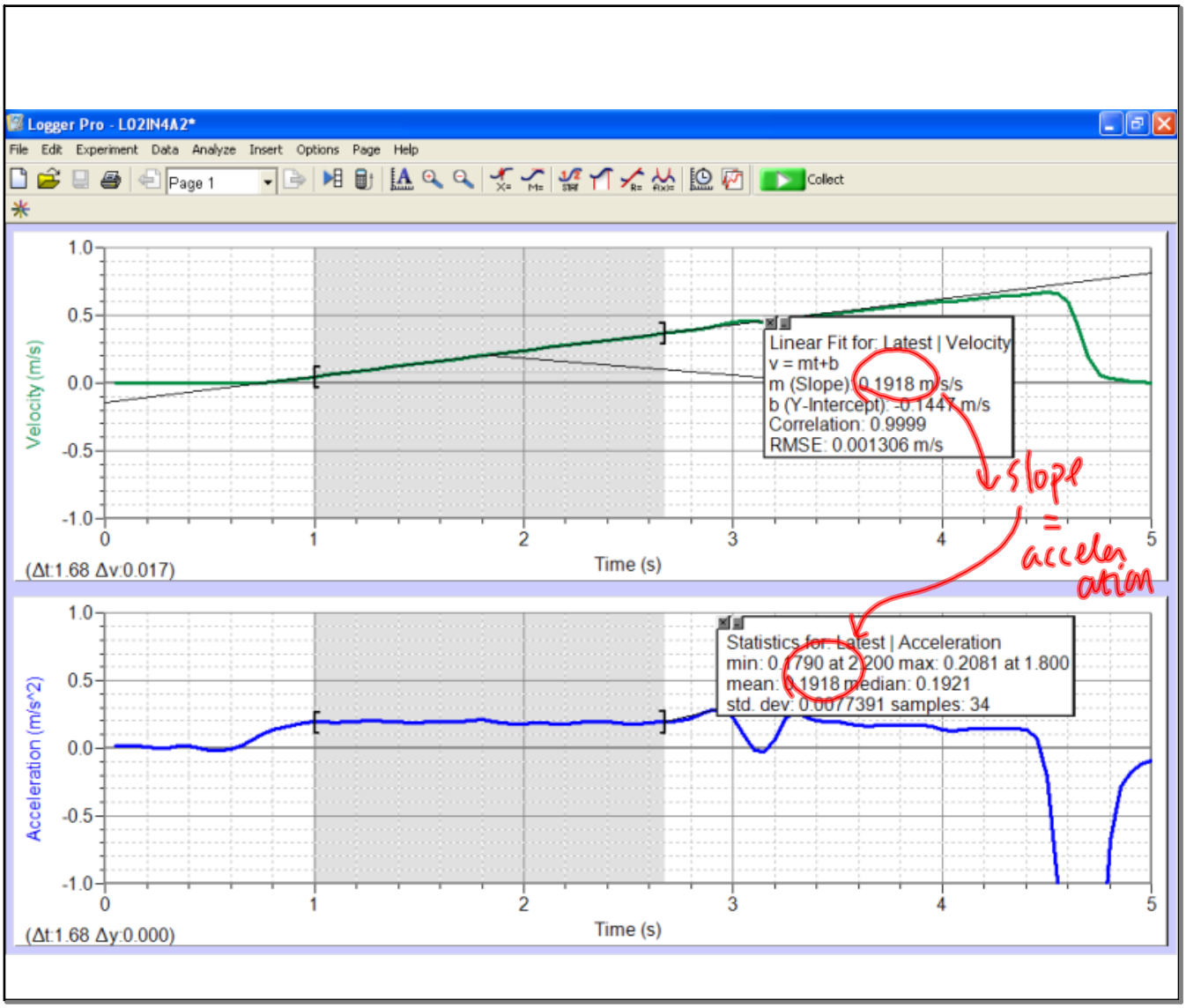
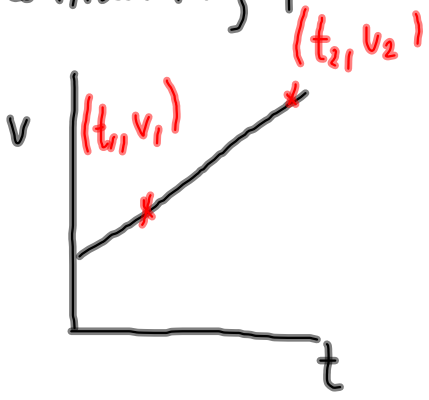
Quiz (VELOCITY)

