Ch29 (Homework)
Current Score : – / 25 **Due :** Monday, August 27 2018 02:26 PM CDT

---

1. –/4 pointsSerPSE9 29.P.002.WI.

Determine the initial direction of the deflection of charged particles as they enter the magnetic fields shown in the figure below.

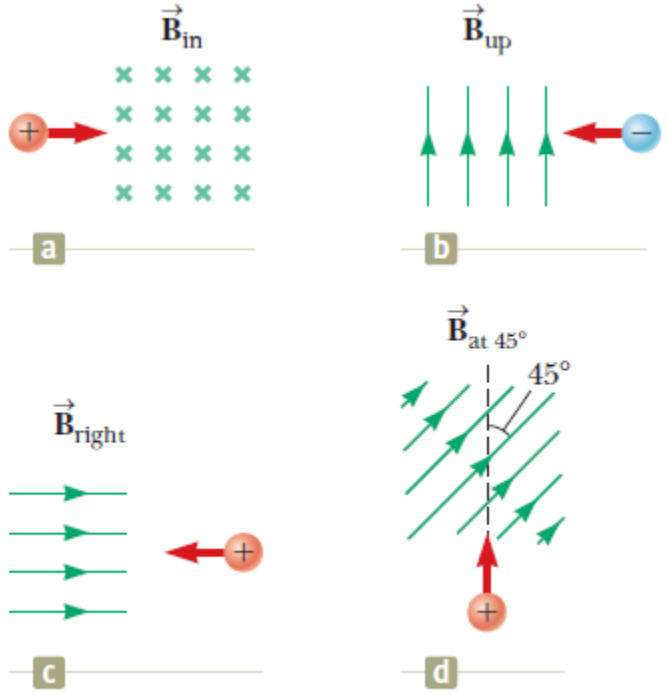


Figure (a) ---Select---
Figure (b) ---Select---
Figure (c) ---Select---
Figure (d) ---Select---

Need Help? Read It Watch It

---

2. –/1 pointsSerPSE9 29.P.008.WI.

A proton moves with a velocity of $\vec{v} = (4\hat{i} - 6\hat{j} + \hat{k})$ m/s in a region in which the magnetic field is $\vec{B} = (\hat{i} + 2\hat{j} - \hat{k})$ T. What is the magnitude of the magnetic force this particle experiences?

[ ] N

Need Help? Read It Watch It

3. –/2 pointsSerPSE9 29.P.009.

A proton travels with a speed of 4.90×10^6 m/s at an angle of 57° with the direction of a magnetic field of magnitude 0.240 T in the positive *x*-direction.

(a) What is the magnitude of the magnetic force on the proton?

[ ] N

(b) What is the proton's acceleration?

[ ] m/s^2

Need Help? Read It

4. –/2 pointsSerPSE9 29.P.013.

An electron moves in a circular path perpendicular to a uniform magnetic field with a magnitude of 2.17 mT. If the speed of the electron is 1.35×10^7 m/s, determine the following.

(a) the radius of the circular path

[ ] cm

(b) the time interval required to complete one revolution

[ ] s

Need Help? Read It

5. –/2 pointsSerPSE9 29.P.015.

A proton (charge $+e$, mass m_p), a deuteron (charge $+e$, mass $2m_p$), and an alpha particle (charge $+2e$, mass $4m_p$) are accelerated from rest through a common potential difference ΔV. Each of the particles enters a uniform magnetic field $\vec{\mathbf{B}}$, with its velocity in a direction perpendicular to $\vec{\mathbf{B}}$. The proton moves in a circular path of radius r_p.

(a) In terms of r_p, determine the radius r_d of the circular orbit for the deuteron.

r_d =

(b) In terms of r_p, determine the radius r_α for the alpha particle.

r_α =

Need Help? Read It

6. –/2 pointsSerPSE9 29.P.024.MI.

A cyclotron designed to accelerate protons has a magnetic field of magnitude 0.330 T over a region of radius 1.60 m.

(a) What is the cyclotron frequency?

rad/s

(b) What is the maximum speed acquired by the protons?

