

6. (a) Hooke's law readily yields  $k = (15 \text{ kg})(9.8 \text{ m/s}^2)/(0.12 \text{ m}) = 1225 \text{ N/m}$ . Rounding to three significant figures, the spring constant is therefore  $1.23 \text{ kN/m}$ .
- (b) We are told  $f = 2.00 \text{ Hz} = 2.00 \text{ cycles/sec}$ . Since a cycle is equivalent to  $2\pi$  radians, we have  $\omega = 2\pi(2.00) = 4\pi \text{ rad/s}$  (understood to be valid to three significant figures). Using Eq. 16-12, we find

$$\omega = \sqrt{\frac{k}{m}} \implies m = \frac{1225 \text{ N/m}}{(4\pi \text{ rad/s})^2} = 7.76 \text{ kg} .$$

Consequently, the weight of the package is  $mg = 76 \text{ N}$ .