Unit 0: Introduction

0.4 Graphing

Graphing Rules

- Label the axis
  - independent (input value) variable on the x-axis
  - dependent (output value) variable on the y-axis
- Give the graph at least ½ of a page.
- Scale each axis
  - Use... labels with units and a title
  - Choose a scale that is... appropriate
  - make sure the scale is consistent
- Plot the points and draw a line of best fit.

be as close to the average as possible

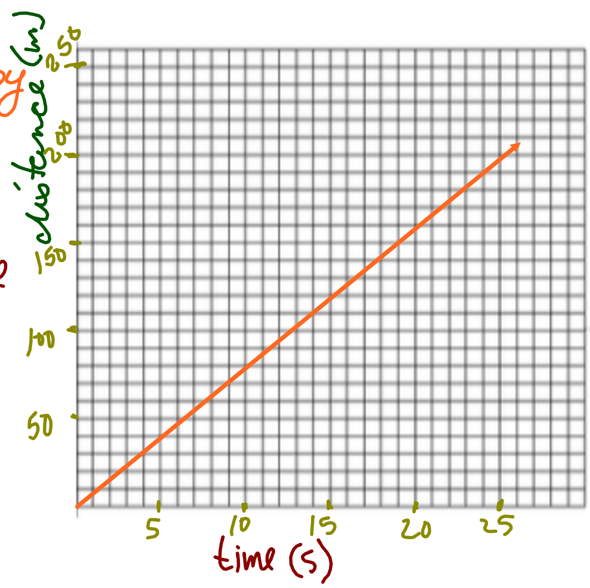
* aim for at least 6 data points

Direct Relationship

* is represented by a straight line (linear)

* passes through the origin

ex// $V = \frac{d}{t}$



$V \propto d$ varies proportionately

$V \propto \frac{1}{t}$ varies inversely

Finding Slope

To find the slope of a straight line:

- Choose... any 2 points (that can easily be estimated)
- Choose them as... far apart as possible
- Use only... points on your line of best fit

Remember the equation of a line is:

$$y = mx + b \leftarrow \text{y-int.}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Determine the slope and y-intercept of the graph shown and write the equation describing this line.

2pts $(0.1, 0.12)$
$(1, 1.1)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1.1 - 0.12}{1 - 0.1}$$

$$= \frac{0.98}{0.9} = \frac{1.0}{1.0} = 1.0$$

$$= 1.09\ \text{V/A}$$

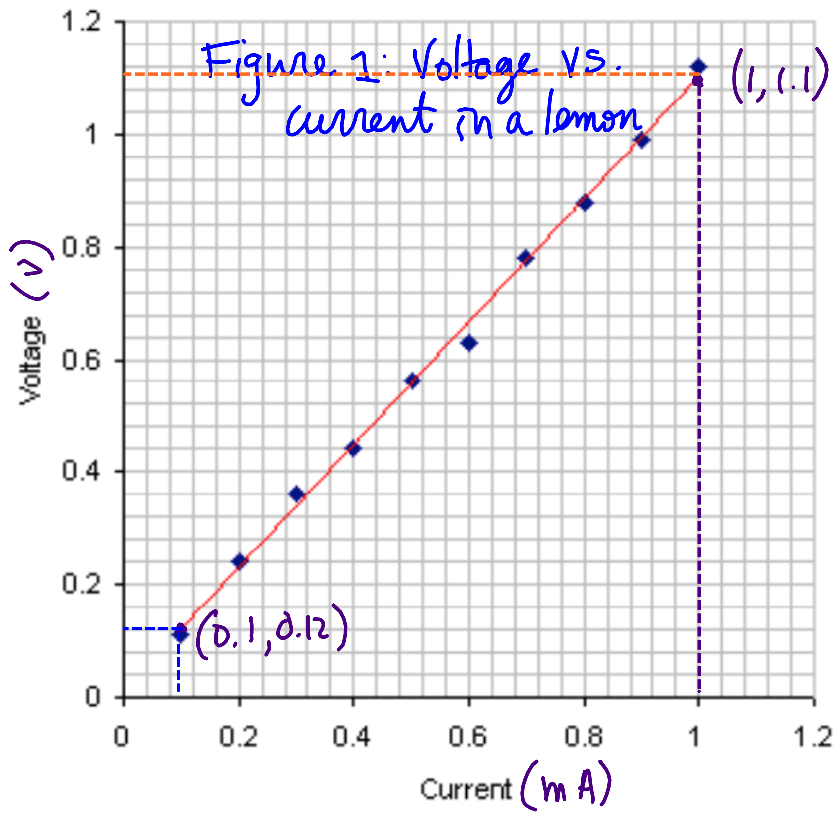
now $y = mx + b$

$V = 1.09C + b$

use $(1, 1.1)$

$1.1 = 1.09(1) + b$

$\boxed{0.01 = b}$



Graphs of Wrath

Mr. Trask was interested in seeing the relationship between the variables velocity and time. He took three superd-up Hot Wheels cars and ran them through an extensive timing circuit. Here are three sets of data recorded in Mr. Trask's secret laboratory lair:

Car 1		Car 2		Car 3	
Time (s)	Velocity (m/s)	Time (s)	Velocity (m/s)	Time (s)	Velocity (m/s)
0	0	0	0	0	0
5	6	5	10	5	2
10	12	10	17	10	5
15	16	15	25	15	8
20	23	20	33	20	14
25	30	25	42	25	18
30	34	30	51	30	21
35	40	35	67	35	25
40	46	40	73	40	30
45	55	45	81	45	34
50	62	50	89	50	39

Your challenge as Mr. Trask's assistant/lackey is to provide a beautiful graph of all three sets of data on only ONE piece of graph paper (Mr. T's lab is a bit budget). Follow the steps like we did in our notes and you will be fine. You MUST have all data fit on your graphs, so you will have to make some tough decisions about your variable range on the axes. Also, use as much space as possible.

Mr. Trask will be looking to make sure your graph is readable and all your labeling and calculations are on the graph as well.

Questions (show all work **on your graph paper**):

1) Find:

Slope of the line for car 1

Slope of the line for car 2

Slope of the line for car 3

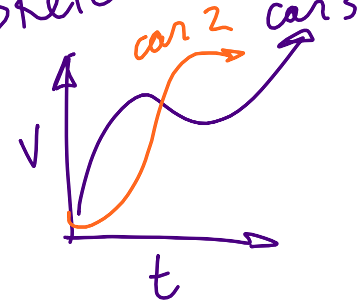
2) a. Write an equation for the line for car 1.

b. Use this equation to predict how fast car 1 will be traveling at t = 90 s.

Discussion:

1) Pretend car 2 has some really bad tires, which heat up and get sticky the longer the vehicle moves. As the tires get stickier, the car's acceleration decreases. What would you predict the graph of car 2 would look like? Sketch a graph.

sketch



2) Pretend that at t = 55s the driver of car 3 sees an adorable marmot in the road and jams on the brakes, suddenly stopping. What would you predict the graph of car 3 would look like? Sketch a graph.