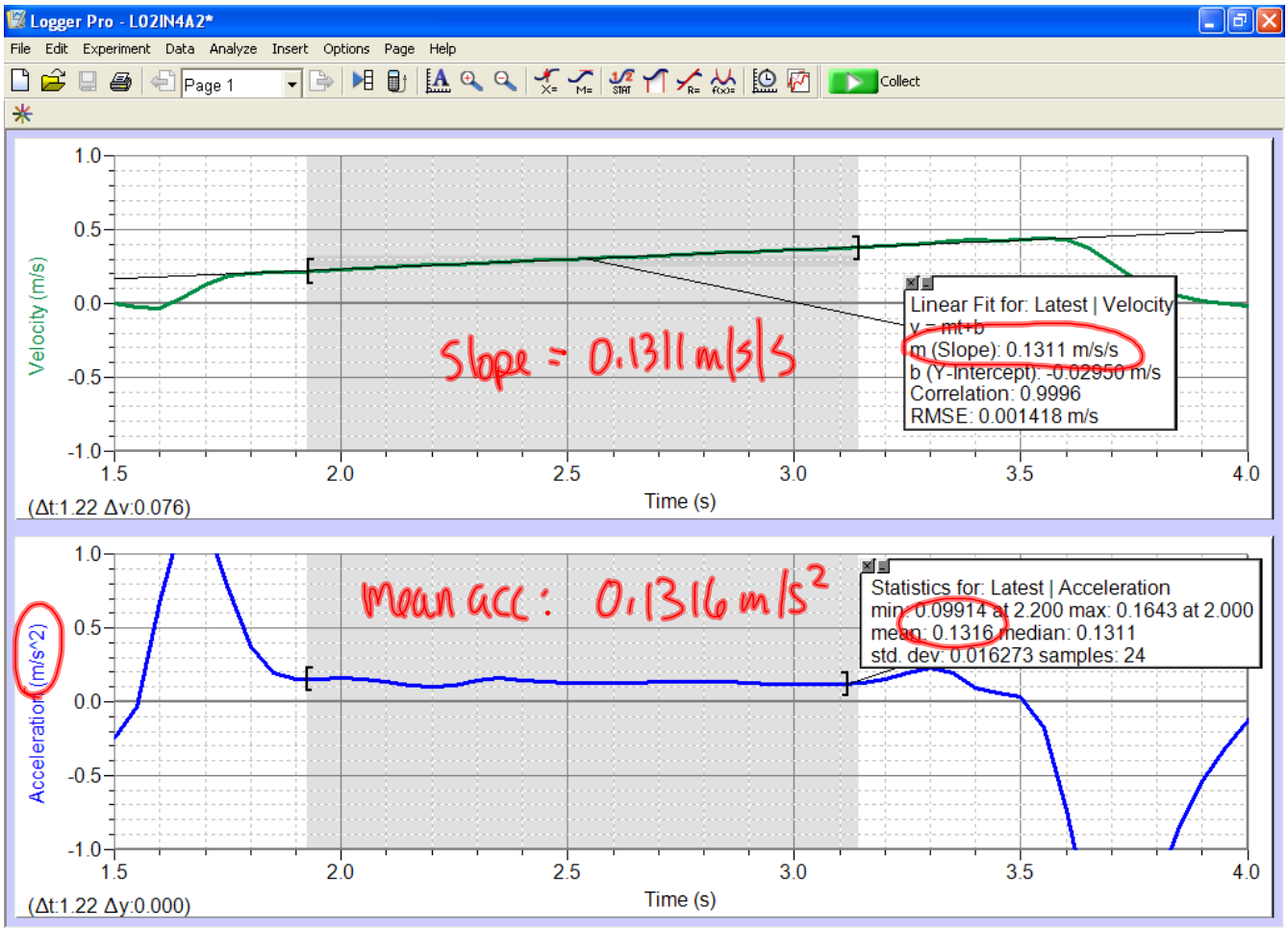
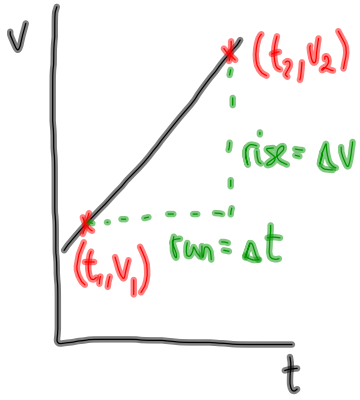

