

1) Soln:

$$T = 2\pi \sqrt{\frac{m}{K}}$$

$$T^2 = 4\pi^2 \left(\frac{m}{K}\right)$$

$$m = \frac{T^2}{4\pi^2} K$$

$$T = \frac{1}{f} \text{ sub in}$$

$$m = \left[ \frac{1}{(90.0 \text{ Hz})^2 (3.00 \times 10^{-2})} \right]^2 (2.50 \times 10^2 \frac{\text{N}}{\text{m}})$$

$$m = 0.869 \text{ Kg}$$

Given:

$$f_B = 90.0 \text{ Hz}$$

$$K = 2.50 \times 10^2 \text{ N/m}$$

$$f_m = 3.00 \times 10^{-2} * f_B$$

$$m = ?$$

2) Given:

$$m = 35 \times 10^3 \text{ Kg}$$

$$f = .71 \text{ Hz}$$

$$K = 1.0 \times 10^6 \text{ N/m}$$

$$M_{\text{trailer}} = ?$$

Soln:

$$M_{\text{total}} = M_w + M_{\text{trailer}}$$

$$T = 2\pi \sqrt{\frac{m_T}{K}}$$

$$T^2 = 4\pi^2 \left(\frac{m_T}{K}\right)$$

$$m_T = \frac{T^2}{4\pi^2} K$$

$$T = \frac{1}{f} \text{ sub in}$$

$$m_T = \left(\frac{1}{.71}\right)^2 (1.0 \times 10^6 \text{ N/m})$$

$$m_T = 5.0 \times 10^4 \text{ m}$$

$$M_{\text{trailer}} = 5.00 \times 10^4 \text{ m} - 35 \times 10^3 \text{ Kg}$$

$$M_{\text{Trailer}} = 15,000 \text{ Kg}$$

3) Given:

$$m = 20.0 \text{ kg}$$
$$f = \frac{42.7}{60.0} = .712 \text{ Hz}$$
$$K = ?$$

Soln.

$$T = 2\pi \sqrt{\frac{m}{K}}$$

$$T^2 = 4\pi^2 \frac{m}{K}$$

$$K = \frac{4\pi^2 m}{T^2}$$

$T = 1/f$  sub in

$$K = 4\pi^2 m f^2$$

$$= 4\pi^2 (20.0 \text{ kg}) (.712 \text{ Hz})^2$$

$$K = 400. \text{ N/m}$$