- description → d-t graph → v-t graph
- d-t graph → description → v-t graph
- Slope on d-t graph = velocity
- Solve problems using $v = \frac{\Delta d}{\Delta t}$
  - sd/units
  - rearrange if necessary


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): 0.1918 m/s/s
b (Y-Intercept): -0.1447 m/s
Correlation: 0.9999
RMSE: 0.001306 m/s
slope = acceleration
(Δt:1.68 Δv:0.017)
Time (s)
Acceleration (m/s^2)
Statistics for: Latest | Acceleration
min: 0.1790 at 2.200 max: 0.2081 at 1.800
mean: 0.1918 median: 0.1921
std. dev: 0.0077391 samples: 34
(Δt:1.68 Δy:0.000)
Time (s)

Acceleration

Consider the graph (v-t) for an object steadily speeding up



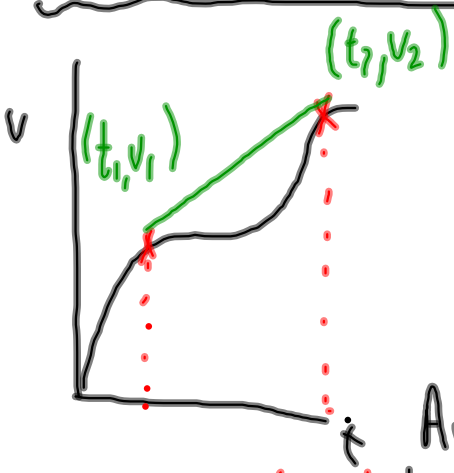
$$\text{slope} = \frac{\text{rise}}{\text{run}}$$

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

from INV5 => slope = acc

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

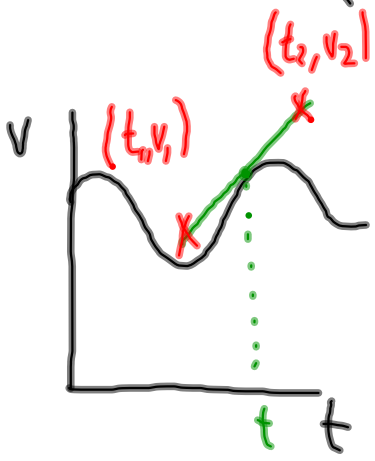
Non-Constant Acceleration



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

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

Average acceleration is the slope of the line joining two points on 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 drawn at time t.

Acceleration Equation

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

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

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

$m/s/s$

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

where: a is the acceleration (m/s^2)

V_1 is the initial velocity (m/s)

V_2 is the final velocity (m/s)

Δt is the time (s)

mp 77

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

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

$\Delta t = 8.5\ s$

$\vec{v}_2 = ??$

5.2 m/s/s

5.2 m/s in 1 s

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

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

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

$+v_1$ $\vec{a}\,\Delta t = \vec{v}_2 - \vec{v}_1$ $+v_1$

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

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

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

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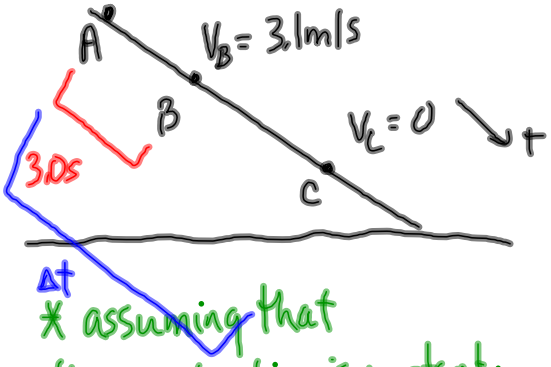
$V_A = 8.2\,m/s$



* assuming that the acceleration is constant.

Find the acceleration b/w A+B.

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

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

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

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

different ways to show acc.

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

$\vec{a} = -1.7\,m/s^2$ [downhill]

$\vec{a} = 1.7\,m/s^2$ [uphill]

Find Δt b/w A and C

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

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

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

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

$$\Delta t = \frac{0 - 8.2\,m/s}{-1.7\,m/s^2} = 4.8\,s$$

$\frac{m}{s} \div \frac{m}{s^2}$

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

TODO

① PP|80

② Lab → Acceleration Sheets