Ch 7 $\theta = \frac{s}{r}$ (angle) — arc length, radius

π rad = 180° = .5 rev

linear $v = \frac{d}{t}$

circular $\omega = \frac{\theta}{t}$ (omega) — circular speed/vel

base $\frac{rad}{s}$ $\frac{degrees}{s}$, $\frac{rev}{s}$

$a = \frac{v}{t}$ $\alpha = \frac{\omega}{t}$ (alpha) — circular acceleration $\frac{rad}{s^2}$

$\frac{circ}{diam} = \pi$ (3.14)

180° degrees = π rad = .5 rev

1. $427° \left| \frac{\pi \text{ rad}}{180°} \right. = 7.45 \text{ rad}$

2. $2.5 \text{ rev} \left| \frac{\pi \text{ rad}}{.5 \text{ rev}} \right. = 15.7 \text{ rad}$

3. $\frac{4\pi}{3} \text{ rad} \left| \frac{180°}{\pi \text{ rad}} \right. = 240°$

4. $43.4 \text{ rad} \left| \frac{.5 \text{ rev}}{\pi \text{ rad}} \right. = 6.9 \text{ rev}$

5. $325 \frac{\text{rev}}{\text{min}} \left| \frac{\pi \text{ rad}}{.5 \text{ rev}} \right| \frac{1 \text{ min}}{60 \text{ s}} = 34 \frac{\text{rad}}{\text{s}}$

$\theta = \frac{s}{r}$

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$\alpha = 3.5 \frac{\text{rad}}{\text{s}^2}$

a) $\omega_i = 2 \frac{\text{rad}}{\text{s}}$ $t_i = 0$

$\theta = ?$ $t = 0 \rightarrow t = 2\text{s}$, $\Delta t = 2\text{s}$

$\rightarrow \theta = \omega_i t + \frac{1}{2}\alpha t^2$

$= 2(2) + \frac{1}{2}(3.5)(2)^2$

$\theta = 11 \text{ rad}$

b) $\omega_f = ?$ @ 2s

$\omega_f = \omega_i + \alpha t$

$= 2 + 3.5(2)$

$= 9 \frac{\text{rad}}{\text{s}}$

θ = s - arc length
r - radius
ω - ang. vel/speed rad/s
α - ang. acc rad/s²

$\rightarrow v_f = v_i + at$ — $\omega_f = \omega_i + \alpha t$

$\rightarrow d = v_i t + \frac{1}{2}at^2$ — $\theta = \omega_i t + \frac{1}{2}\alpha t^2$

$\rightarrow v_f^2 = v_i^2 + 2ad$ — $\omega_f^2 = \omega_i^2 + 2\alpha\theta$

1,2 $\theta = \frac{s}{r}$

Circular angular rotational

$d = 2r$

circ = $2r\pi = d\pi$

area = πr^2

s = 60,000 mi — d = 2ft, r = 1ft

1 circ

use $\theta = \frac{s}{r}$

ans.

1) $3.168 \times 10^8 \text{ rad}$ / $5.04 \times 10^7 \text{ rev}$

2) a) 2.13 m
b) 123 m
c) 773 m

convert $\theta \rightarrow$ rad then use $s = \theta \cdot r$