

$$45^\circ = 45^\circ \cdot \frac{\pi}{180^\circ} = \frac{\pi}{4} \text{ rad.}$$

$$-450^\circ = -450^\circ \cdot \frac{\pi}{180^\circ} = -\frac{5\pi}{2} \text{ rad}$$

$$1 \text{ rad} = 1 \text{ rad} \cdot \frac{180^\circ}{\pi} = \frac{180}{\pi} \approx 57.3^\circ$$

$$\frac{4\pi}{3} = \frac{4}{3} 180^\circ = 240^\circ$$

Ex Given:  $r = 3$   $s = 6$

Find  $\theta$ ?

$$s = r\theta$$

$$6 = 3\theta$$

$$\theta = 2 \text{ rad}$$

Ex  $r = 18.2$   $\theta = \frac{3\pi}{8}$

$$s = \frac{18.2}{10} \cdot \frac{3\pi}{84}$$

$$= \frac{273\pi}{40}$$

$$s = r\theta$$

Ex  $\theta = 60^\circ$   $r = 5$   $s$ ?

$$s = 5 \cdot 60^\circ \cdot \frac{\pi}{180^\circ}$$

$$= \frac{5\pi}{3} \text{ unit}$$

Ex Given:  $r = .8725 \left( \frac{8725}{1000} \right)$

$\theta = 39.72^\circ$

$$S = \frac{8725}{1000} \cdot \frac{3972^\circ}{100} \cdot \frac{\pi}{180^\circ}$$

$$= \frac{1,732,785 \pi \times 10^{-6}}{9}$$

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$$A = \frac{1}{2} r^2 \theta \quad (\text{unit}^2)$$

Ex  $\theta = 1.4$ ,  $r = 2.1 \text{ m}$

$$A = \frac{1}{2} \left( \frac{21}{10} \right)^2 \frac{14}{10}$$

$$= \frac{3087}{1000}$$

$$= 3.087 \text{ m}^2$$

Ex  $\theta = 90^\circ$ ,  $r = 30 \text{ ft}$

$$A = \frac{1}{2} (30)^2 \frac{\pi}{2}$$

$$= 225 \pi \text{ ft}^2$$

$$\frac{10}{2} \quad \frac{30}{2}$$

Linear velocity  $\rightarrow v = \frac{\text{distance}}{\text{time}} = \frac{d}{t} = \frac{s}{t}$

Speed =  $|v|$

Ex  $s = 5 \text{ cm}$   $t = 2 \text{ sec}$

$v = \frac{5}{2} \text{ cm/sec}$

Angular velocity  $\omega = \frac{\theta}{t}$   $\theta \frac{1}{t}$

Ex  $\theta = \frac{3\pi}{4}$   $t = 3 \text{ sec}$

$\omega = \frac{3\pi}{4} \cdot \frac{1}{3}$   
 $= \frac{\pi}{4} \text{ rad/sec}$

$\frac{3\pi}{4} \cdot \frac{1}{3}$

$v = \frac{s}{t}$   $\omega = \frac{\theta}{t}$

$t = \frac{s}{v} = \frac{\theta}{\omega} = \frac{r\theta}{v}$

$\frac{1}{\omega} = \frac{r}{v} \Rightarrow \boxed{v = r\omega}$

Ex

$r = 13$   $\omega = 3 \text{ rad/sec}$

$t = 1' = 60 \text{ sec}$

$s = vt$

$= r\omega t$

$= 13(3)(60)$

$= 2340 \text{ in}$

Ex

$$\omega = 45 \text{ rpm } \left( \frac{\text{rev}}{\text{min}} \right)$$

$$= 45 \frac{2\pi}{\text{min}}$$
$$= 90\pi \text{ rad/min}$$

$$r = 3$$

$$v = r\omega$$

$$= 3(90\pi)$$

$$= 270\pi \text{ in/min}$$

$$r_1 = 2.5 \quad r_2 = 4.8$$

$$\theta_1 = 225^\circ \quad \theta_2 = ?$$

$$s_1 = s_2$$

$$r_1 \theta_1 = r_2 \theta_2$$

$$\frac{25}{10} 225^\circ = \frac{48}{10} \theta_2$$

$$\frac{5}{2} 225^\circ \frac{5}{24} = \theta_2$$

$$\theta_2 = \left( \frac{25(225)}{48} \right)^\circ$$