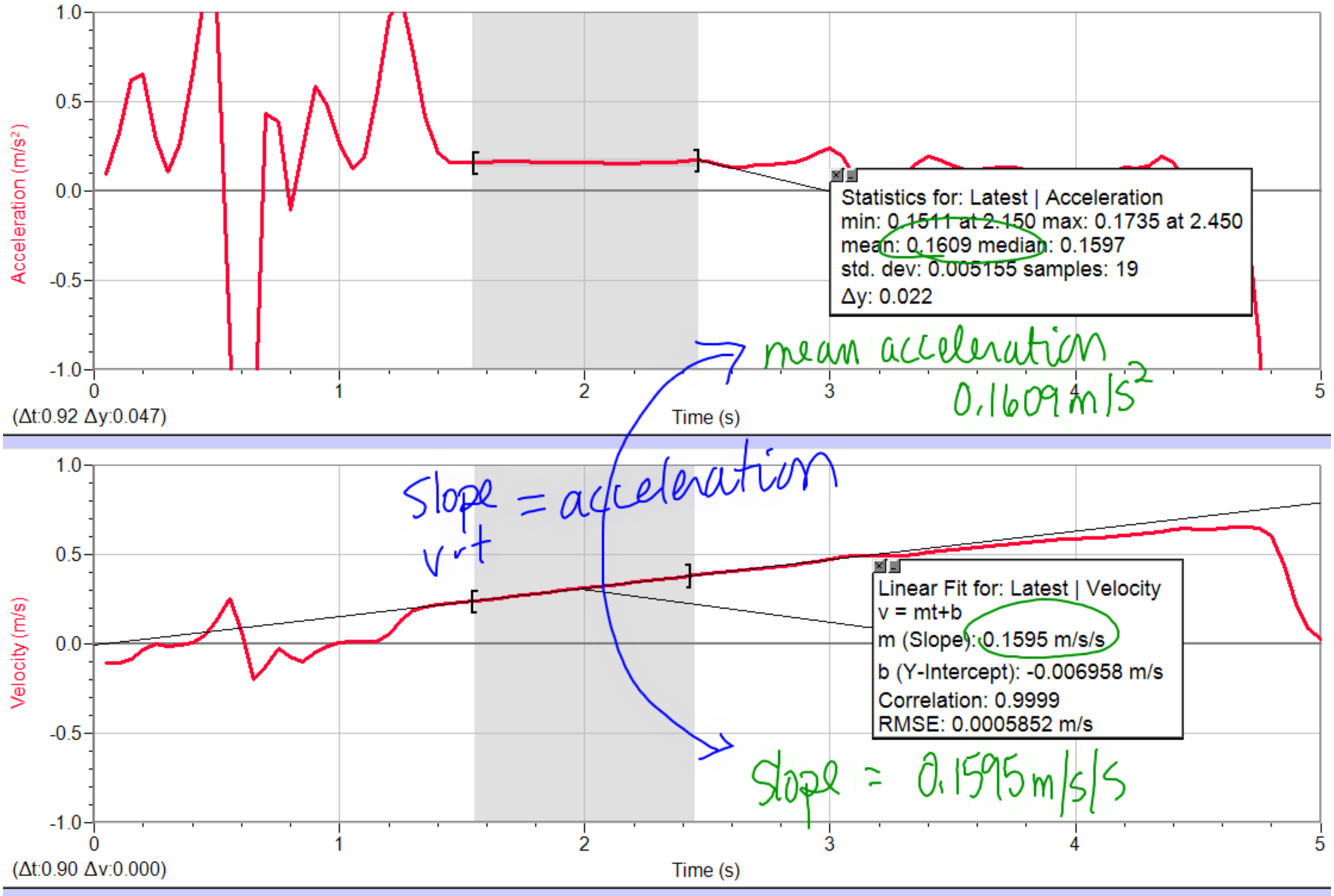
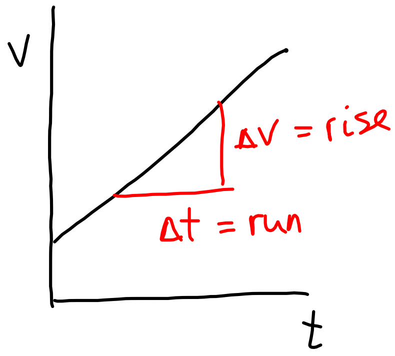