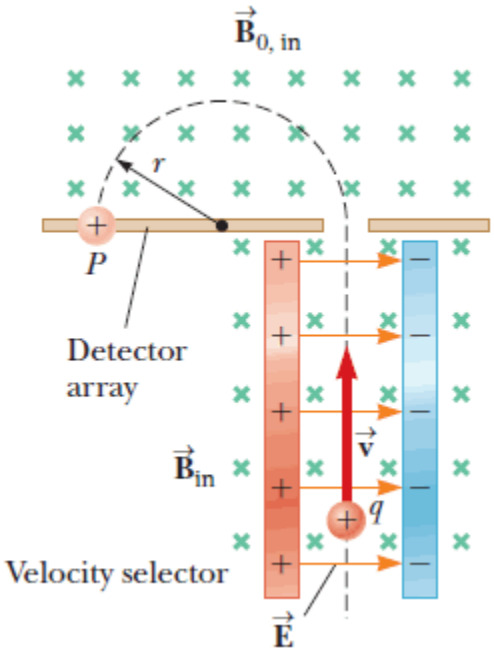
m/s

Need Help? Read It Master It

7. –/1 pointsSerPSE9 29.P.025.WI.

Consider the mass spectrometer shown schematically in the figure below. The magnitude of the electric field between the plates of the velocity selector is 2.90×10^3 V/m, and the magnetic field in both the velocity selector and the deflection chamber has a magnitude of 0.0450 T. Calculate the radius of the path for a singly charged ion having a mass $m = 1.80 \times 10^{-26}$ kg.

[ ] m



Need Help? Read It Watch It

8. –/2 pointsSerPSE9 29.P.039.MI.

A wire having a mass per unit length of 0.520 g/cm carries a 1.60-A current horizontally to the south.

(a) What is the direction of the minimum magnetic field needed to lift this wire vertically upward?

- northward
- eastward
- southward
- westward

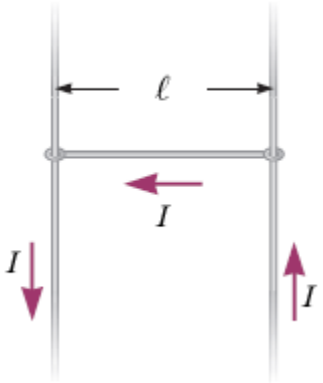
(b) What is the magnitude of the minimum magnetic field needed to lift this wire vertically upward?

_____ T

Need Help? Read It Master It

9. –/5 pointsSerPSE9 29.P.040.

Consider the system pictured in the figure below. A 14.4-cm horizontal wire of mass 15.8 g is placed between two thin, vertical conductors, and a uniform magnetic field acts perpendicular to the page. The wire is free to move vertically without friction on the two vertical conductors. When a 4.75-A current is directed as shown in the figure, the horizontal wire moves upward at constant velocity in the presence of gravity.



(a) What forces act on the horizontal wire? (Select all that apply.)

- ☐ electric force
- ☐ magnetic force
- ☐ gravitational force

(b) Under what condition is the wire able to move upward at constant velocity?

This answer has not been graded yet.

(c) Find the magnitude and direction of the minimum magnetic field required to move the wire at constant speed.

magnitude ____ T

direction ---Select---

(d) What happens if the magnetic field exceeds this minimum value?

This answer has not been graded yet.

Need Help? Read It

---

10. –/2 pointsSerPSE9 29.P.048.WI.

A current of 12.0 mA is maintained in a single circular loop of 3.20 m circumference. A magnetic field of 0.670 T is directed parallel to the plane of the loop.

(a) Calculate the magnetic moment of the loop.

[ ] $mA \cdot m^2$

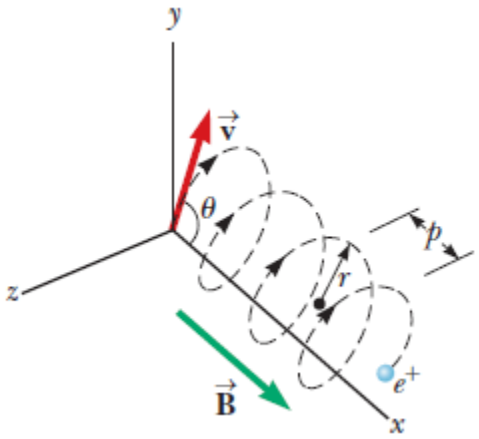
(b) What is the magnitude of the torque exerted by the magnetic field on the loop?

[ ] $mN \cdot m$

Need Help? Read It Watch It

11. –/2 pointsSerPSE9 29.P.073.

A uniform magnetic field of magnitude 0.139 T is directed along the positive x axis. A positron moving at a speed of 4.75×10^6 m/s enters the field along a direction that makes an angle of $\theta = 85.0°$ with the x axis (see figure below). The motion of the particle is expected to be a helix.



(a) Calculate the pitch p of the trajectory as defined in figure.

[ ] m

(b) Calculate the radius r of the trajectory as defined in figure.

[ ] m

Need Help? Read It