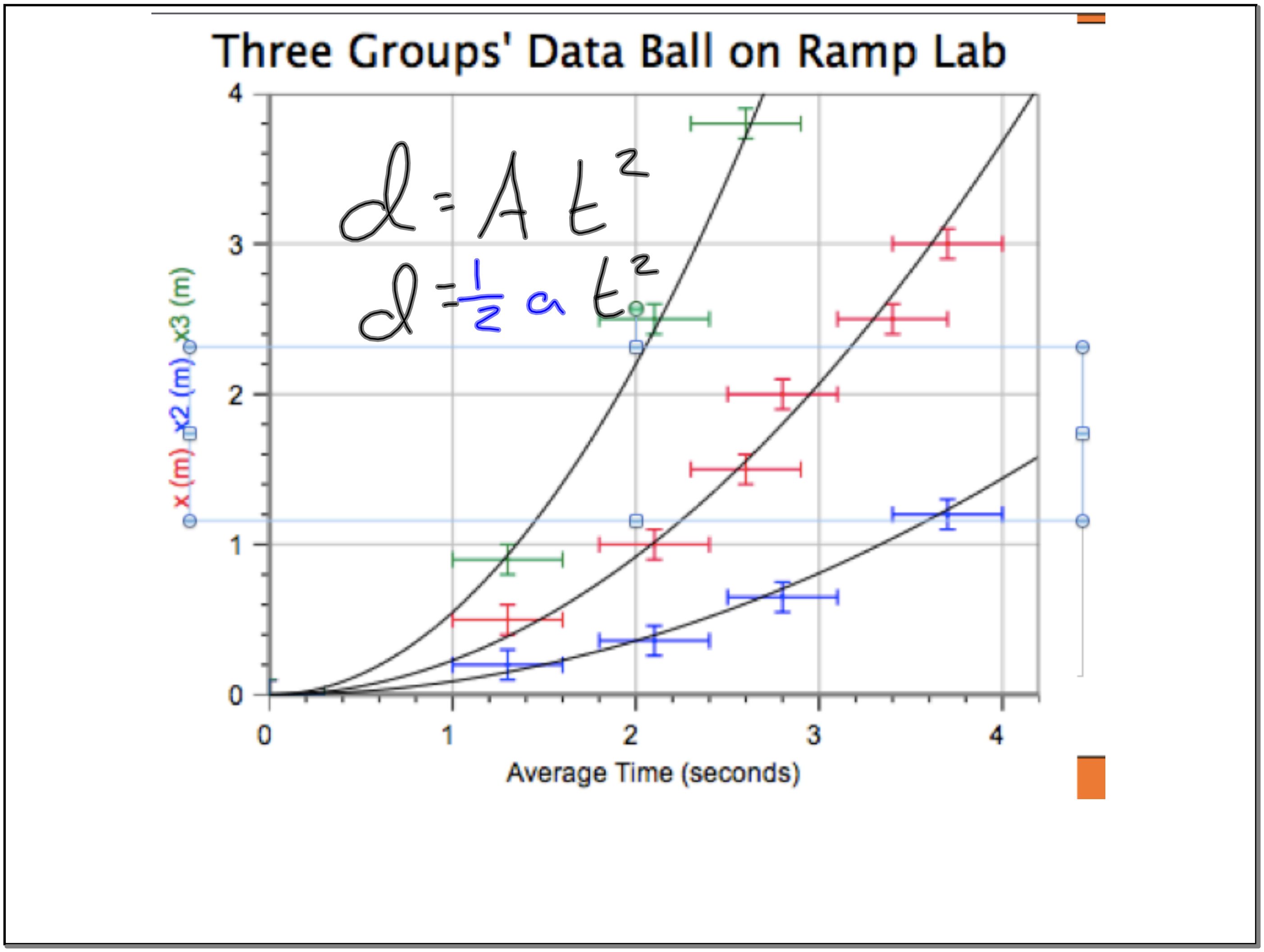
December 02, 2015



Three Groups' Data Ball on Ramp Lab

$d = A t^2$

$d = \frac{1}{2} a t^2$

Acceleration: the rate at which velocity changes.

change in speed and/or direction

there can be negative and positive accelerations

(DO NOT use the term deceleration)

final velocity

initial velocity

$$a = \frac{V_f - V_i}{t} \quad \frac{(\frac{m}{s})}{(s)}$$

time

$$a = \frac{\Delta V}{\Delta t}$$

$\Delta$ = delta

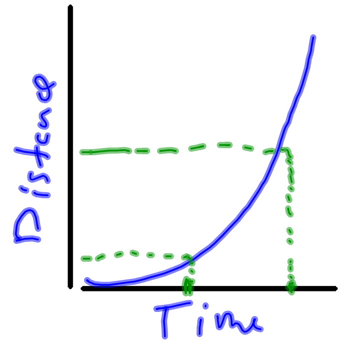
= change in

Units: $\frac{m/s}{s} = \frac{m}{s^2}$

$$\frac{\frac{m}{s} \cdot \frac{1}{s}}{\frac{s}{1} \cdot \frac{1}{s}} = \frac{m}{s} \cdot \frac{1}{s} = \frac{m}{s \cdot s} = \frac{m}{s^2}$$

## Distance vs. Time Graphs for a Constant Acceleration

Relationship: Quadratic



$$\overset{\text{distance}}{d} = \frac{1}{2}\overset{\text{acceleration}}{a}\,\overset{\text{Time}}{t}^{2}$$

When time is doubled, distance will be quadrupled.

Distance vs. time graphs for a constant velocity:

Linear, slope = velocity

# Distance Vs Time

## With a constant Acceleration

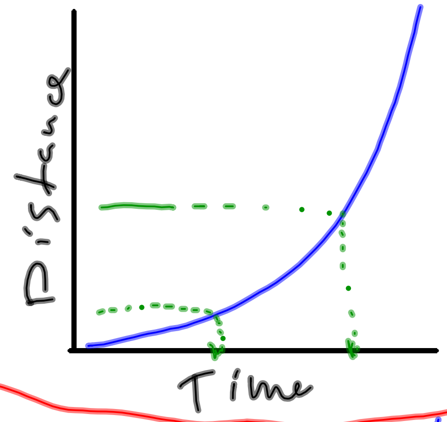
Relationship: quadratic

$d = \underline{\frac{1}{2}a}\, t^2$

~ distance

acceleration

~ time



If you double time, distance is quadrupled.

Prediction: $t = 1.5s \quad d = ?$

$d = 125t^2$

$d = 125(1.5)^2$

$d = 125 \cdot 1.5 \cdot 1.5$

A value $= \frac{1}{2}a$

$2 \cdot 125 = \cancel{\frac{1}{2}}a \cdot \cancel{2}$

$2 \cdot 125 = a$