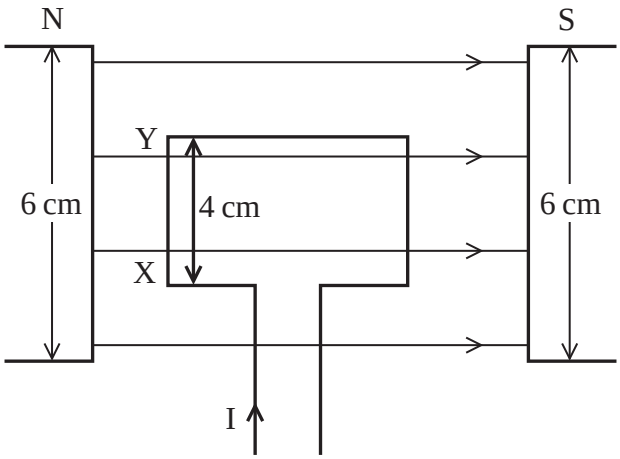
1 A loop of wire is placed inside a magnetic field of magnetic flux density 0.30 T as shown.



Which of the following is the force on side XY if the current in the wire is 2.0 A?

☒ **A** 0.024 N

☒ **B** 0.036 N

☒ **C** 2.4 N

☒ **D** 3.6 N

(Total for Question = 1 mark)

2 A length of current-carrying wire is placed at right angles to a uniform magnetic field of flux density *B*. When the current in the wire is *I* the force acting on the wire is *F*.

What is the force when the flux density is increased to 2*B* and the current reduced to 0.25*I*?

☒ **A** 8*F*

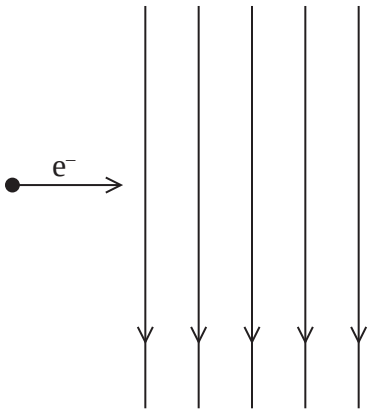
☒ **B** 2*F*

☒ **C** *F*/2

☒ **D** *F*/4

(Total for Question = 1 mark)

3 An electron travelling horizontally enters a uniform electric field which acts vertically downwards as shown in the diagram.



Which of the following statements is **incorrect**?

☒ **A** The electron follows a parabolic path.

☒ **B** The electron accelerates while in the field.

☒ **C** The electric force on the electron acts downwards.

☒ **D** The speed of the electron increases.

(Total for Question = 1 mark)

4 A current of 1.50 A flows in a straight wire of length 0.450 m. The wire is placed in a uniform magnetic field of flux density 2.00×10^{-3} T which acts perpendicular to the wire. Under these conditions the magnetic force balances the weight of the wire.

Calculate the mass of the wire.

☒ **A** 1.32×10^{-2} kg

☒ **B** 1.35×10^{-3} kg

☒ **C** 1.38×10^{-4} kg

☒ **D** 1.35×10^{-4} kg

(Total for Question = 1 mark)

5 A charged, non-magnetic particle is moving in a magnetic field.

Which of the following would **not** affect the magnetic force acting on the particle?

☒ **A** the magnitude of the charge on the particle

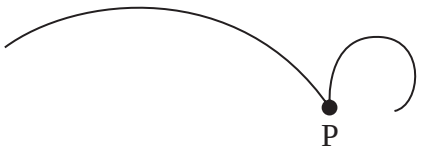
☒ **B** the strength of the magnetic field

☒ **C** the velocity component parallel to the magnetic field direction

☒ **D** the velocity component perpendicular to the magnetic field direction

(Total for Question = 1 mark)

6 The diagram shows the tracks from an event at a point P in a bubble chamber. A magnetic field is directed into the page.



The tracks cannot show the production of a proton-antiproton pair with equal kinetic energies because

☒ **A** the curvature is perpendicular to the magnetic field.

☒ **B** the tracks curve in different directions.

☒ **C** the tracks have different curvatures.

☒ **D** there is no track before point P.

(Total for Question = 1 mark)

7 A cyclotron is a type of particle accelerator. It consists of two metal Dees which are connected to a high frequency voltage supply and are in a strong magnetic field.

The particles change their speed because

☒ **A** of the magnetic field they are in.

