Name(s)	Symbol(s)	Units (SI)	Equation(s)
Density	ρ	$\frac{\text{kilograms}}{\text{meter}^3}$ or $\frac{kg}{m^3}$	$\rho = \frac{\text{mass}}{\text{volume}}$
Displacement	$\Delta\vec{x}$	meters, m	$\Delta\vec{x} = \vec{x}_f - \vec{x}_i$ & $\Delta\vec{x}$ = Area "under" Velocity vs. Time Curve
Speed	speed	$\frac{\text{meters}}{\text{seconds}}$ or $\frac{m}{s}$	$\text{speed} = \frac{\text{distance}}{\text{time duration}}$
Velocity	$\vec{v}$	$\frac{\text{meters}}{\text{seconds}}$ or $\frac{m}{s}$	$\vec{v}_{\text{average}} = \frac{\Delta\vec{x}}{\Delta t}$
Acceleration	$\vec{a}$	$\frac{\text{meters}}{\text{seconds}^2}$ or $\frac{m}{s^2}$	$\vec{a}_{\text{average}} = \frac{\Delta\vec{v}}{\Delta t}$
Acceleration due to Gravity or Gravitational Field	g	$\frac{m}{s^2}$ or $\frac{N}{m}$	$g_{\text{Earth}} = 9.81\frac{m}{s^2} \approx 10\frac{m}{s^2}$ & $\vec{g} = \frac{\vec{F}_g}{m}$
Force	$\vec{F}$	newtons, $N\left(\frac{kg \cdot m}{s^2}\right)$	$\sum\vec{F} = m\vec{a}$ or $\vec{a} = \frac{\sum\vec{F}}{m}$
Coefficient of Friction	μ	none	$\lvert\vec{F}_f\rvert \le \mu\lvert\vec{F}_N\rvert$ $\Rightarrow F_{kf} = \mu_k F_N$ & $F_{sf} \le \mu_s F_N$
Work	W	joules, J (N·m)	$\Delta E = W = F_\parallel d = Fd\cos\theta$ & W = Area "under" Force vs. Position Curve
Kinetic Energy	K or KE	joules, J (N·m)	$KE = \frac{1}{2}mv^2$
Gravitational Potential Energy	U_g or PE_g	joules, J (N·m)	$\Delta U_g = mg\Delta y$ or $PE_g = mgh$
Elastic Potential Energy	U_e or PE_e	joules, J (N·m)	$PE_e = \frac{1}{2}kx^2$
Mechanical Energy	ME or E	joules, J (N·m)	$ME_i = ME_f$
Spring Constant	k	$\frac{N}{m}$	$PE_e = \frac{1}{2}kx^2$ & $\lvert\vec{F}_s\rvert = k\lvert\vec{x}\rvert$
Power	P	watts, $W\left(\frac{J}{s}\right)$	$P = \frac{\Delta E}{\Delta t} = \frac{W}{\Delta t} = \frac{Fd\cos\theta}{\Delta t} = Fv\cos\theta$ & P = Area "under" Force vs. Velocity Curve

Name(s)	Symbol(s)	Units (SI)	Equation(s)
Momentum	$\vec{p}$	$\frac{kg \cdot m}{s}$ (or $N \cdot s$)	$\vec{p} = m\vec{v}$
Impulse	$\vec{J}$	$N \cdot s \left(\text{or } \frac{kg \cdot m}{s}\right)$	$\vec{J} = \vec{F}_{average}\Delta t = \Delta\vec{p}$ & $\vec{J}$ = Area "under" Force vs. Time Curve
Arc Length	s	meters, m	$s = r\Delta\theta$
Angular Displacement	$\Delta\vec{\theta}$	radians, degrees, or revolutions	$\Delta\vec{\theta} = \vec{\theta}_f - \vec{\theta}_i$ & $\Delta\vec{\theta}$ = Area "under" Angular Velocity vs. Time Curve
Angular Velocity	$\vec{\omega}$	$\frac{rad}{s}$ or $\frac{rev}{min}$	$\vec{\omega}_{average} = \frac{\Delta\vec{\theta}}{\Delta t}$
Angular Acceleration	$\vec{\alpha}$	$\frac{rad}{s^2}$	$\vec{\alpha}_{average} = \frac{\Delta\vec{\omega}}{\Delta t}$
Tangential Velocity	$\vec{v}_t$	$\frac{meters}{seconds}$ or $\frac{m}{s}$	$v_t = r\omega$
Tangential Acceleration	$\vec{a}_t$	$\frac{meters}{seconds^2}$ or $\frac{m}{s^2}$	$a_t = r\alpha$ *(always tangent)*
Centripetal Acceleration	$\vec{a}_c$	$\frac{meters}{seconds^2}$ or $\frac{m}{s^2}$	$a_c = \frac{{v_t}^2}{r} = r\omega^2$ *(always inward)*
Centripetal Force	$\sum\vec{F}_{in}$	newtons, $N \left(\frac{kg \cdot m}{s^2}\right)$	$\sum\vec{F}_{in} = m\vec{a}_c$
Rotational Inertia or Moment of Inertia	I	$kg \cdot m^2$	$I_{particle} = mr^2$ & $I_{system} = \sum m_i r_i^2$
Torque	$\vec{\tau}$	$N \cdot m$	$\tau = r_\perp F = rF\sin\theta$ & $\sum\vec{\tau} = I\vec{\alpha}$
Rotational Kinetic Energy	KE_{rot}	joules, J (N·m)	$KE_{rot} = \frac{1}{2}I\omega^2$
Angular Momentum	$\vec{L}$	$\frac{kg \cdot m^2}{s}$	$L_{rigid\ object} = I\omega$ & $L_{particle} = rmv\sin\theta$

Name(s)	Symbol(s)	Units (SI)	Equation(s)
Angular Impulse	$\vec{J}_{rot}$	$N \cdot m \cdot s$	$\vec{J}_{rot} = \vec{\tau}_{average}\Delta t = \Delta\vec{L}$ & $\vec{J}_{rot}$ = Area "under" Torque vs. Time Curve
Universal Gravitational Force	$\vec{F}_g$	newtons, $N\left(\frac{kg \cdot m}{s^2}\right)$	$F_g = \frac{Gm_1m_2}{r^2}$
Universal Gravitational Potential Energy	U_g	joules, J (N·m)	$U_g = -\frac{Gm_1m_2}{r}$
Amplitude	A	meters or degrees	$x(t) = A\cos(2\pi f t)$
Period	T	$\frac{\text{seconds}}{\text{cycle}}$	$T_{\text{mass-spring system}} = 2\pi\sqrt{\frac{m}{k}}$ & $T_{\text{pendulum}} = 2\pi\sqrt{\frac{L}{g}}$
Frequency	f	hertz, $Hz\left(\frac{\text{cycles}}{\text{second}}\right)$	$f = \frac{1}{T}$
Pressure	P	pascals, $Pa\left(\frac{N}{m^2}\right)$	$P = \frac{F_\perp}{A}$
Gauge Pressure	P_{gauge}	pascals, $Pa\left(\frac{N}{m^2}\right)$	$P_{\text{gauge}} = \rho g h$
Volumetric Flow Rate	Av or $\frac{V}{t}$	$\frac{m^3}{s}$	$Av = \frac{V}{t}$