Circular Motion

Converting degrees, radians, revolutions

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

Revolutions → radians $\text{rad} = 2\pi \cdot \text{rev}$

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

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

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

r - *radius, m;* g - *9.8 m/s²*