

65. By the right-hand rule, we see that $\vec{v} \times \vec{B}$ points along $-\hat{k}$. From Eq. 29-2 ($\vec{F} = q\vec{v} \times \vec{B}$), we find that for the force to point along $+\hat{k}$, we must have $q < 0$. Now, examining the magnitudes (in SI units) in Eq. 29-3, we find

$$\begin{aligned} |\vec{F}| &= |q| v |\vec{B}| \sin \phi \\ 0.48 &= |q|(4000)(0.0050) \sin 35^\circ \end{aligned}$$

which yields $|q| = 0.040$ C. In summary, then, $q = -40$ mC.