General Physics - Physics 101 Prof. Bob Ekey
Test #1 – Friday 9/25/20

Slope intercept form of a line

$$y = mx + b$$

Definition of slope.

$$slope = m = \frac{\Delta y}{\Delta x} = \frac{(y_2 - y_1)}{(x_2 - x_1)}$$

General equation for a parabola

$$y = at^2 + bt + c$$

Quadratic Formula (y=0)

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

Displacement $\Delta\vec{r} = \vec{r}_f - \vec{r}_i \quad in \;\; 2D/3D \qquad \Delta\vec{x} = \vec{x}_f - \vec{x}_i \quad in \;\; 1D$

$$\text{average speed} = \frac{\text{distance traveled}}{\text{time interval spent traveling}} = \frac{d}{\Delta t} = \frac{d}{t_f - t_i}$$

$$\text{average velocity} = \vec{v}_{avg} = \frac{\text{displacement}}{\text{time interval}} = \frac{\Delta\vec{r}}{\Delta t} = \frac{\vec{r}_f - \vec{r}_i}{t_f - t_i} \;\; in \;\; 1D = \frac{\vec{x}_f - \vec{x}_i}{t_f - t_i}$$

$$\text{average acceleration} = \vec{a}_{avg} = \frac{\text{change in velocity}}{\text{time interval}} = \frac{\Delta\vec{v}}{\Delta t} = \textit{Slope of velocity vs. time graph}$$

Instantaneous Velocity

$$v = \lim_{\Delta t \to 0} \frac{\Delta s}{\Delta t} = \frac{ds}{dt} = \textit{Slope of tangent line on position vs. time graph}$$

General Kinematic Equations for constant acceleration:

$$s_f = s_i + v_{is}\Delta t + \tfrac{1}{2}a_s(\Delta t)^2 \qquad v_{fs} = v_{is} + a_s\Delta t \qquad v_{fs}^2 = v_{is}^2 + 2a_s(\Delta s)$$

Acceleration on an incline plane

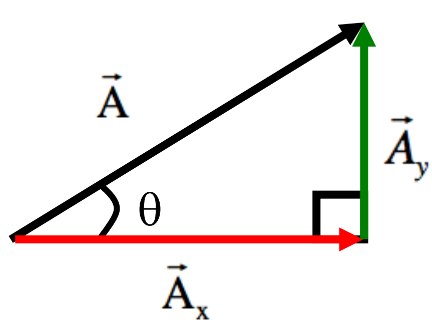
$$a_s = \pm g\sin\theta$$

Note “g” refers to the magnitude of gravity, g=9.8 m/s^2

Total flight time (start/stop same altitude)

$$t_{tot} = t_{rise} + t_{fall} = 2 \cdot t_{rise}$$

Vector Components



$$A_x = A\cos\theta$$
$$A_y = A\sin\theta$$
$$A^2 = A_x^2 + A_y^2$$
$$\theta = \tan^{-1}(A_y/A_x)$$

Works for quadrant I, angle above +x-axis