Constant Acceleration

$d = d_0 + v_0 t + \frac{1}{2}at^2$
$v_f = v_0 t + at$
$v_f^2 = v_0^2 + 2a(d - d_0)$

Projectile Motion

$v_x(t) = v_{x0} = v_0 \cos\theta_0$
$x(t) = x_0 + v_{x0} + v_o \cos(\theta_i)t$
$v_y = y_{y0} - gt = v_0 \sin\theta_i - gt$
$y(t) = y_0 + v_{y0}t - \frac{1}{2}gt^2$
$y(t) = y_0 + v_0 \sin(\theta_i)t - \frac{1}{2}gt^2$
$v_y^2 = v_{0y}^2 - 2g(\delta y)$
$y = y_0 + v_{0y} + \frac{1}{2}gt^2$
$v_f = v_{0y} - gt$
$v_f^2 = v_y^2 - 2(a)d$

Vectors with angles

$A_x = A\cos\theta$
$A_y = A\sin\theta$
$\tan\theta = \frac{A_y}{A_x}$
$\theta = \arctan\frac{A_y}{A_x}$

Angular Velocity

$s = r\theta$
$v = r\omega$
$\omega = \frac{d\theta}{dt} = \frac{2\pi}{T}$
$v = \frac{2\pi r}{T}$
$T = \frac{2\pi r]}{v}$

Kinematics of Constant Angular Acc.

$R =$ radius
$\alpha =$ acceleration $(\frac{rad}{s^2})$
$s = s_0 + v_0 t + \frac{1}{2}at^2$
$\theta = \theta_0 + \omega_0 t + \frac{1}{2}\alpha t^2 \equiv \delta\theta = \omega_0 t + \frac{1}{2}\alpha t^2$
$v_f^2 = v_0^2 + 2a(s - s_0)$
$\omega_f^2 = \omega_0^2 + 2\alpha(\delta\theta)$
$\omega_f = \omega_0 + \alpha t$
$v_f = R\omega$
$\delta s = R\delta\theta$
$a_c = \frac{v_f^2}{R}$ (centripetal)
$a_r = \omega^2 R$
$a_t = R\alpha$ (tangential)
$v_{ang} = \frac{R}{T}$
$a_{ang} = \frac{v_{ang}}{T}$
$a_{total} = \sqrt{a_t^2 + a_c^2}$

Friction

$a = \frac{f_{net}}{m}$
$\mu mg = ma$
$a = \mu g$
$\overrightarrow{F_{net}} = \sum \overrightarrow{F_x} - \overrightarrow{F_k}$
$\sum F_x = ma = T - f_k$
$\sum F_y = +n - mg = 0$
$\sum F_x = F_s - mg\sin\theta$
$F_k = \mu_k n$
$n = mg$
$\sum F = mg - F(\cos\theta - \mu_k \sin\theta)$
$a = \frac{F - \mu mg}{m}$

Newton's Laws

$F = ma$
$\sum F_{m_a + m_b} = (m_a + m_b)a$
$\sum F = T - mg = ma$
$\sum F = \frac{T - F_k}{m}$
$\sum F_x = T_1 \sin\theta_1 + T_2 \sin\theta_2$
$\sum F_y = T_1 \cos\theta_1 + T_2 \cos\theta_2$