HW #2 p 311 Problems 7, 8, 15

p 311 - Problems

(5)

7) $\alpha = 30\ rad/s^2$
$\omega_0 = 0\ m/s$
$\omega_f = ?$
$t = 10\ s$

(1)

$\omega_f = \omega_0 + \alpha t$
$= (30\ rad/s^2)(10\ s)$
$= 300\ rad/s$

8) $r = .30\ m$
$\omega_0 = 4.0\ rad/s$
$\omega_f = 2.0\ rad/s$
$t = 5.0\ s$

a) $\alpha = ?$ $\quad \alpha = \frac{\Delta\omega}{t} = \frac{2.0\ rad/s - 4.0\ rad/s}{5.0\ s}$

$= -.40\ rad/s^2$

b) $\theta = ?$ $\quad \theta = \omega_0 t + \frac{1}{2}\alpha t^2$

(1)

$= (4.0\ rad/s)(5.0\ s) + \frac{1}{2}(-.40\ rad/s^2)(5.0\ s)^2$

$= 15\ rad$

c) $S = \theta r = 15\ rad\,(.30\ m) = 4.5\ m$

15) $\omega_0 = 0$ rad/s $\omega_f = \omega$ rad/s $\theta = 1$ rev $= 2\pi$

Write an expression for...

a) $\alpha = ?$ $\alpha = \frac{\omega^2 - \omega_0^2}{2\theta} = \frac{\omega^2}{2(2\pi)} = \frac{\omega^2}{4\pi}$

b) t first interval $\Delta\theta = \frac{1}{2}\alpha t^2$

$$t_1 = \sqrt{\frac{2(\Delta\theta_1)}{\alpha}} = \sqrt{\frac{2(2\pi)}{\omega^2/4\pi}} = \frac{4\pi}{\omega}$$

(3)

c) t second interval

$$t_{tot} = \sqrt{\frac{2(\Delta\theta)}{\alpha}} = \sqrt{\frac{2(4\pi)}{\omega^2/4\pi}} = \frac{4\sqrt{2}\,\pi}{\omega}$$

$$t_2 = t_{tot} - t_1 =$$

$$= \frac{4\sqrt{2}\pi}{\omega} - \frac{4\pi}{\omega} = \frac{4\pi}{\omega}(\sqrt{2} - 1)$$

d) $s = \theta r$ two revolutions distance ℓ

$$s = (4\pi)\ell$$