Successful Data Tables and Graphs

Making a Data Table

In Science labs it is very important to stay organized and record an accurate record of what you observe. The written record of your observations is your "DATA."
Pre-labs MUST have a labeled data table before you begin the lab.

1. Data should be organized in a clear, logical way so that anyone reading your report can easily see what you did and what you observed in your experiment.

2. In this class you will be expected to design a table for recording data as part of your "Pre-lab," so that it will be ready to use when you actually begin the investigation.

3. **You CANNOT formulate a useful data table until you have a clear idea of the procedure and the purpose of the investigation!** Therefore the first step in designing a data table is to study the lab until you understand exactly what you will be doing and recording.

4. Most tables are divided into vertical columns and horizontal rows. Each column and each row MUST have a title (and if it involves measurement, it must also include units – seconds, mm, ml, etc.)

5. Every observation you make, be it a measurement or a sketch should (one way or another) be inside of a labeled box. In a table, the "label" is provided by the titles of the columns and rows.

6. You are required to **use a ruler** to make your table. Entries must be neat and legible, Leave plenty of space to write or sketch as needed.

Considerations to help you design a useful data table

1. **What are you measuring (or observing)?** In other words what types of information are you gathering? *For example, if you are measuring the temperature and volume of a solution, you need a "Temperature" column and a "Volume" column. If you are sketching a cell as it appears before and after salt water is added, you need columns for "Before salt water" and "After salt water."*

2. **What type of observation will you need to make?** *(Measurements? Written descriptions? Sketches? Or some combination of these?* Separate boxes will be needed for each type of observation you will make.

   NOTE: Do NOT be stingy with space, especially for sketches – you need LOTS of room to include details and label clearly, and to correct mistakes. *You won't regret making boxes too big but you will ALWAYS regret it if they are too small.*

3. **Will your observation be made at a specific time intervals, and /or different times or dates?** If so, you need a way to indicate the date and/or time of each observation.

4. **Will any number on your table be determined by making calculations rather than by direct measurement (e.g. % error)?** If so, you must have a "Calculations" column where you will show how that number was calculated.

Guidelines for Graphing

Different types of graphs are helpful to show different types of information. Pie graphs compare percentages, bar graphs compare quantitative data, and line graphs can either show data over time, or data plotted on a line graph for a set point in time can also compare data and revel patterns or trends. In addition, a line graph can be used to predict data for points not measured in the experiment.

Requirements for Graphs

- Graphs must be made on graph paper
- Graphs must be made by hand and in pencil.

Rules for Proper Graphs

1. **The graph must have a title that describes the relationship or information it shows.**

"The Average Blood Pressure of Humans at Different Ages"

- The same graph could also be called, "The Relationship between Age and Blood Pressure" – *there isn't just one right way!*

2. **The two axes** [vertical (or "Y") and horizontal (or "X")] **must each be labeled as to what they measure and what units are used.**

- A graph without both axes labeled is meaningless!
- The thing being measured in the experiment (the "dependent variable") goes on the vertical (Y) axis

3. **Set the numerical value of the increments** (spaces) **in each axis so that your data will be spread out as much as possible in the space you're given.**

- Should be a minimum of 1/3 of a page. No teeny-tiny graphs please!

4. **Numbering of the graph does not necessarily have to start with 0. Start numbering at a point that is slightly lower than the lowest data value and stop numbering slightly higher than the highest data value.**

5. **All spaces on each axis must have equal value with every other space on that axis.**

- If one square on the x-axis equals 1 second, then every other square on the x-axis must also equal 1 second – and a distance of 3 squares equals 3 seconds, 14 squares = 14 seconds, etc.

6. **If two sets of data are plotted on the same set of axes: 1) *use different colors of pencil for each* and 2) *label each line***

- For example you could plot the growth of 2 tomato plants (one grown with fertilizer and one grown without) on the same graph. One line could be black and one blue or red and you should indicate in some way – by a key or labels – which color represents which plant.

7. **Do not draw lines connecting the dots on a graph of data from an experiment.**

- There is always some error (this is normal and often because of things you have no control over) in experimental data so it never graphs to form a perfect line. To best show the underlying pattern that the data suggests, draw the straight or smooth curve of the line that comes closest to the data points without actually connecting the dots. This is called the "BEST FIT LINE" or "TREND LINE."