

11. (a) Since the problem gives the frequency  $f = 3.00$  Hz, we have  $\omega = 2\pi f = 6\pi$  rad/s (understood to be valid to three significant figures). Each spring is considered to support one fourth of the mass  $m_{\text{car}}$  so that Eq. 16-12 leads to

$$\omega = \sqrt{\frac{k}{\frac{1}{4}m_{\text{car}}}} \implies k = \left(\frac{1}{4}(1450 \text{ kg})\right) (6\pi \text{ rad/s})^2 = 1.29 \times 10^5 \text{ N/m} .$$

- (b) If the new mass being supported by the four springs is  $m_{\text{total}} = 1450 + 5(73) = 1815$  kg, then Eq. 16-12 leads to

$$\omega_{\text{new}} = \sqrt{\frac{k}{\frac{1}{4}m_{\text{total}}}} \implies f_{\text{new}} = \frac{1}{2\pi} \sqrt{\frac{1.29 \times 10^5}{1815/4}} = 2.68 \text{ Hz} .$$