CHAPTER 8: Rotational Kinematics

Angular displacement : $\Delta\theta = \theta - \theta_0$

$\Delta\theta > 0$ *if counterclockwise*

$\Delta\theta < 0$ *if clockwise*

$2\pi \ rad = 1 \ revolution = 360^0$

Average angular velocity : $\omega_{avg} = \dfrac{\Delta\theta}{\Delta t}$

Average angular acceleration : $\alpha_{avg} = \dfrac{\Delta\omega}{\Delta t} = \dfrac{\omega - \omega_0}{t - t_0}$

Equations of rotational motion :

$$\omega = \omega_0 + \alpha(t - t_0)$$

$$\theta = \theta_0 + \frac{1}{2}(\omega + \omega_0)(t - t_0)$$

$$\theta = \theta_0 + \omega_0(t - t_0) + \frac{1}{2}\alpha(t - t_0)^2$$

$$\omega^2 = \omega_0^{\ 2} + 2\alpha(\theta - \theta_0)$$

Tangential quantities : θ, ω, α *using radians*

Arc length : $s = r\theta$

Tangential speed : $v_T = r\omega$

Tangential acceleration : $a_T = r\alpha$

Centripetal acceleration : $a_c = \frac{v_T^2}{r} = r\omega^2$

$a^2 = a_T^2 + a_c^2$

Rolling Motion :

$d = s$

$v = v_T = r\omega$

$a = a_T = r\alpha$