Summary for Graphical Analysis of Data

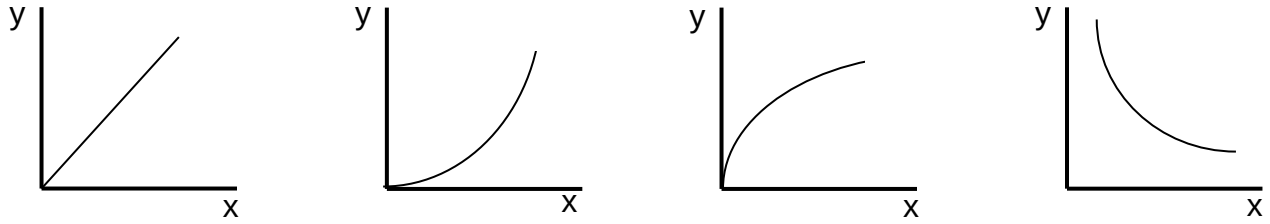
Experiments rarely yield "perfect" results and one approach to analyze this type of data is by graphing. The four labs that you have just completed illustrate different types of relationships that could exist between quantities. They outline a graphical method to obtain the equation for the data.

Summary of method:

1. Plot a graph of y versus x, where y is the dependent variable plotted on the vertical axis and x is the independent variable plotted on the horizontal axis.

2. Draw a line of best fit for the data points and analyze the shape of the graph (see below). If it is a straight line passing through the origin, then the proportion must be $y \alpha x$. If the graph is any other shape, you can tell the general form of the proportionality but the value of "n" is unknown.

Graph shapes and the general form of the proportion:



linear	power	root	inverse
$y \alpha x$	$y \alpha x^n$ (n>1)	$y \alpha \sqrt[n]{x}$ (n>1)	$y \alpha 1/x^n$ (n>0)

3. To get the value for "n", you have to make a new graph on a new set of axis. You would plot a graph of y versus some function of x. For example, if you have a power curve ($y \alpha x^n$), then you would try plotting y versus x^2 and then y versus x^3 and so on until you have a straight line graph. The linear graph indicates that you have the correct power of x. For example, if y versus x^3 produces a straight line through the origin, then $y \alpha x^3$.

4. To determine the equation for the relationship you must calculate the constant of proportionality. The constant of proportionality is the slope (k) of the straight-line graph you obtained in step 3. Remember that this value has units. For the above example, the equation would be: $y=kx^3$ where k is the slope of the y versus x^3 graph.