

61. (a) We want to solve $e^{-bt/2m} = 1/3$ for t . We take the natural logarithm of both sides to obtain $-bt/2m = \ln(1/3)$. Therefore, $t = -(2m/b) \ln(1/3) = (2m/b) \ln 3$. Thus,

$$t = \frac{2(1.50 \text{ kg})}{0.230 \text{ kg/s}} \ln 3 = 14.3 \text{ s} .$$

- (b) The angular frequency is

$$\omega' = \sqrt{\frac{k}{m} - \frac{b^2}{4m^2}} = \sqrt{\frac{8.00 \text{ N/m}}{1.50 \text{ kg}} - \frac{(0.230 \text{ kg/s})^2}{4(1.50 \text{ kg})^2}} = 2.31 \text{ rad/s} .$$

The period is $T = 2\pi/\omega' = (2\pi)/(2.31 \text{ rad/s}) = 2.72 \text{ s}$ and the number of oscillations is $t/T = (14.3 \text{ s})/(2.72 \text{ s}) = 5.27$.