Vectors:

$$\vec{A} = A_x\hat{i} + A_y\hat{j} + A_z\hat{k}$$

$$A = \left|\vec{A}\right| = \left(A_x^2 + A_y^2 + A_z^2\right)^{1/2} \qquad \hat{a} = \frac{\vec{a}}{|\vec{a}|}$$

$C_x = A_x + B_x$ $\qquad C_y = A_y + B_y$ $\qquad C_z = A_z + B_z$

$$\vec{A}\cdot\vec{B} = A_xB_x + A_yB_y + A_zB_z = AB\cos\theta$$

Kinematics:

$$\vec{r} = x\hat{i} + y\hat{j} \qquad \vec{v} = \frac{d\vec{r}}{dt} = v_x\hat{i} + v_y\hat{j} \qquad \vec{a} = \frac{d\vec{v}}{dt} = a_x\hat{i} + a_y\hat{j}$$

$$\Delta\vec{r} = \vec{r}_2 - \vec{r}_1 \qquad <\vec{v}> = \frac{\Delta\vec{r}}{\Delta t} \qquad <\vec{a}> = \frac{\Delta\vec{v}}{\Delta t}$$

Constant acceleration:

$$x = x_o + v_{ox}t + \frac{1}{2}a_xt^2$$

$$v_x = v_{ox} + a_xt$$

$$v_x^2 = v_{ox}^2 + 2a_x\left(x - x_o\right)$$

$$<v_x> = \frac{v_f + v_i}{2}$$

Earth's gravity:

$$g = 9.8\frac{m}{s^2}$$

$$v_x - v_{ox} = <a_x>\Delta t$$

$$x - x_o = <v_x>\Delta t$$

Uniform circular motion:

$$a_{rad} = \frac{v^2}{r}$$

Quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Newton's 2nd "Law"

$$\sum\vec{F} = m\vec{a}$$