

3. (a) Eq. 29-3 leads to

$$v = \frac{F_B}{eB \sin \phi} = \frac{6.50 \times 10^{-17} \text{ N}}{(1.60 \times 10^{-19} \text{ C})(2.60 \times 10^{-3} \text{ T}) \sin 23.0^\circ} = 4.00 \times 10^5 \text{ m/s} .$$

- (b) The kinetic energy of the proton is

$$K = \frac{1}{2}mv^2 = \frac{1}{2}(1.67 \times 10^{-27} \text{ kg})(4.00 \times 10^5 \text{ m/s})^2 = 1.34 \times 10^{-16} \text{ J} .$$

This is  $(1.34 \times 10^{-16} \text{ J})/(1.60 \times 10^{-19} \text{ J/eV}) = 835 \text{ eV}$ .