Linear Angular Variable Analog KEY

Quantity or Description	Linear	Rotational (Angular)	Bridge
position	x (or y, z)	θ (or ϕ)	
displacement	Δx (straight line) s (arc length)	$\Delta\theta$ sometimes delta not shown	$s = r\Delta\theta$
velocity	v where $v = dx/dt$ (linear) or $v_T = ds/dt$ (tangential)	ω where $\omega = d\theta/dt$	$v_T = r\omega$
acceleration	a where $a = dv/dt$ (straight) or $a_T = dv_T/dt$ (tangential)	α where $\alpha = d\omega/dt$	$a_T = r\alpha$
centripetal acceleration		$a_c = v^2/r$	
1st kinematic	$v = v_o + at$	$\omega = \omega_o + \alpha t$	
2nd kinematic	$x = x_o + v_o t + {}^1/_2 at^2$	$\theta = \theta_o + \omega_o t + {}^1/_2 \alpha t^2$	
3rd kinematic	$v^2 = v_o{}^2 + 2a\Delta x$	$\omega^2 = \omega_o{}^2 + 2\alpha\Delta\theta$	
Inertia	m	I	$I = \Sigma mr^2$ $dI = r^2 dm$
Kinetic Energy	$K_{trans} = {}^1/_2 mv^2$	$K_{rot} = {}^1/_2 I\omega^2$	
The quantity that causes acceleration	F	τ	$\tau = \mathbf{r} \times \mathbf{F}$
Newton's Second Law (acceleration format)	$\Sigma F = ma$	$\Sigma\tau = I\alpha$	
Work	$W = F \bullet r$	$W = \tau \bullet \theta$	
Power	$P = dW/dt = \mathbf{F} \bullet \mathbf{v}$	$P = dW/dt = \tau \bullet \omega$	
Momentum (single particle)	$\mathbf{p} = m\mathbf{v}$	$L = I\omega$	$L = \mathbf{r} \times \mathbf{P}$
Momentum (system)	$P = \Sigma p$	$L = \Sigma L$	
Newton's Second Law (momentum format)	$F = dP/dt$	$\tau = dL/dt$	