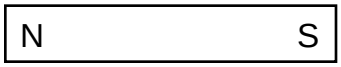
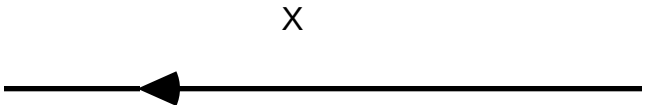
Phys12 Magnetic Fields : Quiz - 20

1) Draw the magnetic field lines around the magnet. Show the direction of the field. (Be neat)



2) Find the direction of the magnetic field at point X. The arrow shows the direction of the conventional current in the wire.



a) Into the page b) Out of the page c) Up d) Down

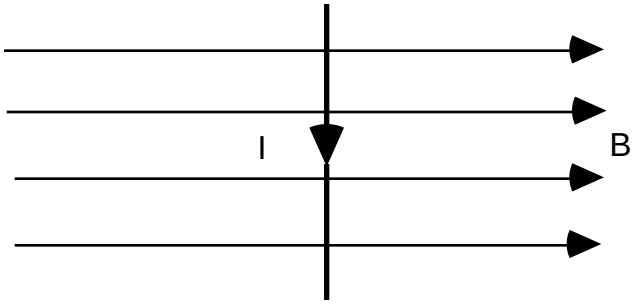
3) A piece of wire 0.30 m long is aligned at right angles to a constant uniform magnetic field. When the wire carries a current of 4.0 A, it experiences a magnetic force of 0.60 N. What is the strength of the magnetic field ?

a) 3.6×10^{-6} T b) 0.50 T c) 0.72 T d) 5.0 T

4) When a current-carrying conductor in an external magnetic field is aligned perpendicular to the direction of the field, it experiences a force with a direction that is :

a) Parallel to the conductor and perpendicular to the field
b) Perpendicular to the conductor and parallel to the field
c) Perpendicular to both the conductor and the field
d) None of the above

5) The diagram below shows a segment of a wire in a magnetic field **B**. If the wire carries a conventional current I in the direction shown, find the direction of the force on the wire.



a) Left b) Right c) Into page d) Out of page

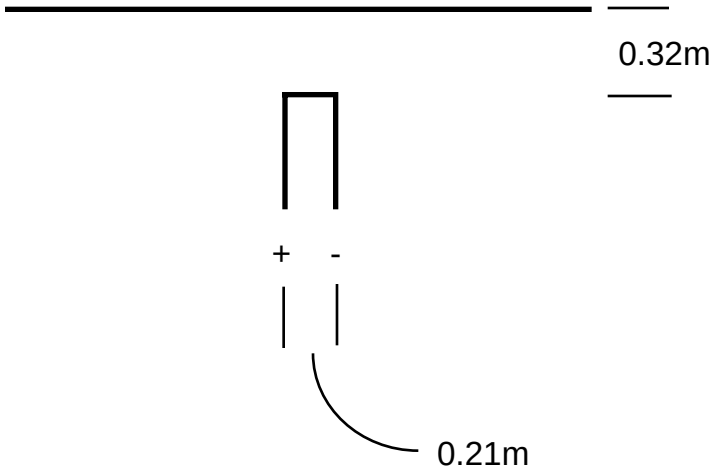
6) What is the strength of the magnetic field (in Teslas) at the center of a solenoid 25 cm in length if the solenoid has 3.0×10^2 turns of wire and carries a current of 8.0 A ?

7) A current I through a solenoid produces a magnetic field of strength B near its center. If the number of turns on the solenoid is doubled, how much current is required to produce the same magnetic field ?

a) 4 I b) 2 I c) I d) I/2

8) Find the magnetic field strength 3.7 cm away from a long wire carrying a current of 930 mA. (Hint : Use $B = 2 \times 10^{-7} \times (I/d)$ where I is the current and d is the distance from the wire)

9) The diagram below shows two wires. The upper long wire carries a current of 6.2 A. The lower wire (0.21m long) carries a current of 2.5 A. Find the magnitude of the magnetic force on the short wire. (Hint : the magnitude of the magnetic field due to a long current carrying wire is : $2 \times 10^{-7} \times (I/d)$ where I is the current in Amps and d is the distance from the wire in meters)



10) A negatively charged particle (moving to the right) enters a magnetic field (directed out of the page). In which direction will the magnetic force be exerted ?

a) Into page b) Out of page c) Up d) Down

11) When a proton enters a uniform magnetic field at right angles to the field it follows a circular path with a radius R. What is the radius of the path of an Alpha particle which enters the field with the same velocity.

a) 2R b) R/2 c) R/4 d) 4R

12) A proton with a velocity of 3.9×10^{6} m/s enters a magnetic field at right angles to the field. If the magnetic force is 7.5×10^{-15} N, what is the strength of the magnetic field ?

a) 4.7×10^{-25} T b) 1.9×10^{-21} T c) 1.2×10^{-2} T d) 2.9×10^{6} T

13) What is the speed (in m/s) of a proton that travels in a circular path of radius 4.5 cm perpendicular to a 2.0 T magnetic field ?

a) 2.9×10^{3} b) 4.3×10^{6} c) 8.6×10^{6} d) 1.6×10^{8}

14) An electron enters a uniform magnetic field that is at right angles to its motion. The electrons move in a circular path of radius R. If the magnetic field strength is doubled, what is the new radius of the path of the electron.

a) R/4 b) R/2 c) 2R d) 4R

15) Which of the following is true about two parallel wires carrying equal currents in the same direction ?

a) They repel b) They attract c) There is no effect
d) They move perpendicular to their common plane.

16) Express the Tesla in terms of the S.I. base units. (S.I. base units are; m, kg, s, and A(amperes)).

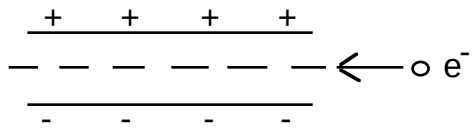
17) When a charged particle enters a uniform magnetic field that is directed perpendicular to the velocity, which of the following changes ?

a) Speed only b) Velocity only c) Speed and velocity
d) Velocity and energy only

18) If a particle of charge q is moving in a circular path of radius R in a uniform magnetic field B, the magnitude of the momentum is :

a) Bqv b) BqR c) (Bqv^2/R) d) BqvR

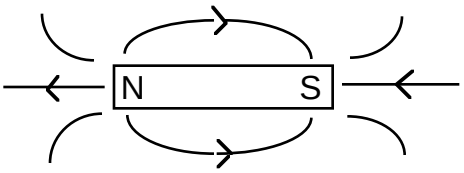
19) An electron travels between charged parallel plates as shown below. The speed is 1.9×10^7 m/s and the force is 8.0×10^{-16} N [up].



Find the magnitude and direction of a uniform magnetic field within the plates that will allow the electron to pass straight through the plates without being deflected.

Magnitude of **B** = _____ , Direction of **B** = _____ .

Answers :



1) See text, lines should not cross, direction is from N to S. 2) a, 3) b, 4) c, 5) d, 6) 0.012 T, 7) d, 8) 5.0×10^{-6} T, 9) 2.0×10^{-6} N, 10) c, 11) a, 12) c, 13) c, 14) b, 15) b, 16) $kg \cdot A^{-1} \cdot s^{-2}$, 17) b, 18) b, 19) 2.6×10^{-4} T, out of the page.