☒ **B** the voltage supply is alternating.

☒ **C** there is a potential difference between the two Dees.

☒ **D** the magnetic field is at right angles to the Dees.

(Total for Question = 1 mark)

8 A coil of N turns and cross-sectional area A lies perpendicular to a magnetic field of flux density B. The magnetic flux linkage is X.

A second coil with twice the number of turns but half the cross-sectional area lies perpendicular to a magnetic field of flux density $2B$. The magnetic flux linkage with the second coil is

☒ **A** $\frac{X}{2}$

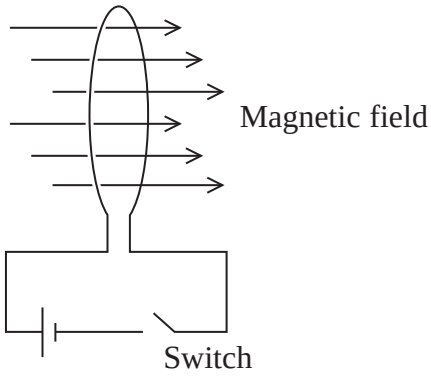
☒ **B** X

☒ **C** $2X$

☒ **D** $4X$

(Total for Question 1 mark)

9 A circular loop of thin wire is placed so that its plane is perpendicular to a magnetic field as shown.



As the switch is closed, the loop of wire will

☒ **A** become a circle of smaller radius.

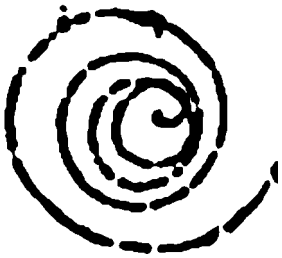
☒ **B** not change.

☒ **C** rotate about its centre.

☒ **D** rotate so that its plane is parallel to the field.

(Total for Question = 1 mark)

10 The diagram shows the path of an electron in a bubble chamber.



Which of the following can you deduce from the diagram?

☒ **A** The electron is moving anti-clockwise.

☒ **B** The electron is moving clockwise.

☒ **C** The magnetic field is acting out of the page.

☒ **D** The speed of the electron is increasing.

(Total for Question = 1 mark)

11 A conductor of length 50 mm carries a current of 3.0 A at 30° to a magnetic field of magnetic flux density 0.40 T.

The magnitude of the magnetic force acting on the conductor is

☒ **A** 0.030 N

☒ **B** 0.050 N

☒ **C** 30 N

☒ **D** 52 N

(Total for Question 1 mark)

12 Figure 1 shows a vertical plane square coil of 50 turns, carrying a current of 3.0 A. The length of each side of the coil is 4.0 cm. Figure 2 shows a view of this coil from above within a horizontal magnetic field of flux density 0.20 T.

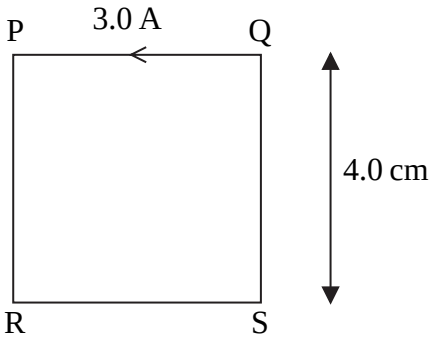


Figure 1

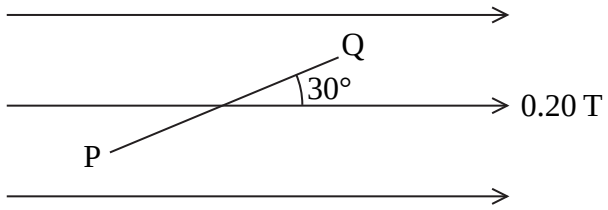


Figure 2

The force on side QS is

☒ **A** 120 N

☒ **B** 60 N

☒ **C** 1.2 N

☒ **D** 0.60 N

(Total for Question = 1 mark)

13 Charged particles are travelling at a speed *v*, at right angles to a magnetic field of flux density *B*. Each particle has a mass *m* and a charge *Q*.

Which of the following changes would cause a decrease in the radius of the circular path of the particles?

☒ **A** an increase in *B*

☒ **B** an increase in *m*

☒ **C** an increase in *v*

☒ **D** a decrease in *Q*

(Total for Question = 1 mark)