

Answer the questions in the spaces provided. If you run out of room for an answer, continue on the back of the page.

Name: _____

Course code and period: _____

1 Multiple Choice

1. A charged particle with mass m passes into a magnetic field parallel to the field. What is the magnetic force the particle experiences?
A. 0 N B. $+\infty$ C. $-\infty$ D. m N E. 1 N
2. A space fighter is flying perpendicularly through an enemy defence magnetic field of 5.00×10^2 T at a speed of 1.00×10^3 km/h, and is struck by a charged particle lance, charging the fighter with 175C. What is the magnitude of the net force experienced by the fighter?
A. 0 N B. 2.43×10^4 N C. 8.75×10^7 N D. 2.43×10^2 N E. 1 N
3. What current is needed for a conductor of length 0.025m, perpendicular to (and fully in) a magnetic field with a strength of 0.10 T, to have a force of 1 N?
A. 0 A B. 400 A C. 4 A D. 40 A E. 1 N
4. A solenoid of 16 turns that is 15cm long creates a magnetic field with a strength of 2.4×10^{-2} T. What is the current flowing through this solenoid?
A. 179 A B. 1790 A C. 17900 A D. 1.79 A E. None of the above
5. For a straight conductor of length L and current I and at a distance r , which of the following would cause a doubling in magnetic field strength?
A. Halving r to $\frac{1}{2}r$ B. Doubling I to $2I$ C. Halving L to $\frac{1}{2}L$ D. A and B
E. None of the above

2 Full Solution

1. (6 points) A particle with mass m and charge e is launched out of a device with a velocity of v m/s into deep space. After a while, the particle enters a magnetic field with a strength of B [into page] at an angle of 45° above the horizontal. Please see Figure 1 for a diagram.
 - (a) (1 point) Using the variables given above, what is the \vec{F}_m experienced by the particle?

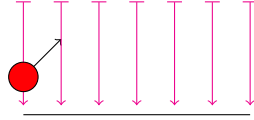


Figure 1: Particle and magnetic field

- (b) (2 points) Describe the path the particle follows after a lengthy period of time causes the particle to settle into a determinable path.
- (c) (1 point) After a period of time, the particle settles into a path discussed in the previous part. Determine the radius of this orbit.
- (d) (2 points) If the mass was halved to $\frac{m}{2}$ and the magnetic field was reversed to be [out of page], describe the new path the particle follows.