

9. Straight line motion will result from zero net force acting on the system; we ignore gravity. Thus, $\vec{F} = q(\vec{E} + \vec{v} \times \vec{B}) = 0$. Note that $\vec{v} \perp \vec{B}$ so $|\vec{v} \times \vec{B}| = vB$. Thus, obtaining the speed from the formula for kinetic energy, we obtain

$$\begin{aligned}
 B &= \frac{E}{v} = \frac{E}{\sqrt{2m_e K}} \\
 &= \frac{100 \text{ V} / (20 \times 10^{-3} \text{ m})}{\sqrt{2(9.11 \times 10^{-31} \text{ kg})(1.0 \times 10^3 \text{ V})(1.60 \times 10^{-19} \text{ C})}} \\
 &= 2.7 \times 10^{-4} \text{ T} .
 \end{aligned}$$