Name: _____ Phys 12

Worksheet 6.5 Magnetic Force

1. A proton traveling vertically at a speed of 2.10×10^5 m/s through a horizontal magnetic field experiences a magnetic force of 9.50×10^{-14} N what is the magnitude of the magnetic field? (2.83 T)

2. A copper wire (l = 0.222m) carries conventional current of 0.960A a north through a magnetic field ($B=7.50 \times 10^{-4}$T) that has directed vertically upward what is the magnitude and direction of the magnetic force acting on the wire? (1.60×10^{-4} N East)

3.Calculate the magnitude and the direction of the magnetic force on an electron traveling north at a speed of 3.52×10^5 m/s through a vertically upward magnetic field of 2.80×10^{-1}T. (1.58×10^{-14}N West)

4. Calculate the magnitude and the direction of the magnetic force on an alpha particle traveling south at a speed of 7.40×10^4 m/s through vertically upward magnetic field of 5.50T. (1.30×10^{-13} N West)

5. Calculate the magnitude and the direction of the magnetic field that produces a magnetic force of 1.70×10^{-14}N East on a proton that is traveling 1.90×10^4 m/s North through the magnetic field. (5.59 T up)

6. An electron experiences an upward force of 7.1×10^{-14}N when it is traveling 2.7×10^5m/s south through a magnetic field what is the magnitude and direction of the magnetic field? (1.6 T West)

7. Calculate the magnitude and the direction of the magnetic force on an alpha particle traveling upward at a speed of 2.11×10^5 m/s through a magnetic field that is directed down. (0)

8. A wire in the armature of an electric motor is 2.50×10^{-1}m long and is perpendicular to a magnetic field of 5.00×10^{-1}T Calculate the magnetic force on the wire when it carries a current of 3.60 A. (4.50×10^{-1})

9. An electron is accelerated from rest by a potential difference of 1.70×10^3V and then enters a magnetic field of 2.50×10^{-1}T moving perpendicular to it what is the magnitude of the magnetic force acting on the electron? (9.77×10^{-13} N)

10. An electron is accelerated by a potential difference and then travels perpendicular through a magnetic field of 7.20×10^{-1}T where it experiences a magnetic force of 4.1×10^{-13}N. Assuming this electron starts from rest through what potential differences is the electron accelerated? (3.6×10^1 V)

11. Calculate the downward acceleration of an electron that is traveling horizontally at a speed of 6.20×10^5 m/s perpendicular to a horizontal magnetic field of 2.30×10^{-1} T. (2.50×10^{16}m/s^2)

12. An alpha particle travel through a magnetic field of 4.22×10^{-1} T perpendicular to the field. If the radius of the arc of the deflected particles is 1.50×10^{-3} m what is the speed of the particles? (3.05×10^4 m/s)

13. A proton travels through a magnetic field at a speed of 5.40×10^5 m/s perpendicular to the field. If the radius of the arc of the deflected proton is 7.20×10^{-3} m what is the magnetic field strength? (7.83×10^{-1} T)

14. Calculate the charge to mass ratio of a particle that is traveling 3.60×10^5 m/s and is deflected in an arc with a radius of 7.40×10^{-2} m as it travels through a perpendicular magnetic field of 6.10×10^{-1} T. (7.98×10^6 C/kg)

15. Alpha particles travel undeflected through magnetic and electric fields that are perpendicular to each other. The speed of the alpha particles is 7.80x105 m/s and the strength of the magnetic field is 2.20×10^{-1} T Assuming that the alpha particles are traveling perpendicular to these fields what is the strength of the electric field? (1.72×10^{5} N/C)

16. Positive charged particles travel undeflected through magnetic and electric fields that are perpendicular to each other. The magnetic field strength is 6.50×10^{-1} T and the strength of the electric field is 2.10×10^{5} N/C assuming the charged particles are traveling perpendicular to these fields what is the speed of the charged particles?

(3.23×10^{5} m/s)

17. Alpha particles travel through a magnetic field of 3.60×10^{-1} T and are deflected in an arc with a radius of 8.20×10^{-2}m. Assuming the alpha particles are traveling perpendicular to the field what is the energy of each alpha particle.

(6.71×10^{-15} J)

18. In a CRT electrons are accelerated from rest by a potential difference of 2.50×10^{3} V. What is the maximum speed of the electrons? (2.96×10^{7} m/s)

19. In a CRT electron reaches a maximum speed of 4.75×10^{7} m/s if this electron is accelerated from rest what is the potential difference across the tube? (6.42×10^{3}V)

20. In a CRT electrons are accelerated from rest by a potential difference of 1.40×10^{3}V These electrons enter a magnetic field with a strength of 2.20×10^{-2} T Assuming the electrons are traveling perpendicular to the field what id the radius of the arc of the deflected electrons? (5.74×10^{-3}m)

21. Electrons are accelerated form rest in a CRT. These electrons now pass through a magnetic field of 1.40×10^{-2} T and through an electric field of 4.20×10^{5} N/C. The fields are perpendicular to each other the electron are no deflected assuming the electrons are traveling perpendicular to these fields what is the potential difference across the CRT?

(2.56×10^{3} V)

22. A negatively charged particle with a mass of 8.4×10^{-27} kg is traveling at a velocity of 5.6×10^{5} m/s perpendicularly through a magnetic field of 2.8×10^{-1} T If the radius of the path of the particle is 3.5 cm how many excess electrons does this particle carry? (3)

23. Alpha particles travel at a speed of 3.00×10^{6} m/s through a magnetic field. If the magnetic field strength is 4.2×10^{-2} T what is the radius of the path followed by the alpha particles when the magnetic field is parallel to the direction the alpha particles travel? (no deflection)

24. A proton moves through a 0.75 T magnetic field in a circle with a radius of 0.30m what is the momentum of this proton? (3.6×10^{-20} kg*m/s)

25. Electrons are accelerated from rest through a potential difference these electrons are than deflected along an arc of radius 0.77m when they travel through a 2.2×10^{-4} T magnetic field. What is the accelerated voltage? (2.5×10^{3}V)

26. An ion with a charge to mass ratio of 1.10×10^{4} C/kg travels perpendicular to magnetic field (B=9.10×10^{-1} T) in a circular path (r=0.240 m) How long does it take the ion to complete one revolution? (6.28×10^{-4} s)