Kinematic Equations for Rotational Motion

(*For constant angular acceleration ONLY*)

** To select the appropriate equation to solve a particular problem:

1) List what quantities are given - (*will be* 3)
2) List what is being asked for - (*will be* 1).
3) Find the equation in the table that contains all 4 involved quantities.

Equation	Involved Quantities	Unneeded Quantity
1) $\omega_f = \omega_i + \alpha t$	$\omega_i, \omega_f, \alpha, t$	$\Delta\theta$
2) $\omega_f^{\,2} = \omega_i^{\,2} + 2\alpha\Delta\theta$	$\Delta\theta, \omega_f, \omega_i, \alpha$	t
3) $\Delta\theta = \omega_i t + \frac{1}{2}\alpha t^2$	$\Delta\theta, \omega_i, \alpha, t$	ω_f
4) $\Delta\theta = \frac{1}{2}(\omega_f + \omega_i)t$	$\Delta\theta, \omega_f, \omega_i, t$	α
5) $\Delta\theta = \omega_f t - \frac{1}{2}\alpha t^2$	$\Delta\theta, \omega_f, \alpha, t$	ω_i

** $\Delta\theta = (\theta_f - \theta_i)$

**** These equations work for motion about ANY <u>axis of rotation</u> (*x, y, or z – or some combination*)**

**** If $\Delta\theta$ also represents the *total* angular displacement about *only* 1 axis, you can replace $\Delta\theta$ with θ and then think of ω_f and ω_i in terms of *angular speed* rather than *angular velocity***