Graphing Analysis Review

For problem 1

- Determine the dependent and independent variables
- Plot the graphs necessary to linearize the data with appropriate titles, and labels and units.
- Show calculations for the slope including units
- Write the formula that describes the relationship
- State the written relationship between the variables.

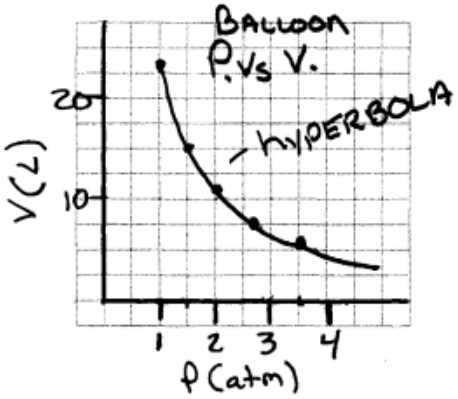
1. An experiment was done where the pressure on a balloon was varied as the volume was measured and the following data obtained.

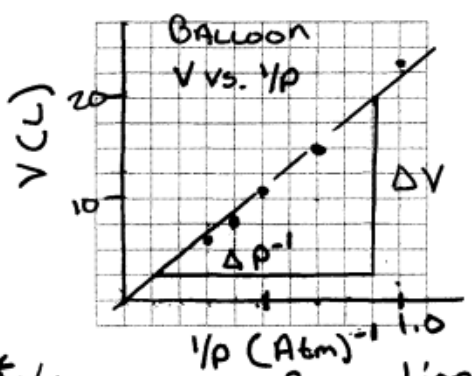
Press (atm)	1/P (A^{-1})	Vol (liters)
1.0	1.0	23
1.5	0.67	15
2.0	0.50	11
3.5	0.29	6.5
2.8	0.36	8

$m = \frac{\Delta V}{\Delta P^{-1}} = \frac{V_f - V_i}{P_f^{-1} - P_i^{-1}} = \frac{20 - 2.5}{0.9 - 0.1} = \frac{17.5\ L}{.8\ A^{-1}}$

$m = 22\ L \cdot Atm$

$V = \frac{22\ L \cdot Atm}{P}$





*V is INVERSLY Proportional to P

Things you need to know
Independent – dependent variables
Physics – Science
Scientific Method
How to form and test a hypothesis
Science vs Technology
Graphs, slopes, units and labels, shapes and types of relationships
Precision – accuracy

Precision:

When taking measurements precision deals with consistency of data points or how closely they are grouped together.

Accuracy:

Accuracy pertains to how close the data is to a standard or accepted value.

For problem 2

- Determine the dependent and independent variables
- Plot the graphs necessary to linearize the data with appropriate titles, and lab
- Show calculations for the slope including units
- Write the equation that describes the relationship
- State the written relationship between the variables.

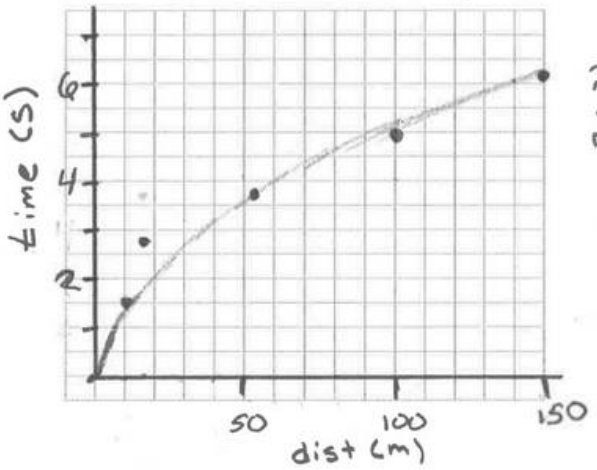
2. An experiment was done where the distance of an accelerating car traveled was measured at specific time intervals and the following data obtained.

