Physics 7A Equation Sheet

$$\Delta x = x_f - x_i$$

$$v_x = \lim_{\Delta t \to 0} \frac{\Delta x}{\Delta t} = \frac{dx}{dt}$$

$$a_x = \lim_{\Delta t \to 0} \frac{\Delta v_x}{\Delta t} = \frac{dv_x}{dt}$$

$$v_{fx} = v_{ix} + a_x \Delta t$$

$$\Delta x = \frac{1}{2}(v_{ix} + v_{fx})\Delta t$$

$$\Delta x = v_{ix}\Delta t + \frac{1}{2}a_x \Delta t^2$$

$$v_{fx}^2 = v_{ix}^2 + 2a_x \Delta x$$

Quadratic formula: $ax^2 + bx + c = 0$

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

$$\vec{r}(t) = x(t)\hat{\imath} + y(t)\hat{\jmath}$$

$$\Delta\vec{r} = \vec{r}_2 - \vec{r}_1 = \Delta x\hat{\imath} + \Delta y\hat{\jmath}$$

$$\vec{v}_{Av} = \frac{\Delta\vec{r}}{\Delta t} = \frac{\Delta x}{\Delta t}\hat{\imath} + \frac{\Delta y}{\Delta t}\hat{\jmath}$$

$$\vec{v} = \lim_{\Delta t \to 0} \frac{\Delta\vec{r}}{\Delta t} = v_x\hat{\imath} + v_y\hat{\jmath}$$

$$\vec{a}_{Av} = \frac{\Delta\vec{v}}{\Delta t} = \frac{\Delta v_x}{\Delta t}\hat{\imath} + \frac{\Delta v_y}{\Delta t}\hat{\jmath}$$

$$\vec{a} = \lim_{\Delta t \to 0} \frac{\Delta\vec{v}}{\Delta t} = a_x\hat{\imath} + a_y\hat{\jmath}$$

Projectile Motion Equations

$$v_{ix} = v_i \cos\theta_i \qquad v_{iy} = v_i \sin\theta_i$$

$$\frac{v_y}{v_x} = \tan\theta$$

$$\Delta x = v_{ix}\Delta t$$

$$v_{fy} = v_{iy} - g\Delta t$$

$$\Delta y = \frac{1}{2}(v_{iy} + v_{fy})\Delta t$$

$$\Delta y = v_{iy}\Delta t - \frac{1}{2}g\Delta t^2$$

$$v_{fy}^2 = v_{iy}^2 - 2g\Delta y$$

Range formula:

$$\Delta x = \frac{v_i^2 \sin 2\theta}{g}$$

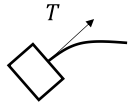
Newton's 2nd Law

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

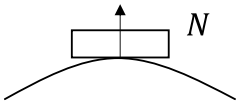
Newton's 3rd Law

$$\vec{F}_{A\ on\ B} = -\vec{F}_{B\ on\ A}$$

Tension:



Normal Force



Gravity

$$\vec{w} = m\vec{g}$$

Static Friction $f_S \leq \mu_S N$

Kinetic Friction $f_K = \mu_K N$

Uniform Circular Motion

$$a = \frac{v^2}{r}$$

$$v = \frac{2\pi r}{T} = 2\pi r f$$