Rules for Good Graphing

Graphs must be done on graph paper, in blue or black in pen, handwritten, and using a straight edge.

When constructing a graph in science be sure to follow these steps:

1. **Title** - Place a ***descriptive title*** above your graph.("Graph 1" is not a descriptive title).

2. **Axes** - Place your dependent variable on the y-axis and your independent variable on the x-axis. There are always two variables in an experiment - the variable *you* control is the independent variable, the change that it causes is the dependent variable. **Use a ruler to draw your x and y axes.**

3. **Label** each axis with a short title that includes units in parentheses.

4. **Scale** - Here's the is one factor that can destroy your graph so pay close attention.

You want to remember three things: (1) use as much of the grid as you can, (2) the smaller the scale the more accurately you can plot your data and read the graph, (3) the scale needs to be one that you can easily read and (4) you do not start your scale at zero unless there is a need to.

So how do you accomplish this? By following these steps:

- Determine what data you wish to plot on the axis. For example, look at the highest and lowest temperature in an experiment on exothermic reactions. The lowest temperature was 22.3 C and the highest was 36.8 C.
- Find the difference between these points by subtracting the smaller from the larger. In this case 36.8 C - 22.3 C = 14.5 C. So you must have enough room on your axis to plot 14.5 C or you will not be able to plot all your data.
- Count the number of spaces you have on the axis. Lets say you have 30 spaces.
- Divide the data difference by the number of spaces (be sure to include your units). In our case this would be: 14.5 C / 30 spaces = 0.48 C per space. This will give you the *smallest* scale you could possibly use and still have all your data appear on the grid.
- If the scale is not easy to count by (and most won't be) pick the first scale you can easily count by that is greater than your smallest possible scale. Examples of choices less than one are 0.10, 0.20, and 0.50- do not use scales like 0.32 or 0.70. In our case we would use 0.50 C per space.
- Always begin numbering on the first line of your axis and skip one or more lines when writing the numbers. In our case we would begin with 22.0 C on the first line and skip the next line and write 23.0 C on the third line, 24.0 on the fifth line ... until we placed 38.0 on the last line. If you attempt to number every line the numbers get too crowded so number every second, fourth or fifth line.
- Do not begin your scale at zero unless your data require you to do so. If you had done so in the experiment above your scale would have been larger and less accurate. (Your calculations for your scale would have been: 36.8 C - 0 C = 36.8 C and your smallest possible scale: 36.8 C / 30 spaces = 1.2 C/space. Your scale would have been either 1.5 C per space or possibly 2.0 C per space which is 3x or 4x bigger than needed.
- Do not use your data as your scale. Your scale must be consistent - it must increase by a set amount as you go across or up your graph.

5. **Plot and circle your points**. You always circle your points so that they are still visible should your curve go through them.

6. **Look at your points to determine which type of curve you will draw**. In science the three most common curves are linear (a straight line), parabola (curves up) and a hyperbola (curves down). The distribution of your points will determine which type of curve you will draw.

7. **Draw your line of best fit - do not simply connect your points.** In science you are plotting measurements and every measurement has a margin of error. You therefore draw your curve (line) so that it is the best average of all your points. Some points will fall above the line, some will fall below the line and some will fall on the line.