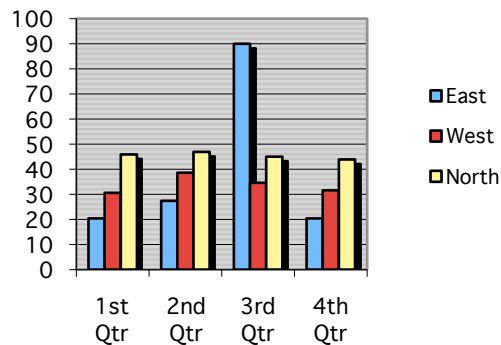
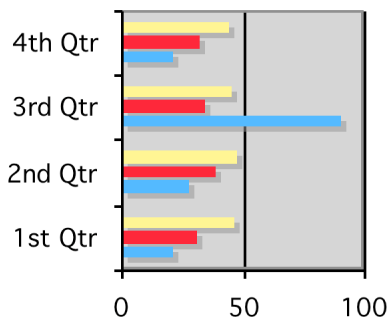


## Choosing Appropriate Graphs *or* What to do with all that data...

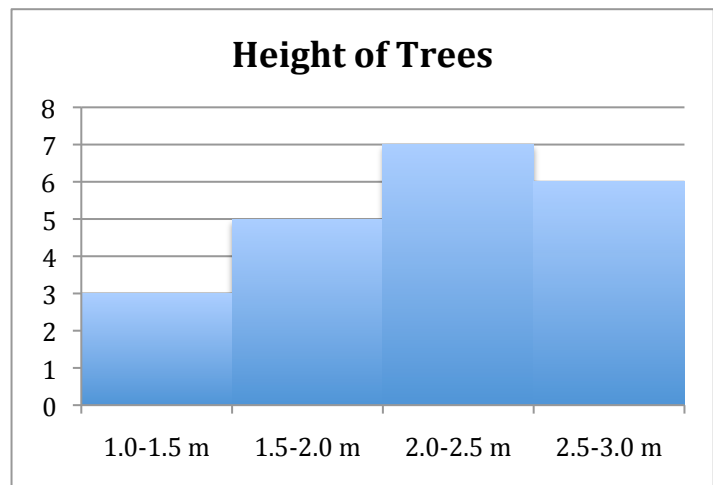
Bar Graphs are appropriate for data that are non-numerical and discrete for at least one variable, i.e. they are grouped into separate categories. There are no dependent or independent variables. Important features of this type of graph include:

- Data are collected for discontinuous, non-numerical categories (e.g. place, colour, and species) so the bars do not touch.
- Data values may be entered on or above the bars if you wish.
- Multiple sets of data can be displayed side-by-side for direct comparison (e.g. males and females of the same age group).
- Axes may be reversed so that the categories are on the x-axis, i.e. the bars can be vertical or horizontal. When they are vertical, these graphs are sometimes called column graphs (MS Excel uses this name for vertical bar graphs).



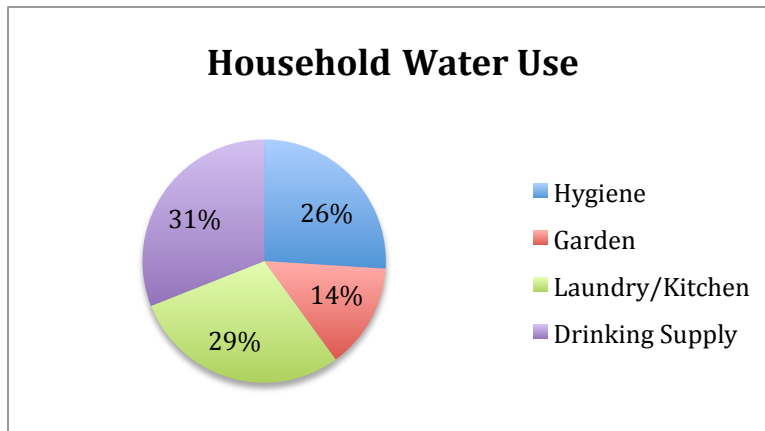
Histograms are plots of continuous data and are often used to represent frequency distributions, where the y-axis shows the number of times a particular measurement or value was obtained. For this reason, they are often called frequency histograms. Important features of this type of graph include:

- The data are numerical and continuous (e.g. height or weight) so the bars touch. (A column graph from Excel can be made into a histogram).
- The x-axis usually records the class interval. The y-axis usually records the number of individuals in each class interval (frequency).



