## Position, Velocity and Acceleration

Position, Velocity and Acceleration are

Vectors!

$$\vec{v}_{av} = \frac{\vec{r}_f - \vec{r}_0}{t_f - t_0}$$

$$\vec{a}_{av} = \frac{\vec{v}_f - \vec{v}_0}{t_f - t_0}$$

$$v_x = \frac{x_f - x_0}{t_f - t_0}$$

$$\vec{a}_{av} = \frac{\vec{v}_f - \vec{v}_0}{t_f - t_0} \qquad a_x = \frac{v_{xf} - v_{x0}}{t_f - t_0} \qquad a_y = \frac{v_{yf} - v_{y0}}{t_f - t_0} \qquad |\vec{a}| = \sqrt{a_x^2 + a_y^2}$$

## x direction y direction

$$\vec{v}_{av} = \frac{\vec{r}_f - \vec{r}_0}{t_f - t_0} \qquad v_x = \frac{x_f - x_0}{t_f - t_0} \qquad v_y = \frac{y_f - y_0}{t_f - t_0} \qquad |\vec{v}| = \sqrt{v_x^2 + v_y^2}$$

$$a_{y} = \frac{v_{yf} - v_{y0}}{t_{f} - t_{0}}$$

$$\left| \vec{v} \right| = \sqrt{v_x^2 + v_y^2}$$

$$\left|\vec{a}\right| = \sqrt{a_x^2 + a_y^2}$$

• x and y directions are INDEPENDENT!