

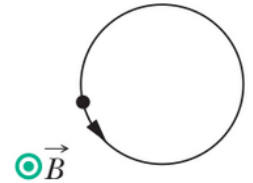
06 – Magnetic Fields (Ch. 28)

$$e = 1.60 \cdot 10^{-19} \text{ C}; m_p = 1.673 \cdot 10^{-27} \text{ Kg}; m_e = 9.109 \cdot 10^{-31} \text{ Kg}$$

1) A proton traveling at 23.0° with respect to the direction of a magnetic field of strength 2.60 mT experiences a magnetic force of $6.50 \cdot 10^{-17} \text{ N}$. Calculate (a) the proton's speed and (b) its kinetic energy in electron-volts.

2) A particle of mass 10 g and charge $80 \mu\text{C}$ moves through a uniform magnetic field, in a region where the free-fall acceleration is $-9.8\hat{j} \text{ m/s}^2$. The velocity of the particle is a constant $20\hat{i} \text{ km/s}$, which is perpendicular to the magnetic field. What, then, is the magnetic field?

18) In the figure, a particle moves along a circle in a region of uniform magnetic field of magnitude $B = 4.00 \text{ mT}$. The particle is either a proton or an electron (you must decide which). It experiences a magnetic force of magnitude $3.20 \cdot 10^{-15} \text{ N}$. What are (a) the particle's speed, (b) the radius of the circle, and (c) the period of the motion?



39) A horizontal power line carries a current of 5000 A from south to north. Earth's magnetic field ($60.0 \mu\text{T}$) is directed toward the north and inclined downward at 70.0° to the horizontal. Find the (a) magnitude and (b) direction of the magnetic force on 100 m of the line due to Earth's field.