HW-12.#4

$2\pi r = 200$

$r = \frac{200}{2\pi} = 31.83 \text{ meters}$

$35 \frac{\text{miles}}{\text{hr}} \times \frac{5\text{km}}{3.1\text{miles}} \times \frac{1000\text{m}}{\text{km}} \times \frac{\text{hr}}{3600\text{s}} = 15.68 \frac{\text{m}}{\text{s}}$

$V = \omega r \qquad 15.68 = \omega\ 31.83$

$\omega = .4926 \text{ rad/s}$ (d)

$\theta = \theta_0 + \omega_0 t + \frac{1}{2}\alpha t^2 \qquad \omega = \omega_0 + \alpha t$

$\frac{3}{4}(2\pi) = " 0 + " 0 + \frac{1}{2}\alpha t^2 \qquad .4926 = 0 + \alpha t$

$\omega_f^2 - \omega_0^2 = 2\alpha(\theta_f - \theta_0)$

$(.4926)^2 - 0^2 = 2\alpha\left(\frac{3}{4} \cdot 2\pi\right)$

$(.4926)^2 = \alpha\, 3\pi$

$\alpha = .0257 \frac{\text{rad}}{\text{s}^2}$ (b)

$\omega = \omega_0 + \alpha t$

$.4926 = 0 + (.0257)t \qquad t = 19.17\text{s}$ (a)

$\omega_f^2 - \omega_0^2 = 2\alpha(\theta_f - \theta_0)$

$\omega_f^2 - 0 = 2(.0257)(\pi)$ ← halfway

$\omega_f = .4018$

$V = r\omega = (31.83)(.4018) = 12.79 \frac{\text{m}}{\text{s}}$