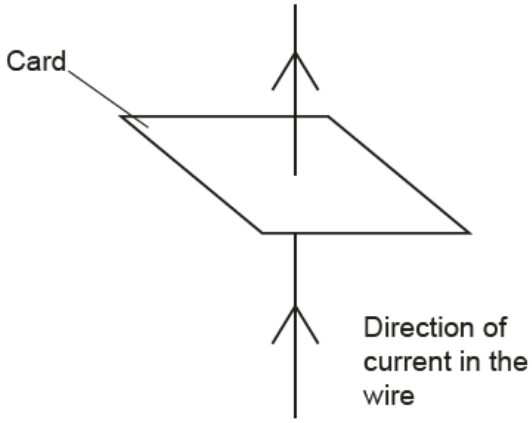


Fig. 16.1

Draw an arrow on the field line at position **X** on **Fig. 16.1** to show the direction of the magnetic field. **[1]**

(b) A current in a wire creates a magnetic field. A straight wire carrying an electric current passes through a flat card as shown in **Fig. 16.2**.

(i) Draw on **Fig. 16.2** the shape and direction of the magnetic field observed on the card. **[2]**



(ii) Suggest **one** way the students could increase the strength of the magnetic field around the wire.

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

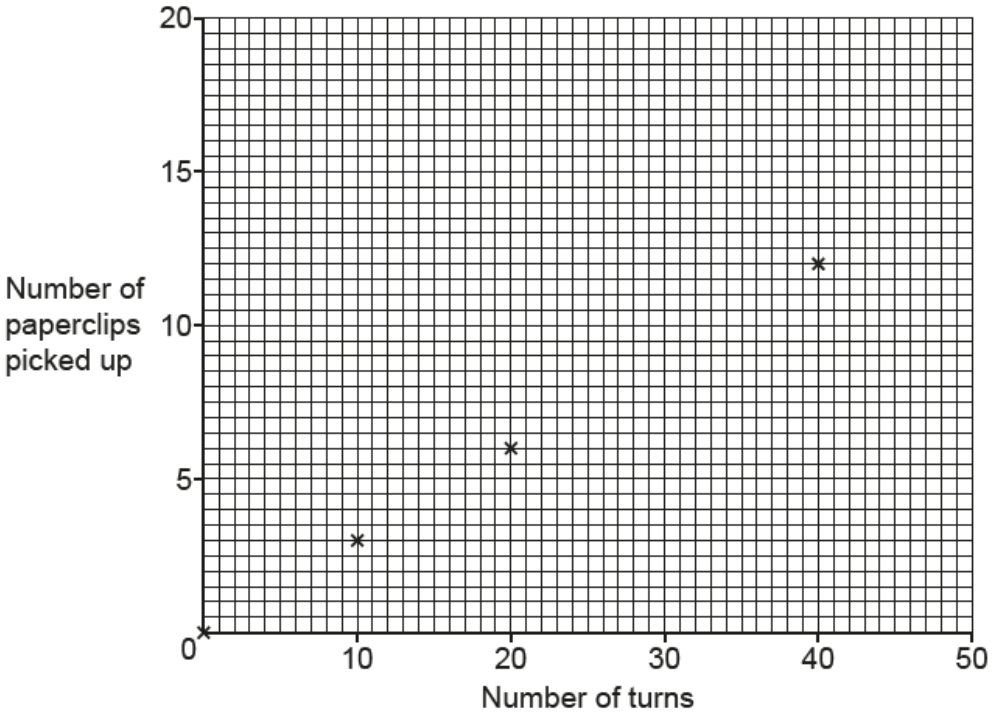
(c) The students investigate the strength of an electromagnet. They change the number of turns on the electromagnet and count how many paperclips it can pick up.

The students record their data in a table.

Number of turns	Number of paperclips picked up
0	0
10	3
20	6
30	10
40	12
50	14

(i) Plot the **two** missing results onto the graph.

Draw a line of best-fit.



[3]

(ii) Describe the relationship between the number of turns and the number of paperclips picked up. You may use data from the graph in your answer.

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

(iii) Suggest **two** variables the students need to control in their experiment.

1 .....

2 .....

[2]

3. Nov/2020/Paper_J249/02/No.4

Which action **increases** the strength of an electromagnet?

