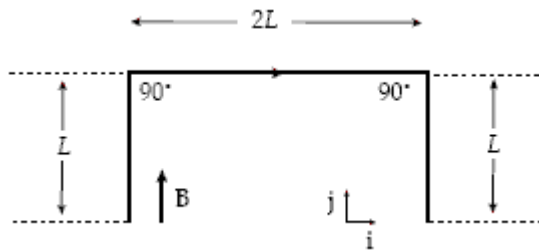


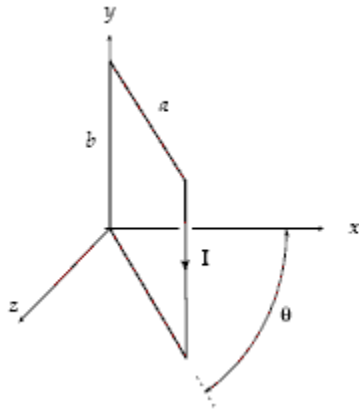
Physics 210 Multiple Choice Week 8

- _____ 1. A particle (mass = 2.0 mg, charge = $-6.0 \mu\text{C}$) moves in the positive direction along the x axis with a velocity of 3.0 km/s. It enters a magnetic field of $(2.0\mathbf{i} + 3.0\mathbf{j} + 4.0\mathbf{k})$ mT. What is the acceleration of the particle?
- $(36\mathbf{j} - 27\mathbf{k}) \text{ m/s}^2$
 - $(-36\mathbf{j} + 27\mathbf{k}) \text{ m/s}^2$
 - $(-24\mathbf{j} + 18\mathbf{k}) \text{ m/s}^2$
 - $(24\mathbf{j} - 18\mathbf{k}) \text{ m/s}^2$
 - $(24\mathbf{j} - 27\mathbf{k}) \text{ m/s}^2$
- _____ 2. A segment of wire carries a current of 25 A along the x axis from $x = -2.0$ m to $x = 0$ and then along the y axis from $y = 0$ to $y = 3.0$ m. In this region of space, the magnetic field is equal to 40 mT in the positive z direction. What is the magnitude of the force on this segment of wire?
- 2.0 N
 - 5.0 N
 - 1.0 N
 - 3.6 N
 - 3.0 N
- _____ 3. A straight wire is bent into the shape shown. Determine the net magnetic force on the wire when the current I travels in the direction shown in the magnetic field \mathbf{B} .

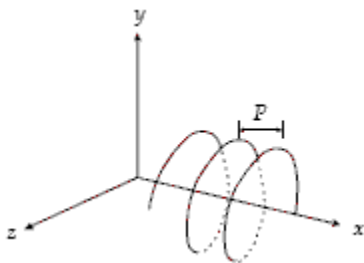


- $2IBL$ in the $-z$ direction
- $2IBL$ in the $+z$ direction
- $4IBL$ in the $+z$ direction
- $4IBL$ in the $-z$ direction
- zero

4. The figure shows the orientation of a rectangular loop consisting of 80 closely wrapped turns each carrying a current I . The magnetic field in the region is $(40 \mathbf{i})$ mT. The loop can turn about the y axis. If $\theta = 30^\circ$, $a = 0.40$ m, $b = 0.30$ m, and $I = 8.0$ A, what is the magnitude of the torque exerted on the loop?



- a. $2.5 \text{ N} \cdot \text{m}$
 b. $1.5 \text{ N} \cdot \text{m}$
 c. $3.1 \text{ N} \cdot \text{m}$
 d. $2.7 \text{ N} \cdot \text{m}$
 e. $0.34 \text{ N} \cdot \text{m}$
5. What current must be maintained in a square loop (50 cm on a side) to create a torque of $1.0 \text{ N} \cdot \text{m}$ about an axis through its center and parallel to one of its sides when a magnetic field of magnitude 70 mT is directed at 40° to the plane of the loop?
- a. 66 A
 b. 89 A
 c. 61 A
 d. 75 A
 e. 37 A
6. A uniform magnetic field of 0.50 T is directed along the positive x axis. A proton moving with a speed of 60 km/s enters this field. The helical path followed by the proton shown has a pitch of 5.0 mm. Determine the angle between the magnetic field and the velocity of the proton.



- a. 39°
 b. 51°
 c. 44°
 d. 34°
 e. 71°

- _____ 7. A particle ($m = 3.0 \mu\text{g}$, $q = 5.0 \mu\text{C}$) moves in a uniform magnetic field given by $(60\mathbf{j})$ mT. At $t = 0$ the velocity of the particle is equal to $(30\mathbf{j} - 40\mathbf{k})$ m/s. The subsequent path of the particle is
- circular with a 50-cm radius.
 - helical with a 6.3-cm pitch.
 - circular with a period of 31 ms.
 - helical with a 40-cm radius.
 - none of the above
- _____ 8. A proton moves around a circular path (radius = 2.0 mm) in a uniform 0.25-T magnetic field. What total distance does this proton travel during a 1.0-s time interval? ($m = 1.67 \times 10^{-27}$ kg, $q = 1.6 \times 10^{-19}$ C)
- 82 km
 - 59 km
 - 71 km
 - 48 km
 - 7.5 km
- _____ 9. An electron follows a circular path (radius = 15 cm) in a uniform magnetic field (magnitude = 3.0 G). What is the period of this motion?
- $0.12 \mu\text{s}$
 - 1.2 ms
 - $0.18 \mu\text{s}$
 - 1.8 ms
 - $1.8 \mu\text{s}$
- _____ 10. A proton is accelerated from rest through a potential difference of 2.5 kV and then moves perpendicularly through a uniform 0.60-T magnetic field. What is the radius of the resulting path?
- 15 mm
 - 12 mm
 - 18 mm
 - 24 mm
 - 8.5 mm
- _____ 11. What value of B should be used in a velocity selector to separate out 2.0-keV protons if E is fixed at 80 kV/m?
- 0.18 T
 - 0.11 T
 - 0.15 T
 - 0.13 T
 - 0.23 T

**Physics 210 Multiple Choice Week 8
Answer Section**

MULTIPLE CHOICE

- | | |
|------------|--------|
| 1. ANS: A | PTS: 1 |
| 2. ANS: D | PTS: 1 |
| 3. ANS: B | PTS: 1 |
| 4. ANS: D | PTS: 1 |
| 5. ANS: D | PTS: 1 |
| 6. ANS: B | PTS: 1 |
| 7. ANS: D | PTS: 1 |
| 8. ANS: D | PTS: 1 |
| 9. ANS: A | PTS: 1 |
| 10. ANS: B | PTS: 1 |
| 11. ANS: D | PTS: 1 |