

1.3 Graphical Analysis

STANDARDS

1.4 I can use graphical analysis to recognize and understand relationships between variables.

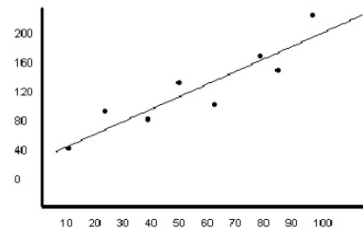
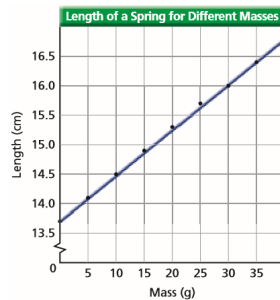
Graphical Analysis

Graphical analysis is the analysis of data done through data tables and graphs to determine the relationship between variables.

Graphical Analysis

A graph is worth a thousand words!

Mass Attached to Spring (g)	Length of Spring (cm)
0	13.7
5	14.1
10	14.5
15	14.9
20	15.3
25	15.7
30	16.0
35	16.4



Independent vs Dependent variables on a graph

Look at the graph on the right

- Which is the independent variable?
- Which is the dependent variable?

The Dependence of Traffic Ticket Cost on Automobile Speed

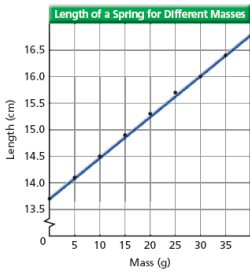
Graphs and graphing advice from <http://misterguch.brinkster.net/graph.html>

Dependent and Independent Variables

When two physical quantities are plotted against one another in such a graph, the horizontal axis is usually considered to be an **independent variable** and the vertical axis a **dependent variable**.

We manipulate (x) result (y)

Linear Relationships



$y = mx + b$
rate of change
 m → slope
 b → y-int
Initial condition

Example

Table 1-4 Mass of Pure Gold Nuggets	
Volume (cm ³)	Mass (g)
1.0	19.4
2.0	38.6
3.0	58.1
4.0	77.4
5.0	96.5

Example

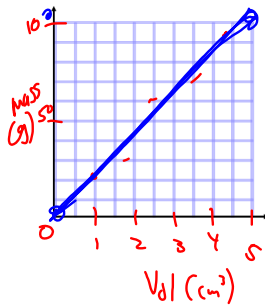


Table 1-4 Mass of Pure Gold Nuggets	
Volume (cm ³)	Mass (g)
1.0	19.4
2.0	38.6
3.0	58.1
4.0	77.4
5.0	96.5

* Direct Linear
 Inverse Quadratic
 Exponential

Example

- Plot the mass versus volume from the values given in the table and draw the curve that best fits all points.
- Describe the resulting curve in complete sentences. What type of relationship exists between the mass of pure gold nuggets and their volume?

The relationship between mass and volume of gold nuggets is directly linear.

- What is the value of the slope of this graph? Include the proper units.

$\frac{100g}{5cm^3} = 20 g/cm^3$

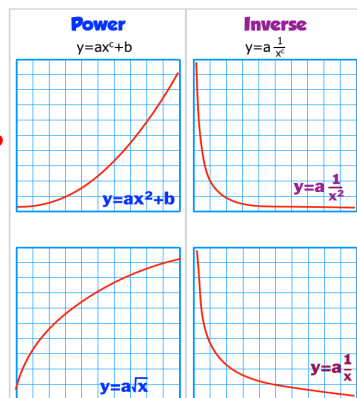
- Write the equation showing mass as a function of volume for gold.

$y = mx + b$ $M = (20 \frac{g}{cm^3})V + 0$

- Write a sentence that provides a word interpretation of the equation showing mass as a function of volume for gold.

Mass is 20 g/cm³ Volume

Other Relationships



Predicting Values

Physicists use data and graphing as a form of modeling.

These models are then used to accurately predict how systems will behave.

HOMework

Unit 1 Problems
(8-9)