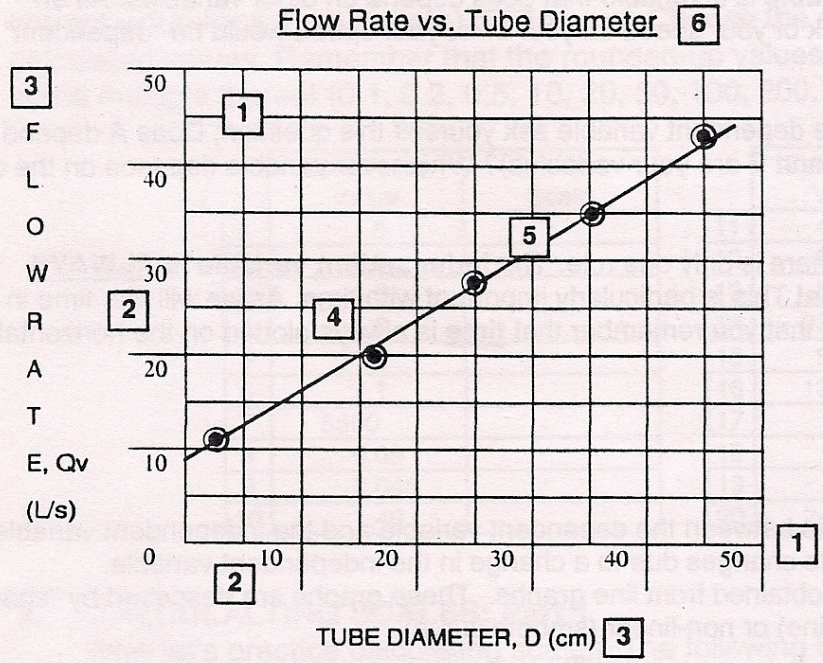
SNC1DI **Graphing Notes**

A line graph is one of the best ways to present the data gathered in an experiment so the relationship between the two variables can be determined. The following is an example of a graph that contains all six (6) essential "elements" that are required in a graph.



1 - Fills Available Space- Axes are drawn so as to be not too close to the edges of the sheet of paper. The axes are always drawn "vertical" **vs** "horizontal" which is "dependent variable" **vs** "independent variable". **Use pencil for the entire graph!**

2 - The scale can be obtained by dividing the largest table value (***LTV***) by the number of useable lines (squares) on the graph paper. Round this number up to the most appropriate interval of 1, 2, 5, 10 etc. (including decimals, Ex. 0.2 or 0.05)

Ex. Largest table value (***LTV***) = 280, # of squares = 15, 280/15=18.67 Therefore, use 20 as your interval. **Remember use as much of the graph as possible! The bigger the graph, the more accurate!**
- The scale must be linear and generally starts from zero. There must be equal increases in scale values. Ex. You CAN NOT begin 0, 5, 10 and then jump to 300!
- It is not necessary to put a number at all lines on the scale. To do so would insult the reader!

3 - The axis is labeled using the following format: Quantity, symbol, (units). For example, from the 'x' axis above: Tube Diameter, D, (cm)

4 - Plot data points using small dots with error circles drawn around them. If multiple lines will be plotted, use different shapes or different colours for your data points and provide a legend.

5 - The line (or curve) should be a "LINE OF BEST FIT" which is a straight line drawn with a RULER **or** a smooth curve through the best average of the points. **Never connect the dots unless they are absolutely straight along the line!**

6 - The title is the last entry on the graph and it is located so that it doesn't interfere with the graph itself, usually at the top. The format is "Dependent Variable" vs. "Independent Variable". From the graph above: Flow Rate vs. Tube Diameter. It is written in this format because the flow rate of the fluid depends on the diameter of the tube it comes out of.

A Word about Variables:

There are two types of variables you will encounter while graphing scientific data. An **Independent Variable** is the variable in an experiment which does not depend on any other variable. As an example, **time** is always an independent variable because it never stops. It can not be affected by any other variable. A **Dependent Variable** is a variable that does depend on other variables. As an example, if you were keeping track of your speed on your bike, your speed would be "dependent" on the time.

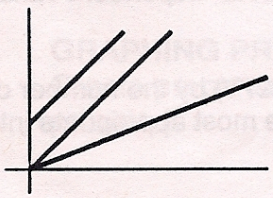
To determine which variable is the dependent variable ask yourself this question; Does A depend on B or does B depend on A (where A and B are your variables)? Whichever variable depends on the other is the dependent variable.

When graphing these variables, there is only one rule. **The independent variable is ALWAYS plotted on the horizontal (x) axis!** This is particularly important with time. As we will use time in a lot of our experiments, it is important that you remember that **time** is always plotted on the horizontal (x) axis.

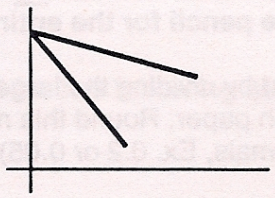
Description of Line Graphs:

A line graph shows the relationship between the dependent variable and the independent variable. It shows how the dependent variable changes due to a change in the independent variable. Mathematical information can be obtained from line graphs. These graphs are described by "shape". They are either linear (a straight line) or non-linear (smooth curve).

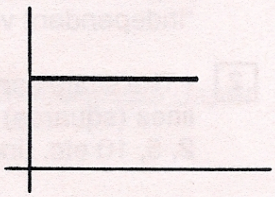
For example:



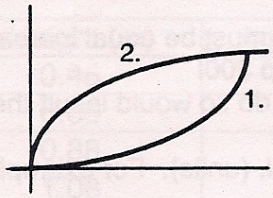
Linear with a positive (constant) slope.



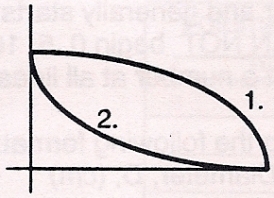
Linear with a negative (constant) slope.



Linear with a slope of 0; indicates No Relationship exists between the two variables.



1. Non-Linear with an increasing positive slope
2. Non-Linear with a decreasing positive slope.



1. Non-Linear with an increasing negative slope.
2. Non-Linear with a decreasing negative slope.