8. (a) The acceleration amplitude is related to the maximum force by Newton's second law: $F_{\max} = ma_m$. The textbook notes (in the discussion immediately after Eq. 16-7) that the acceleration amplitude is $a_m = \omega^2 x_m$, where ω is the angular frequency ($\omega = 2\pi f$ since there are 2π radians in one cycle). The frequency is the reciprocal of the period: $f = 1/T = 1/0.20 = 5.0$ Hz, so the angular frequency is $\omega = 10\pi$ (understood to be valid to two significant figures). Therefore,

$$F_{\max} = m\omega^2 x_m = (0.12\,\text{kg})(10\pi\,\text{rad/s})^2(0.085\,\text{m}) = 10\ \text{N}\ .$$

(b) Using Eq. 16-12, we obtain

$$\omega = \sqrt{\frac{k}{m}} \implies k = (0.12\,\text{kg})(10\pi\,\text{rad/s})^2 = 1.2 \times 10^2\ \text{N/m}\ .$$