

59. Using Eq. 29-2 and Eq. 3-30, we obtain

$$\vec{F} = q(v_x B_y - v_y B_x) \hat{k} = q(v_x(3B_x) - v_y B_x) \hat{k}$$

where we use the fact that  $B_y = 3B_x$ . Since the force (at the instant considered) is  $F_z \hat{k}$  where  $F_z = 6.4 \times 10^{-19} \text{ N}$ , then we are led to the condition

$$q(3v_x - v_y) B_x = F_z \implies B_x = \frac{F_z}{q(3v_x - v_y)} .$$

Substituting  $v_x = 2.0 \text{ m/s}$ ,  $v_y = 4.0 \text{ m/s}$  and  $q = -1.6 \times 10^{-19} \text{ C}$ , we obtain  $B_x = -2.0 \text{ T}$ .