Acceleration (m/s²)
Time (s)
(Δt:0.92 Δy:0.047)
Statistics for: Latest | Acceleration
min: 0.1511 at 2.150 max: 0.1735 at 2.450
mean: 0.1609 median: 0.1597
std. dev: 0.005155 samples: 19
Δy: 0.022
mean acceleration
0.1609 m/s²
slope = acceleration
v-t
Velocity (m/s)
Time (s)
(Δt:0.90 Δv:0.000)
Linear Fit for: Latest | Velocity
v = mt+b
m (Slope): 0.1595 m/s/s
b (Y-Intercept): -0.006958 m/s
Correlation: 0.9999
RMSE: 0.0005852 m/s
slope = 0.1595 m/s/s

Velocity-Time Graphs + Acceleration

Constant Acceleration



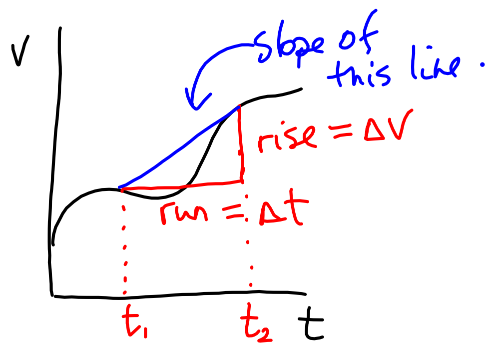
$$\text{slope} = \frac{\text{rise}}{\text{run}}$$

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

From Investigation 5, we know that the slope on a v-t graph is the acceleration

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

Non-constant Acceleration

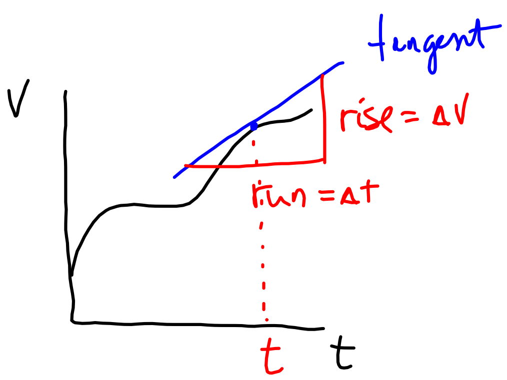


$$\text{slope} = \frac{\text{rise}}{\text{run}}$$

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

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

Average acceleration is the slope of the line joining t_1 and t_2



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

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

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

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

Acceleration

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

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

MP|77

(+)

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

$\Delta t = 8.5s$

$\vec{V}_1 = 0$

$\vec{V}_2 = ?$

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

$\frac{m}{s} \cdot \frac{1}{s}$

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

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

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

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

$$\vec{V}_2 = \vec{a}\Delta t + \vec{V}_1 \quad (\vec{V}_1 = 0)$$

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

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

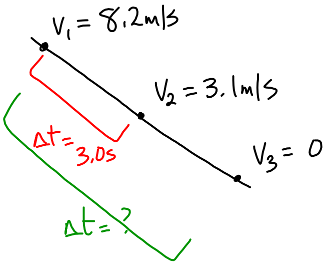
$$\vec{V}_2 \doteq 44\ m/s\ [\text{downhill}]$$

units

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

The velocity of the boulder will be 44 m/s [downhill]

MP|78



Find the acceleration:

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

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

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

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

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

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

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

$$\frac{m}{s} \cdot \frac{1}{s}$$

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

Find the time to stop:

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

$$a \Delta t = \Delta v$$

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

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

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

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

$$\Delta t = 4.8 s$$

units

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

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

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

TO DO:

1. Read p61-64 and p74-77
2. PP|80
3. Calculator Pad
4. Changing Motion Lab
5. Graphs of Motion Review