

64. The force associated with the magnetic field must point in the \hat{j} direction in order to cancel the force of gravity in the $-\hat{j}$ direction. By the right-hand rule, \vec{B} points in the $-\hat{k}$ direction (since $\hat{i} \times (-\hat{k}) = \hat{j}$). Note that the charge is positive; also note that we need to assume $B_y = 0$. The magnitude $|B_z|$ is given by Eq. 29-3 (with $\phi = 90^\circ$). Therefore, with $m = 10 \times 10^{-3}$ kg, $v = 2.0 \times 10^4$ m/s and $q = 80 \times 10^{-6}$ C, we find

$$\vec{B} = B_z \hat{k} = - \left(\frac{mg}{qv} \right) \hat{k} = -0.061 \hat{k}$$

in SI units (Tesla).