Logger Pro - L02IN4A2*
File Edit Experiment Data Analyze Insert Options Page Help
Page 1
Collect
Velocity (m/s)
Linear Fit for: Latest | Velocity
y = mt+b
m (Slope): 0.1311 m/s/s
b (Y-Intercept): -0.02950 m/s
Correlation: 0.9996
RMSE: 0.001418 m/s
Slope = 0.1311 m/s/s
(Δt:1.22 Δv:0.076)
Time (s)
Acceleration (m/s^2)
mean acc: 0.1316 m/s²
Statistics for: Latest | Acceleration
min: 0.09914 at 2.200 max: 0.1643 at 2.000
mean: 0.1316 median: 0.1311
std. dev: 0.016273 samples: 24
(Δt:1.22 Δy:0.000)
Time (s)

Acceleration & Velocity-Time Graphs

Constant Acceleration



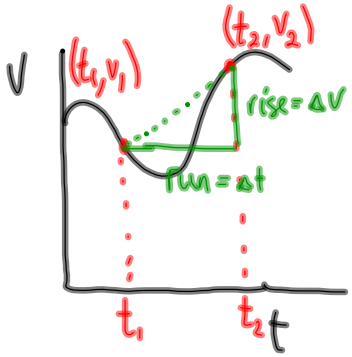
$$\text{slope} = \frac{\text{rise}}{\text{run}}$$

$$\text{slope} = \frac{\Delta v}{\Delta t}$$

But slope = acceleration (see Logger Pro Graphs)

$$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$$

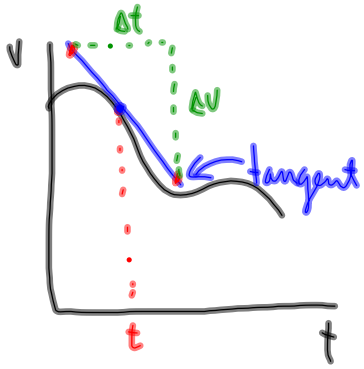
Non-Constant Acceleration



$$\text{slope} = \frac{\Delta v}{\Delta t}$$

$$\vec{a}_{ave} = \frac{\Delta \vec{v}}{\Delta t}$$

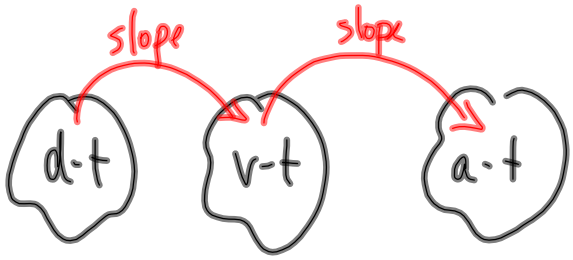
Average acceleration is the slope of the line connecting two points on the v-t graph



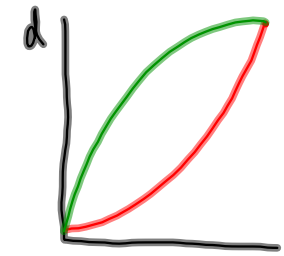
$$\text{slope} = \frac{\Delta v}{\Delta t}$$

$$\vec{a}_{inst} = \frac{\Delta \vec{v}}{\Delta t}$$

Instantaneous acceleration is the slope of the tangent drawn at t (v-t graph)

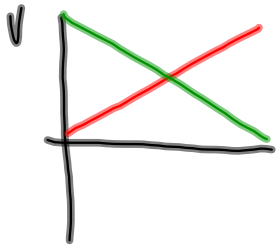


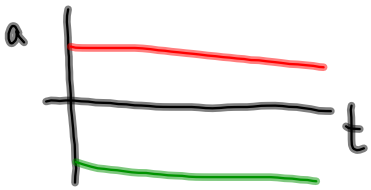
Kinematics Graphs

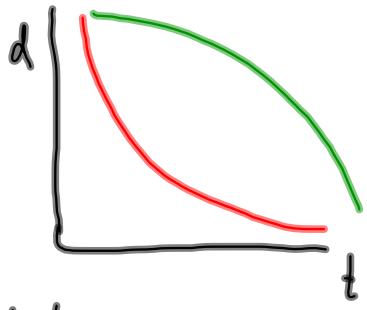


- speeding up steadily going away (+) (+) (+ acc)

