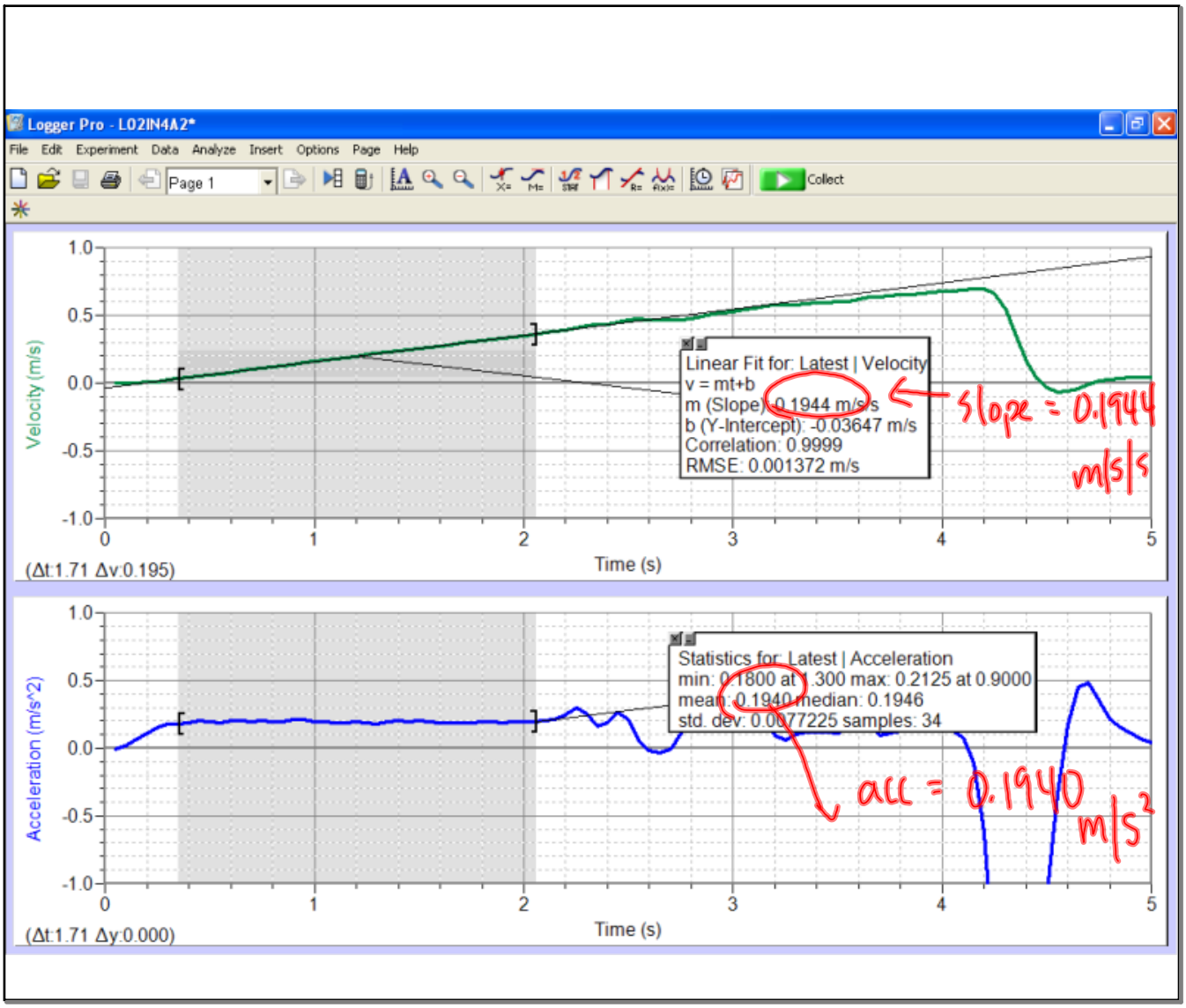
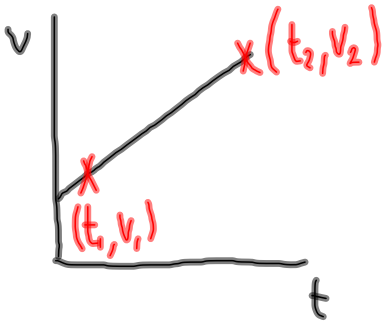
VELOCITY QUIZ

- description → d-t graph → v-t graph
- d-t graph → description → v-t graph
- slope on d-t graph = velocity
- solve problems using $v = \frac{\Delta d}{\Delta t}$
  - units | sds
  - rearrange equation


