CORE

Exercise 6.3

1. A suitable unit of magnetic field strength is

   A. $A\ N^{-1}\ m^{-1}$
   B. $kg\ s^{-2}\ A^{-1}$
   C. $A\ m\ N^{-1}$
   D. $kg\ A\ s^{2}$

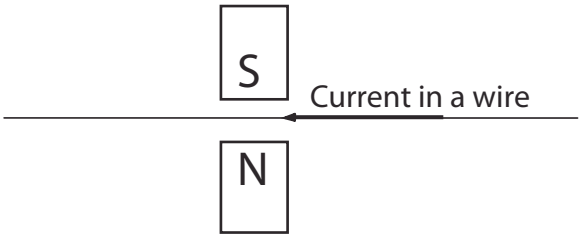
2. An electron enters a uniform magnetic field that is at right angles to its originaldirection of movement. The path of the electron is

   A. an arc of a circle
   B. helical
   C. part of a parabola
   D. a straight line

3. Two long straight wires with currents flowing in opposite directions experience a force because

   A. the current in both wires increases
   B. the current in both wires decreases
   C. the current in the wires produces an attraction
   D the current in the wires produces a repulsion

4. Determine in which direction the wire moves in the diagram shown.

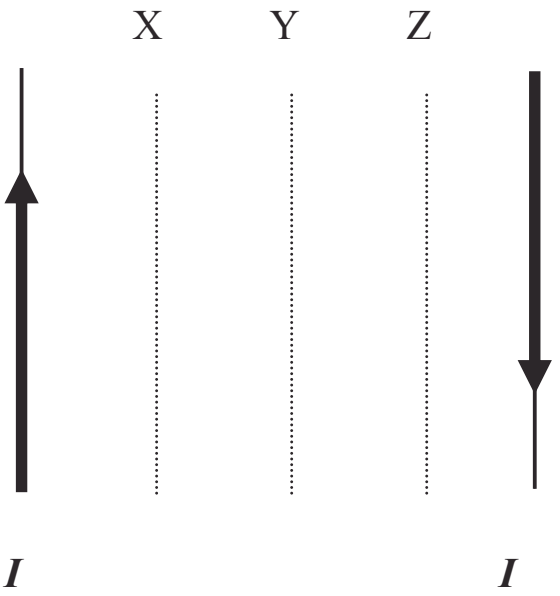


   A. outwards
   B. inwards
   C. it does not move
   D. sideways

5. An electron passes through a uniform magnetic field of 0.050 T at right angles to the direction of the field at a velocity of $2.5 \times 10^{6}\ ms^{-1}$. The magnitude of the force on the electron in newtons is:

   A. 2.0×10^{-14}
   B. 4.0×10^{-14}
   C. 8.0×10^{-14}
   D. zero

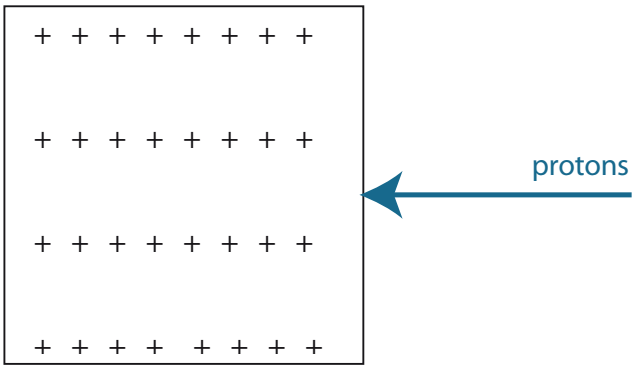
6. Two parallel wires carry currents *I* of equal magnitude in opposite directions as shown in the diagram



The line along which the magnetic fields cancel is

   A. X
   B. Y
   C. Z
   D. the magnetic fields do not cancel

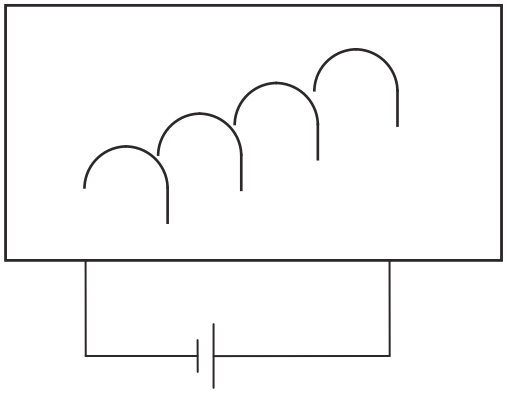
7. A beam of protons enter a uniform magnetic field directed into the page as shown



The protons will experience a force that pushes them

   A. into the page
   B. out of the page
   C. upwards
   D. downwards

8. Below is a schematic diagram of a coil connected to a battery.



When an electric current flows in the circuit, the end of the coil labelled X will be:

A. a south pole
B. a north pole
C. either a north or a south pole
D. neither a north or a south pole

9. An ion carrying a charge of 3.2×10^{-19} C enters a field of magnetic flux density of 1.5 T with a velocity of 2.5×10^{5} m s^{-1} perpendicular to the field. Calculate the force on the ion.

10. A straight wire of length 50 cm carries a current of 50 A. The wire is at right angles to a magnetic field of 0.3 T. Calculate the force on the wire.

11. A straight wire of length 1.4 m carries a current of 2.5 A. If the wire is in a direction of 25° to a magnetic field of 0.7 T, calculate the force on the wire.

12. A beam of electrons enters a pair of crossed electric and magnetic fields in which the electric field strength of 3.0 × 104 V m^{-1} and magnetic flux density of 1.0×10^{-2} T. If the beam is not deflected from its path by the fields, what must be the speed of the electrons?

13. An electron in one of the electron guns of a television picture tube is accelerated by a potential difference of 1.2×10^{4} V. It is then deflected by a magnetic field of 6.0×10^{-4} T. Determine

i. the velocity of the electron when it enters the magnetic field.
ii. the radius of curvature of the electron while it is in the magnetic field.

14. A point charge of – 15 C is moving due north at 1.0×10^{3} ms^{-1} enters a uniform magnetic field of 1.2×10^{-4} T directed into the page. Determine the magnitude and direction of the force on the charge.

15. A vertical wire 50 cm long carries a current of 1.5 A from the north to the south. It experiences a force of 0.2 N.

(a) Determine the magnitude of the magnetic field

(b) Determine how the force could be increased to could be increased to 2 N.