Physics Equations

$V_{avg} = \frac{\Delta x}{\Delta t}$

$a_{avg} = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{\Delta t}$

$\Delta x = v_i(\Delta t) + \frac{1}{2}a(\Delta t)^2$

$\Delta x = \frac{1}{2}(v_i + v_f)\,\Delta t$

$v_f = v_i + a(\Delta t)$

$v_f^2 = v_i^2 + 2a\Delta x$

$v_{y,f} = a(\Delta t)$

$(v_{y,f})^2 = 2a\Delta y$

$\Delta y = \frac{1}{2}a(\Delta t)^2$

$v_x = v_{x,i} = v_{x,f}$

$v_{x,i} = v_i(\cos\Theta)$

$v_{y,i} = v_i(\sin\Theta)$

$\Delta x = v_i(\cos\Theta)(\Delta t)$

$v_{y,f} = v_i(\sin\Theta) + a(\Delta t)$

$(v_{y,f})^2 = v_i^2(\sin\Theta)^2 + 2a\Delta y$

$\Delta y = v_i(\sin\Theta)(\Delta t) + \frac{1}{2}a(\Delta t)^2$

$v_i = \sqrt{\frac{a\Delta x}{2(\sin\Theta)(\cos\Theta)}}$

$F = ma$

$F_n = mg$

$F_{friction} = \mu F_n$

$W_{net} = F_{net}d = KE_f - KE_i$

$KE = \frac{1}{2}mv^2$

$PE_g = mgh$

$PE_{elastic} = \frac{1}{2}kx^2$

$ME = KE + \Sigma PE$

$W_{net} = F_{net}\,d(\cos\Theta)$

$P = W/\Delta t = F(d/\Delta t) = Fv$

$p = mv$

$\Delta p = mv_f - mv_i$

$F\Delta t = \Delta p$

$m_1v_{1,i} + m_2v_{2,i} = m_1v_{1,f} + m_2v_{2,f}$

$m_1v_{1,i} + m_2v_{2,i} = (m_1 + m_2)v_f$

$KE_i + PE_{g,i} + PE_{elastic,i} = KE_f + PE_{g,f} + PE_{elastic,f}$

$$\Delta\theta = \frac{s}{r} \qquad \omega_{avg} = \frac{\Delta\theta}{\Delta t}$$

$$\alpha = \frac{\Delta\omega}{\Delta t} = \frac{\omega_f - \omega_i}{\Delta t} \qquad v_t = r\omega$$

$$a_t = r\alpha \qquad a_c = \frac{v_t^2}{r} = r\omega^2$$

$$F_c = ma_c = \frac{mv_t^2}{r} = mr\omega^2$$

$$F_g = G\frac{m_1 m_2}{r^2} \qquad v_{esc} = \sqrt{\frac{2mG}{r}} \qquad v_{orb} = \sqrt{\frac{mG}{r+h}}$$

$$\omega_f = \omega_i + \alpha\Delta t$$

$$\Delta\theta = \omega_i\Delta t + \frac{1}{2}\alpha(\Delta t)^2$$

$$\omega_f^2 = \omega_i^2 + 2\alpha(\Delta\theta)$$

$$\Delta\theta = \frac{1}{2}(\omega_i + \omega_f)\Delta t$$

$$G = 6.673 \times 10^{-11}\ N\cdot\frac{m^2}{kg^2}$$