- slowing down steadily going away (−) (+) (− acc)

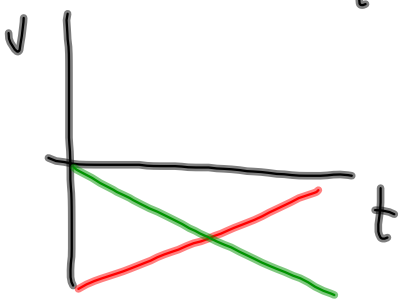


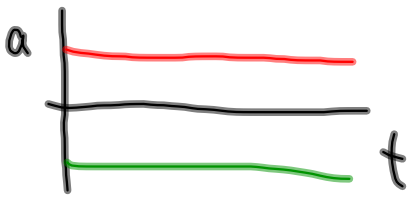




- slowing down steadily going towards (−) (−) (+ acc)

- speeding up steadily going towards (+) (−) (− acc)





Acceleration Equation

mp177

$\vec{a} = 5.2\ m/s^2$ [downhill]

$\Delta t = 8.5\ s$

$\vec{v}_1 = 0\ m/s$ (implied)

$\vec{v}_2 = ?$

$$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$$

$$\vec{a} = \frac{\vec{v}_2 - \vec{v}_1}{\Delta t}$$

$$\vec{a}\,\Delta t = \vec{v}_2 - \vec{v}_1$$

$$\vec{v}_2 = \vec{v}_1 + \vec{a}\,\Delta t$$

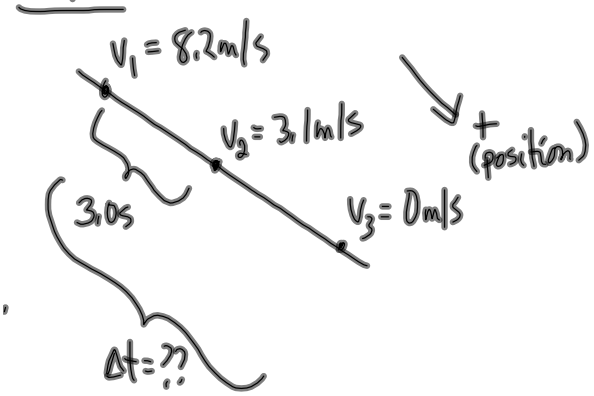
$$\vec{v}_2 = 0\ m/s + \left(5.2\ \frac{m}{s^2}\ [\text{downhill}]\right)(8.5\ s)$$

$$\vec{v}_2 = 44.2\ \frac{m}{s}\ [\text{downhill}]$$

$$\vec{v}_2 \doteq 44\ \frac{m}{s}\ [\text{downhill}]$$

The velocity of the boulder will be $44\ \frac{m}{s}$ [downhill]

MP/78



* acceleration is constant

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

$$a = \frac{V_2 - V_1}{\Delta t}$$

$$a\Delta t = V_2 - V_1$$

$$\Delta t = \frac{V_2 - V_1}{a}$$

$$\Delta t = \frac{0 - 8.2 m/s}{-1.7 m/s^2}$$

$$\Delta t = 4.8 s$$

Find the acceleration:

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

$$a = \frac{V_2 - V_1}{\Delta t}$$

$$a = \frac{3.1 m/s - 8.2 m/s}{3.0 s}$$

$$a = \frac{-5.1 m/s}{3.0 s}$$

$$a = -1.7 m/s^2$$

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

$$\frac{m/s}{m/s^2} = \frac{m}{s} \div \frac{m}{s^2} = \frac{m}{s} \cdot \frac{s^2}{m} = s$$

TO DO

1. p 73/24 + 25 (find only the acc)
2. PP/80
3. Read Chapter 2 and Chapter 3 (up to p80)
4. Calculator Pad
5. LAB - Changing Motion