

MOTION EQUATIONS FOR ROTATION

- Just like in linear motion, there are 4* equivalent MOTION equations for Rotation. Same equations, different letters.
- You often use these when given a lot of rotational quantities. Same process: List variables, pick equation, solve.

LINEAR EQUATIONS	ROTATIONAL EQUATIONS
$v_f = v_i + a t$	
$v_f^2 = v_i^2 + 2 a \Delta x$	
$\Delta x = v_i t + \frac{1}{2} a t^2$	
$\Delta x = \frac{1}{2} (v_i + v_f) t$ *	

EXAMPLE 1: A wheel initially at rest accelerates around its central axis, with a constant 4 rad/s^2 until it reaches 80 rad/s .
(a) By the time it reaches 80 rad/s , how many degrees will it have rotated through? (b) How long (in s) does this take?

EXAMPLE 2: A very heavy disk, 20 m in radius, takes 1 hour to make a complete revolution, accelerating from rest at a constant rate. What rotational velocity will the disk have 1 hour after it starts accelerating?

PRACTICE: MOTION EQUATIONS FOR ROTATION

PRACTICE: A tiny object spins with 5 rad/s around a circular path of radius 10 m . The object then accelerates at 3 rad/s^2 . Calculate its angular speed 8 s after starting to accelerate. → BONUS: Calculate its *linear* displacement in the 8 s .

PRACTICE: MOTION EQUATIONS FOR ROTATION

PRACTICE: The turntable of a DJ set is spinning at a constant rate just before it is turned off. If the turntable decelerates at 3 rad/s^2 and goes through an additional 30 rotations before stopping, how fast (in RPM) was the turntable initially spinning?

→ BONUS: How long (in seconds) does the turntable take to stop?