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

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

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

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

Ex **Given:** $r = 3$ $P = 6$

Find θ?

$S = r\theta$

$6 = 3\theta$

$\theta = 2$ rad $\checkmark$

Ex $r = 18.2 \quad \theta = \frac{3\pi}{8}$
$\quad\quad 91$

$S = \frac{182}{10} \frac{3\pi}{84}$

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

$S = r\theta$

Ex $\theta = 60^\circ \quad r = 5 \quad P?$

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

$\quad = \frac{5\pi}{3}$ unit $\checkmark$

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

$$t = 39.72°$$

$$S = \dfrac{8725}{1000} \cdot \dfrac{3972}{100} \cdot \dfrac{\pi}{180°}$$

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

$$A = \dfrac{1}{2} r^2 t \quad (unit^2)$$

Ex. $\theta = 1.4$ $\quad r = 2.1\,m$

$$A = \dfrac{1}{2} \left(\dfrac{21}{10} \right)^2 \dfrac{\cancel{14}^{\,7}}{10}$$

$$= \dfrac{3087}{1000}$$

$$= 3.087\,m^2$$

Ex $\theta = 90°$ $\quad r = 30\,ft$

$$A = \dfrac{1}{2} (30)^2 \dfrac{\pi}{2} \qquad\qquad \dfrac{10}{2} \quad \dfrac{30}{2}$$

$$= 225\,\pi\,ft^2$$

Linear velocity → $v = \dfrac{distance}{time} = \dfrac{d}{t} = \dfrac{s}{t}$

$$Speed = |v|$$

Ex $s = 5\ cm$ $t = 2\ sec$

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

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

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

$$\omega = \frac{3\pi}{4}\ \frac{1}{3}$$

$$\dfrac{\frac{3\pi}{4}}{3}$$

$$= \frac{\pi}{4}\ rad/sec$$

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

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

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

Ex $r = 13$ $\omega = 3\ rad/sec$
     $t = 1' = 60\ sec$

$$s = vt$$
$$= r\omega t$$
$$= 13\ (3)\ (60)$$
$$= 2340\ in$$

$\underline{\text{Ex}}$ $\omega = 45 \, rpm \left(\dfrac{rev}{min}\right)$

$= 45 \, \dfrac{2\pi}{\cancel{rev}}$

$= 90\pi \, rad/min$

$\underline{r = 3}$

$v = r\omega$

$= 3(90\pi)$

$= 270\pi \, in/min$

$r_1 = 2.5 \qquad r_2 = 4.8$

$\theta_1 = 225° \qquad \theta_2 ?$

$S_1 = S_2$

$r_1 \theta_1 = r_2 \theta_2$

$\dfrac{25}{10} \, 225° = \overset{24}{\dfrac{48}{\underset{5}{10}}} \, \theta_2$

$\dfrac{5}{2} \, 225° \, \dfrac{5}{24} = \theta_2$

$\theta_2 = \left(\dfrac{25\,(225)}{48}\right)°$