


A Level • OCR • Physics

 4 mins 4 questions

Multiple Choice Questions

# Magnetic Fields

Magnetic Fields / Magnetic Fields Lines / Fleming's Left-Hand Rule / Force on a Current-Carrying Conductor / Magnetic Flux Density / Force on a Moving Charge / Motion of Charged Particles in a B Field / Velocity Selector

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Total Marks

/4

- 1 A student is doing an experiment on the magnetic force experienced by a current-carrying wire in a uniform magnetic field. The magnetic flux density  $B$  can be varied.

For a particular flux density, the current in the wire is 2.0 A. The length of the wire in the field is 0.12 m. The angle between the current and the magnetic field is  $30^\circ$ . The force experienced by the wire is  $7.7 \times 10^{-2}$  N.

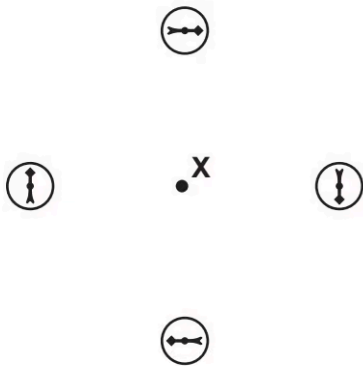
The student calculates  $B$  and records the results in a table.

Which row shows the correct table heading for  $B$  and the correct value for  $B$ ?

	Table heading for $B$	Value for $B$
A	$B / \text{T}$	0.37
B	$B / \text{T}$	0.64
C	$B / \text{Wb}$	0.37
D	$B / \text{Wb}$	0.64

(1 mark)

- 2 The diagram shows four magnetic compasses placed at the same distance from point **X**.

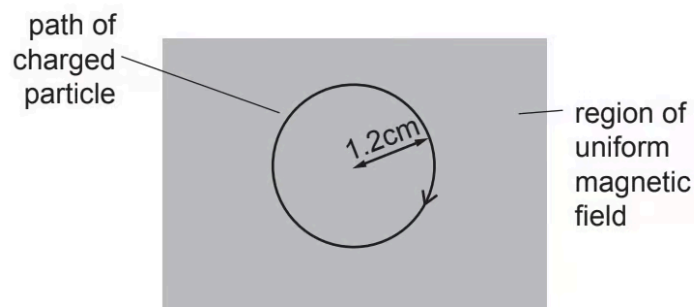


Which of the following is most likely to be at point **X**?

- A. permanent magnet
- B. current-carrying solenoid
- C. current-carrying flat coil
- D. straight current-carrying wire

(1 mark)

- 3 A charged particle moves in a circular path of radius 1.2 cm in a uniform magnetic field.



The direction of the magnetic field is perpendicular to the plane of the paper. The particle has mass  $m$ , charge  $+Q$  and speed  $v$ . Another particle of mass  $3m$ , charge  $+2Q$  and speed  $v$  moves in a circular path of radius  $R$  in the same magnetic field.

What is the value of  $R$ ?

- A. 0.8 cm

- B.** 1.2 cm
- C.** 1.8 cm
- D.** 7.2 cm

**(1 mark)**

- 4** The acceleration of a proton as it travels perpendicular to a magnetic field is  $1.6 \times 10^{14} \text{ m s}^{-2}$ . The flux density of the magnetic field is 0.37 T.

What is the velocity of the proton?

- A.**  $4.5 \times 10^6 \text{ m s}^{-1}$
- B.**  $3.0 \times 10^8 \text{ m s}^{-1}$
- C.**  $2.5 \times 10^3 \text{ m s}^{-1}$
- D.**  $1.7 \times 10^6 \text{ m s}^{-1}$

**(1 mark)**