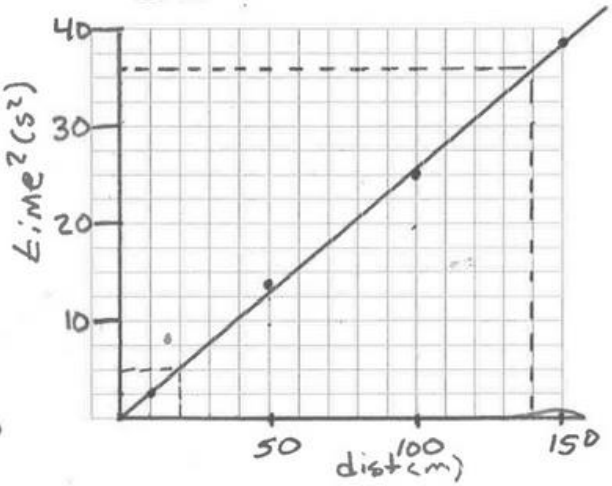
Note: The way that this problem is actually written, Time would be the independent variable. However the data table is backwards showing distance as the independent variable. If you graphed it with dist as the independent variable it will look as follows:

Dist (m)	Time (s)	T^2
10.	1.5	2.3
15.	2.8	7.8
52.	3.6	13
103.	5.0	25
150	6.2	38

$$\frac{\Delta t^2}{\Delta d} = \frac{36-5}{140-20} = 0.258 \frac{s^2}{m}$$

$$t^2 = 0.258d$$





If you graphed it as time being the independent variable, it will look as follows:

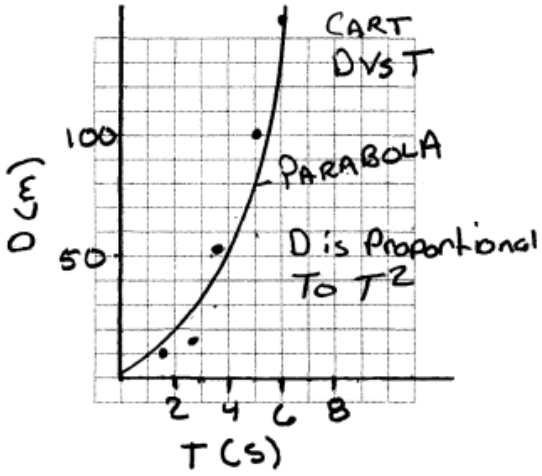
An experiment was done where the distance of an accelerating car traveled was measured at specific time intervals and the following data obtained.

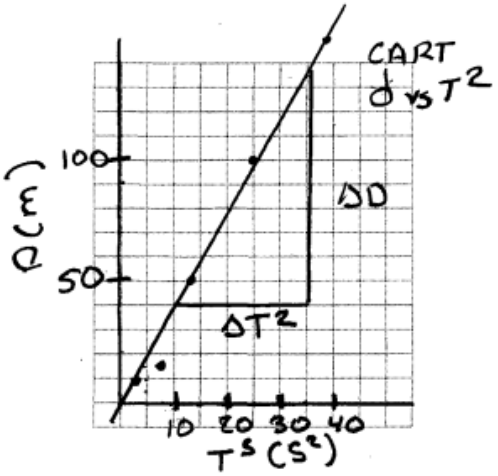
Dist (m)	Time (s)	T^2 (s^2)
10.	1.5	2.3
15.	2.8	7.8
52.	3.6	13.0
103.	5.0	25
150	6.2	38

$m = \frac{\Delta D}{\Delta T^2} = \frac{D_f - D_i}{T_f^2 - T_i^2} = \frac{135-40}{35-10} = \frac{95m}{25\,s^2}$

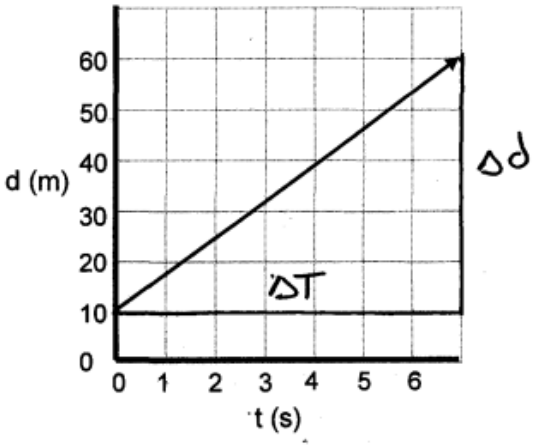
$m = 3.8\,m/s^2$

$d = 3.8\,m/s^2\,t^2$





4. Consider the position vs time graph to the right



a. Determine the average velocity of the object.

$V = \frac{\Delta d}{\Delta t} = \frac{d_f - d_i}{T_f - T_i} = \frac{60-10}{7-0} = \frac{50}{7}\,\frac{m}{s}$

$V = 7.1\,m/s$

b. Write the formula that describes the motion of the object

$D = 7.1\,\frac{m}{s}T + 10\,m$