A Decreasing the current

B Decreasing the number of turns of wire

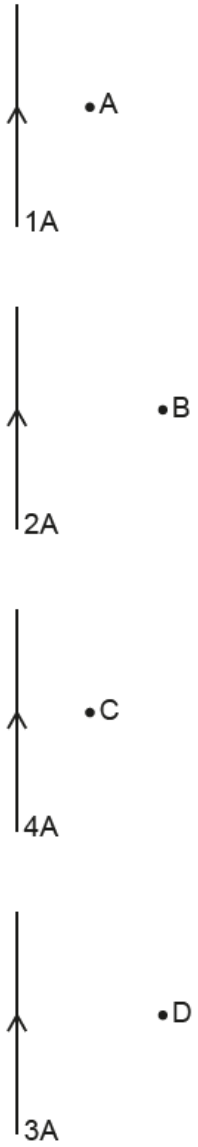
C Increasing the number of turns of wire

D Using a copper core

Your answer ☐ **[1]**

4. Nov/2020/Paper_J249/02/No.7

The different currents in four wires are shown below. The magnetic field is measured at positions **A**, **B**, **C** and **D**.

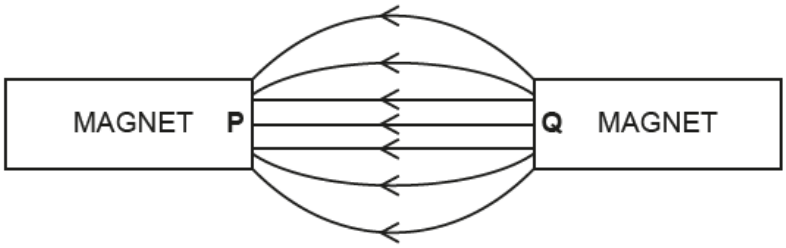


Which position will experience the strongest magnetic field?

Your answer ☐ **[1]**

5. Nov/2021/Paper_J249/03/No.2

A magnetic field line diagram shows the magnetic field between the poles **P** and **Q** of two magnets.



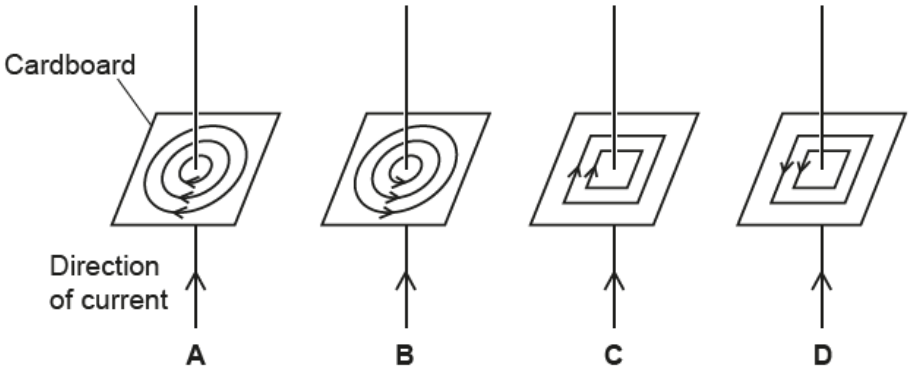
What are the poles **P** and **Q**?

	Pole P	Pole Q
A	North	North
B	North	South
C	South	North
D	South	South

Your answer ☐ **[1]**

6. Nov/2021/Paper_J249/03/No.3

A current is passed through a straight wire.



Which diagram shows the magnetic field around the current-carrying wire?

Your answer ☐ **[1]**

7. Nov/2021/Paper_J249/03/No.8

A student investigates the magnetic effect of a current in a solenoid with a core. The student makes four different solenoids.

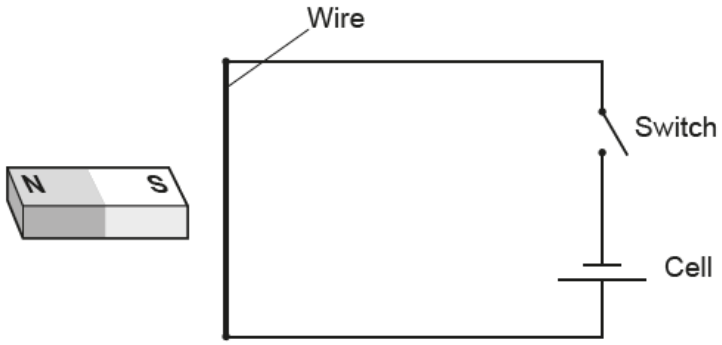
Which solenoid will have the strongest magnetic field?

Solenoid	Number of turns	Core
A	10	Copper
B	10	Iron
C	20	Copper
D	20	Iron

Your answer ☐ **[1]**

8. Nov/2021/Paper_J249/03/No.20

A student places a wire near a magnet. The wire is connected in series to a cell and a switch, as shown in the diagram.



