33. (a) Eq. 16-12 (divided by 2π) yields

$$f = \frac{1}{2\pi}\sqrt{\frac{k}{m}} = \frac{1}{2\pi}\sqrt{\frac{1000\,\text{N/m}}{5.00\,\text{kg}}} = 2.25\ \text{Hz}\ .$$

(b) With $x_\text{o} = 0.500$ m, we have $U_\text{o} = \frac{1}{2}kx_\text{o}^2 = 125$ J.

(c) With $v_\text{o} = 10.0$ m/s, the initial kinetic energy is $K_\text{o} = \frac{1}{2}mv_\text{o}^2 = 250$ J.

(d) Since the total energy $E = K_\text{o} + U_\text{o} = 375$ J is conserved, then consideration of the energy at the turning point leads to

$$E = \frac{1}{2}kx_m^2 \quad \Longrightarrow \quad x_m = \sqrt{\frac{2E}{k}} = 0.866\ \text{m}\ .$$