Logger Pro - L02IN4A2*
File Edit Experiment Data Analyze Insert Options Page Help
Page 1
Collect
Velocity (m/s)
Linear Fit for: Latest | Velocity
v = mt+b
m (Slope) 0.1944 m/s/s
b (Y-Intercept) -0.03647 m/s
Correlation: 0.9999
RMSE: 0.001372 m/s
slope = 0.1944 m/s/s
(Δt:1.71 Δv:0.195)
Time (s)
Acceleration (m/s^2)
Statistics for: Latest | Acceleration
min: 0.1800 at 1.300 max: 0.2125 at 0.9000
mean: 0.1940 median: 0.1946
std. dev: 0.007225 samples: 34
acc = 0.1940 m/s²
(Δt:1.71 Δy:0.000)
Time (s)

Acceleration

Constant Acceleration

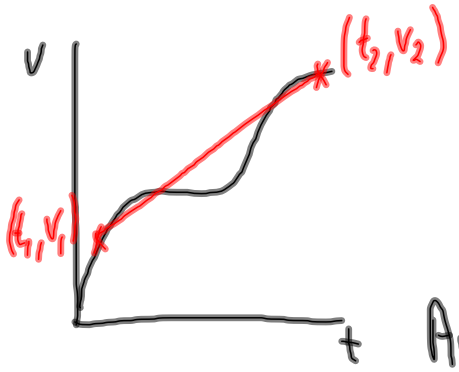


$$\text{Slope} = \frac{\Delta v}{\Delta t} \quad \frac{\text{rise}}{\text{run}}$$

From INV 5 -> slope = acc

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

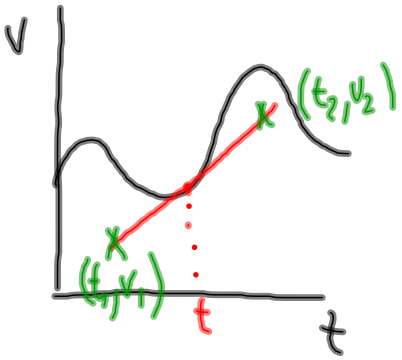
Non-constant Acceleration



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

$$a_{ave} = \frac{\Delta v}{\Delta t}$$

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



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

$$a_{inst} = \frac{\Delta v}{\Delta t}$$

Instantaneous acceleration is the slope of the tangent at time t.

Acceleration Equation

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

$$a = \frac{v_2 - v_1}{\Delta t}$$

$\frac{m/s}{s}$

$m/s/s$

Where: a is acceleration (m/s^2)

v_1 is the initial velocity (m/s)

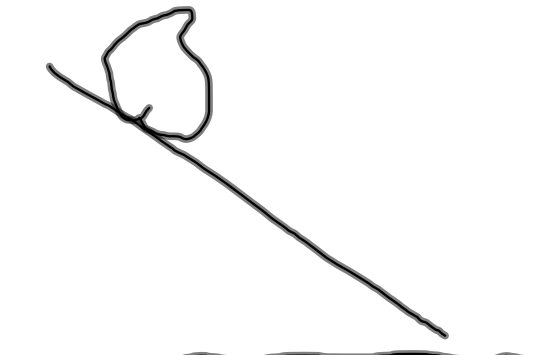
v_2 is the final velocity (m/s)

Δt is time interval (s)

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

Oct 7-2:18 PM

mp 177



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

$\Delta t = 8.5 s$

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

$\vec{V}_2 = ?$

5.2 m/s/s

increases 5.2m/s every second

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

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

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

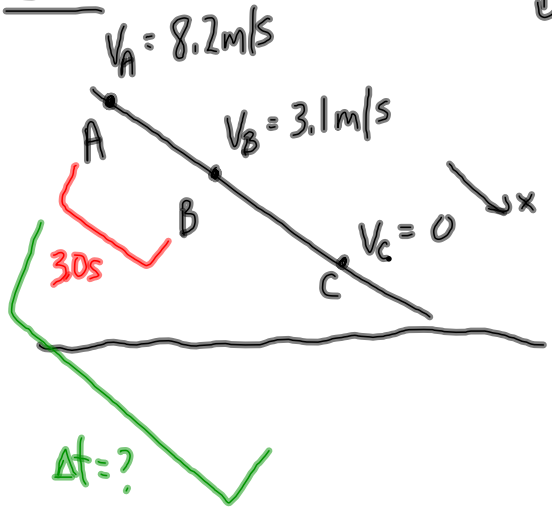
$\vec{V}_2 = \vec{V}_1 + \vec{a}\Delta t$

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

$\vec{V}_2 = 44 m/s$ [downhill]

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

MP|78



Find the acceleration b/w A + B

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

$$a = \frac{v_2 - v_1}{\Delta t}$$

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

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

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

Find Δt for A -> C

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

$$a = \frac{v_2 - v_1}{\Delta t}$$

$$a \Delta t = v_2 - v_1$$

$$\Delta t = \frac{v_2 - v_1}{a}$$

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

$$\Delta t = 4.8 s$$

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

TO DO:

① PP|80

② LAB - Tuesday

3.