

Converting degrees, radians, revolutions

Degrees → radians rad = degrees $\cdot \frac{\pi}{180}$

Revolutions → radians radians = $2\pi \cdot$ revolutions

Radians → degrees deg = radians $\cdot \frac{180}{\pi}$

Circular motion

Angular Displacement, Velocity, and Acceleration

Angular displacement & velocity

$$\theta = \omega t$$

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

Angular velocity & acceleration

$$\omega = \alpha t$$

$$\alpha = \frac{\omega}{t}$$

θ - Angular displacement; ω - angular velocity; α - angular acceleration; t - time

Linear & angular displacement

Linear displacement: $d = r\theta$

Linear velocity: $v = r\omega$

d - linear displacement; θ - angular displacement, radians; v - linear velocity; ω - angular velocity, rad/sec
 r - Radius of circle

Centripetal force & acceleration

Centripetal force

$$F_c = \frac{mv^2}{r}$$

$$F_c = m\omega^2 r$$

Centripetal acceleration

$$a_c = \frac{v^2}{r}$$

$$a_c = \omega^2 r$$

F_c - centripetal force, N; ω - angular velocity, rad/s; m - mass, kg; v - linear velocity, m/s; r - radius, m
 a_c - centripetal acceleration, m/s²

Critical velocity

$$v_{\text{crit}} = \sqrt{rg}$$

r - radius, m; g - 9.8 m/s²