$\vec{\mathbf{p}} = m\vec{\mathbf{v}}$
$\vec{\mathbf{J}} = \int \vec{\mathbf{F}} dt = \Delta\vec{\mathbf{p}}$
$\vec{\mathbf{F}} = d\vec{\mathbf{p}}/dt$
$\sum \vec{\mathbf{F}}_{ext} = d\vec{\mathbf{P}}/dt = M\vec{\mathbf{a}}_{CM}$
$\vec{\mathbf{p}}_{1i} + \vec{\mathbf{p}}_{2i} = \vec{\mathbf{p}}_{1f} + \vec{\mathbf{p}}_{2f}$
$\vec{\mathbf{r}}_{CM} = (\sum m_i\vec{\mathbf{r}}_i)/(\sum m_i)$

$\omega = d\theta/dt, \quad \alpha = d\omega/dt = d^2\theta/dt^2$
$\ell = r\theta,\ v = r\omega,\ a_{tan} = r\alpha,\ a_{rad} = \omega^2 r$
$\theta = \theta_0 + \omega_0 t + \frac{1}{2}\alpha t^2$
$\omega = \omega_0 + \alpha t$
$\omega^2 = \omega_0^2 + 2\alpha\Delta\theta$
$\Delta\theta = \frac{1}{2}(\omega + \omega_0)t$
$I = \sum m_i r_i^2$
$I_P = I_{cm} + Md^2$
$K = \frac{1}{2}I\omega^2$

Moments of inertia:

Slender rod, about center	$\frac{1}{12}ML^2$
Slender rod, about end	$\frac{1}{3}ML^2$
Rectangular plate, about center	$\frac{1}{12}M(a^2 + b^2)$
Rectangular plate, about edge	$\frac{1}{3}Ma^2$
Hollow cylinder	$\frac{1}{2}M(R_1^2 + R_2^2)$
Solid cylinder	$\frac{1}{2}MR^2$
Thin-walled hollow cylinder	MR^2
Solid sphere	$\frac{2}{5}MR^2$
Thin-walled hollow sphere	$\frac{2}{3}MR^2$

$\tau = F\ell,\ \vec{\tau} = \vec{\mathbf{r}} \times \vec{\mathbf{F}}$
$\tau = I\alpha$
$K = \frac{1}{2}Mv_{cm}^2 + \frac{1}{2}I_{cm}\omega^2$
$W = \int \tau\, d\theta, \quad P = \tau\omega$
$\vec{\mathbf{L}} = \vec{\mathbf{r}} \times \vec{\mathbf{p}} = \vec{\mathbf{r}} \times m\vec{\mathbf{v}}$
$\vec{\mathbf{L}} = I\vec{\omega}$
$\sum \vec{\tau} = d\vec{\mathbf{L}}/dt$

$\sum F_x = 0,\ \sum F_y = 0,\ \sum \vec{\tau} = 0$

$|\vec{\mathbf{A}} \times \vec{\mathbf{B}}| = AB\sin\phi = AB_\perp = A_\perp B$
$\vec{\mathbf{A}} \times \vec{\mathbf{B}} = (A_yB_z - A_zB_y)\hat{\mathbf{i}} + (A_zB_x - A_xB_z)\hat{\mathbf{j}} + (A_xB_y - A_yB_x)\hat{\mathbf{k}}$

$\vec{\mathbf{F}} = m\vec{\mathbf{a}}$
$\vec{\mathbf{F}}_{B\,on\,A} = -\vec{\mathbf{F}}_{A\,on\,B}$
$w = mg$
$f_s \le \mu_s n,\ f_k = \mu_k n$

$K = \frac{1}{2}mv^2$
$W = \vec{\mathbf{F}} \cdot \vec{\mathbf{s}} = Fs\cos\phi$
$W = \int_{x_1}^{x_2} F_x dx = \int_{P_1}^{P_2} \vec{\mathbf{F}} \cdot d\vec{\ell}$
$W_{tot} = K_2 - K_1 = \Delta K$
$P = dW/dt$

$W = -\Delta U$
$U = mgh,\ U = \frac{1}{2}kx^2$
$K_2 + U_2 = K_1 + U_1 + W_{other}$
$F_x(x) = -dU(x)/dx$
$\vec{\mathbf{F}} = -\left[\frac{\partial U}{\partial x}\hat{\mathbf{i}} + \frac{\partial U}{\partial y}\hat{\mathbf{j}} + \frac{\partial U}{\partial z}\hat{\mathbf{k}}\right]$

$v_x = dx/dt, \quad v_{av-x} = (x_2 - x_1)/(t_2 - t_1)$
$a_x = dv_x/dt, \quad a_{av-x} = (v_{2x} - v_{1x})/(t_2 - t_1)$
$x(t) = x_0 + \int_0^t v_x(t)\,dt$
$v_x(t) = v_{0x} + \int_0^t a_x(t)\,dt$
$\vec{\mathbf{v}} = d\vec{\mathbf{r}}/dt$
$\vec{\mathbf{a}} = d\vec{\mathbf{v}}/dt$

$x = x_0 + v_{0x}t + \frac{1}{2}a_x t^2$
$v_x(t) = v_{0x} + a_x t$
$v_x(t)^2 = v_{0x}^2 + 2a_x\Delta x$
$\Delta x = \frac{v_{0x} + v_x(t)}{2}t$
$\vec{\mathbf{r}} = \vec{\mathbf{r}}_0 + \vec{\mathbf{v}}_0 t + \frac{1}{2}\vec{\mathbf{a}}t^2$
$\vec{\mathbf{v}} = \vec{\mathbf{v}}_0 + \vec{\mathbf{a}}t$

$\vec{\mathbf{A}} = A_x\hat{\mathbf{i}} + A_y\hat{\mathbf{j}} + A_z\hat{\mathbf{k}}$
$A_x = A\cos\theta, \quad A_y = A\sin\theta$
$A = \sqrt{A_x^2 + A_y^2}, \quad \tan\theta = A_y/A_x$
$\vec{\mathbf{A}} \cdot \vec{\mathbf{B}} = AB\cos\theta = A_xB_x + A_yB_y + A_zB_z$

$a_{rad} = v^2/R = 4\pi^2 R/T^2$
$\vec{\mathbf{v}}_{P/A} = \vec{\mathbf{v}}_{P/B} + \vec{\mathbf{v}}_{B/A}$

$g = 9.80$ m/s^2, 1 hr = 3600 s, 1 km/hr = 0.278 m/s

If $at^2 + bt + c = 0$, then $t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.
If $x = at^n$, then $dx/dt = nat^{n-1}$.
If $x = at^n$, then $\int_{t_1}^{t_2} x(t)\,dt = \frac{a}{n+1}\left(t_2^{n+1} - t_1^{n+1}\right)$.