(a) Explain what will happen to the wire when the switch is closed.

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

(b) A wire of length 0.25 m experiences a force of 0.15 N when a current of 5.0 A flows.

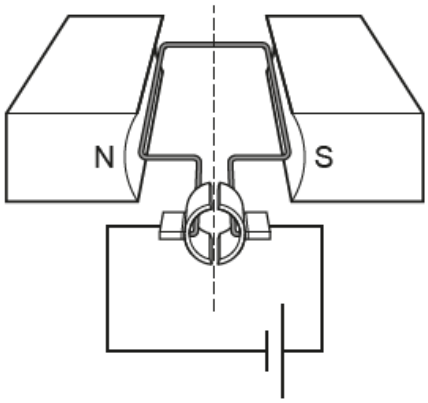
Calculate the magnetic flux density of the field.

Use an equation from the data sheet to help you.

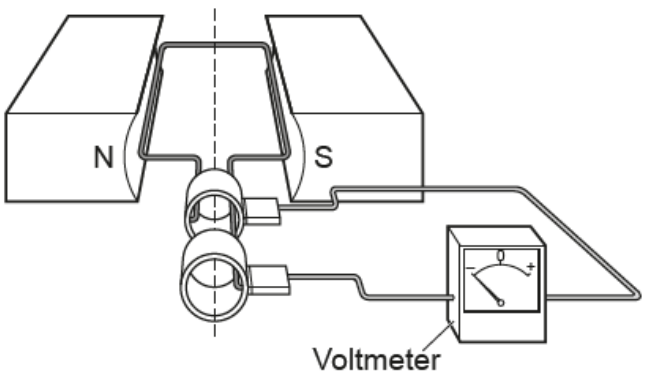
Magnetic flux density = ... T **[3]**

(c) The student looks at diagrams of a motor and a generator.

Motor



Generator



(i) Compare the similarities **and** differences of a motor and a generator. Include ideas about how they work.

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..... **[3]**

(ii) How does the output current of an alternator differ from that of a dynamo?

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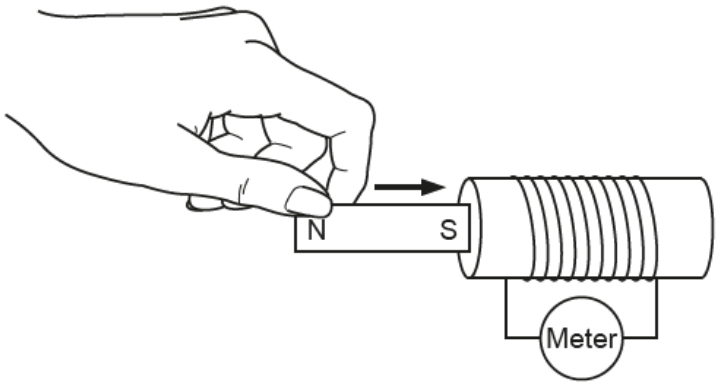
..... **[2]**

9. Nov/2020/Paper_J249/03/No.8

A student inserts a magnet into a coil of wire.



What is induced across the ends of the coil of wire?

A Charge

B Magnetism

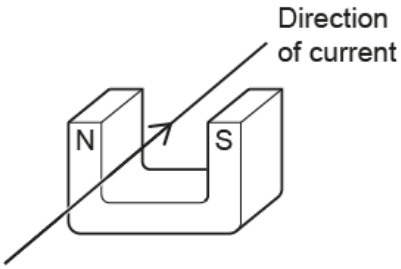
C Potential difference

D Resistance

Your answer ☐ **[1]**

10. Nov/2020/Paper_J249/03/No.11

A wire is placed between the poles of a magnet, perpendicular to the magnetic field lines.



Which direction will the wire move when a current flows?

A Down

B Left

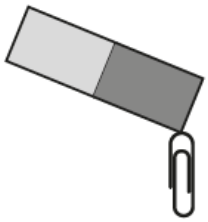
C Right

D Up

Your answer ☐ **[1]**

11. Nov/2020/Paper_J249/03/No.12

A magnet is used to pick up a paperclip.



Which statement explains why the paperclip is picked up?

A The magnet is a permanent magnet and the opposite pole has been induced at the top of the paperclip.

B The magnet is a permanent magnet and the same pole has been induced at the top of the paperclip.

C The magnet is a temporary magnet and the opposite pole has been induced at the top of the paperclip.

D The magnet is a temporary magnet and the same pole has been induced at the top of the paperclip.

Your answer ☐ **[1]**