

PROB. 13.1

$$m = 1300 \text{ kg}, \quad v = \left(108 \frac{\text{km}}{\text{hr}}\right) \left(\frac{\text{hr}}{3600 \text{ s}}\right) \left(\frac{1000 \text{ m}}{\text{km}}\right) = 30 \frac{\text{m}}{\text{s}}$$

FIND KINETIC ENERGY: $T = \frac{1}{2} m v^2$

$$T = \frac{1}{2} (1300 \text{ kg}) \left(30 \frac{\text{m}}{\text{s}}\right)^2 \left(\frac{\text{N} \cdot \text{s}^2}{\text{kg} \cdot \text{m}}\right) \left(\frac{\text{J}}{\text{N} \cdot \text{m}}\right) = 5.85 \times 10^5 \text{ J}$$

IF $m = 9000 \text{ kg}$ AND $T = 5.85 \times 10^5 \text{ J}$, FIND v

$$v = \sqrt{\frac{2T}{m}} = \sqrt{\frac{2(5.85 \times 10^5 \text{ N} \cdot \text{m})}{(9000 \text{ kg})} \cdot \left(\frac{\text{kg} \cdot \text{m}}{\text{N} \cdot \text{s}^2}\right)}$$

$$v = \left(11.40 \frac{\text{m}}{\text{s}}\right) \left(\frac{3600 \text{ s}}{\text{hr}}\right) \left(\frac{\text{km}}{1000 \text{ m}}\right) = 41.04 \frac{\text{km}}{\text{hr}}$$