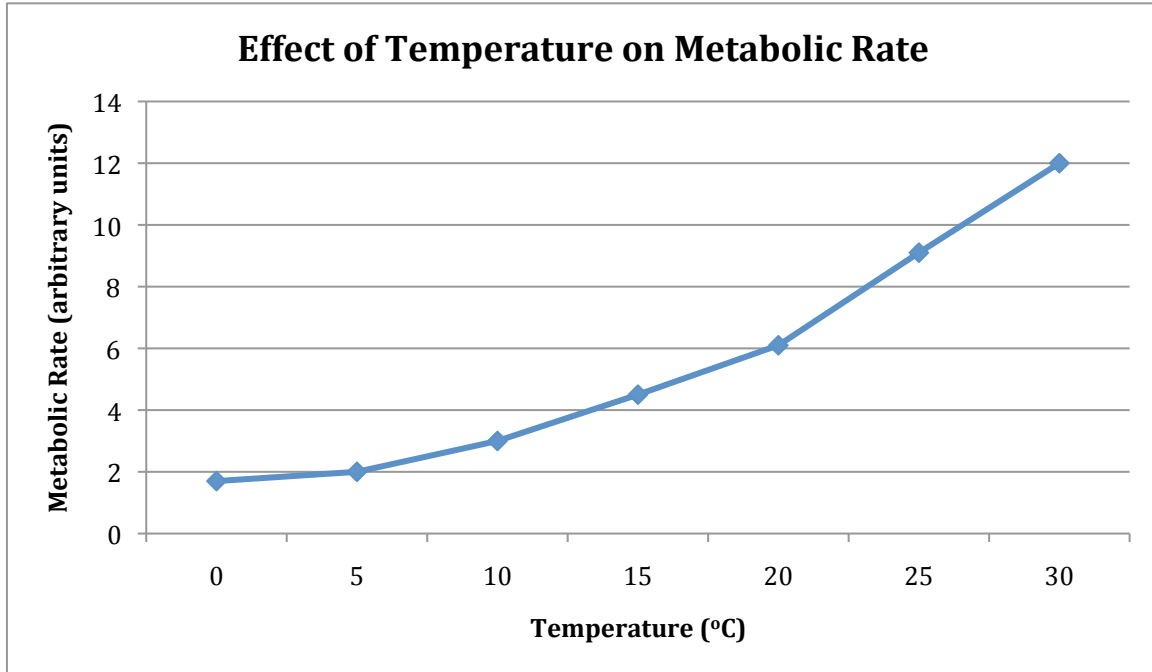
Pie Graphs can be used instead of bar graphs, generally in cases where there are six of fewer categories involved. A pie graph provides strong visual impact of the relative proportions in each category, particularly where one of the categories is very dominant. Features of pie graphs include:

- The data for one variable are discontinuous (non-numerical or categories).
- The data for the dependent variable are usually in the form of counts, proportions or percentages.
- Pie graphs are good for visual impact and showing relative proportions.
- They are not suitable for data sets with a large number of categories.



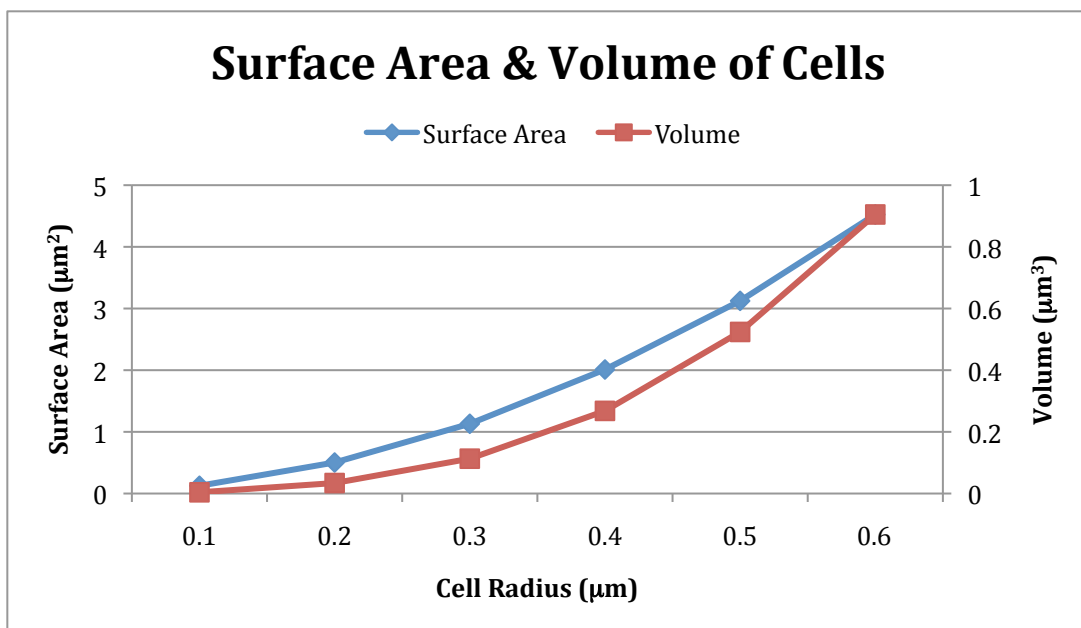
Line Graphs are used when one variable (the independent variable) affects another, the dependent variable. Line graphs can be drawn with or without a measure of spread (error bars). Important features of line graphs include:

- The data must be continuous for both variables.
- The dependent variable is usually the biological response.
- The independent variable is often time or the experimental treatment.
- In cases where there is an implied trend (e.g. one variable increases with the other) a line of best fit is usually plotted through the data points to show the relationship.
- If fluctuations in the data are likely to be important (e.g. with climate and other environmental data) the data points are usually connected directly (point-to-point).
- Line graphs may be drawn with a measure of error. The data are presented as points (the calculated means), with bars above and below, indicating a measure of variability or spread in the data (e.g. standard error, standard deviation or 95% confidence intervals).
- Where no error value has been calculated, the scatter can be shown by plotting the individual data points vertically above and below the mean. By convention, bars are not used to indicate the range of raw values in a data set.



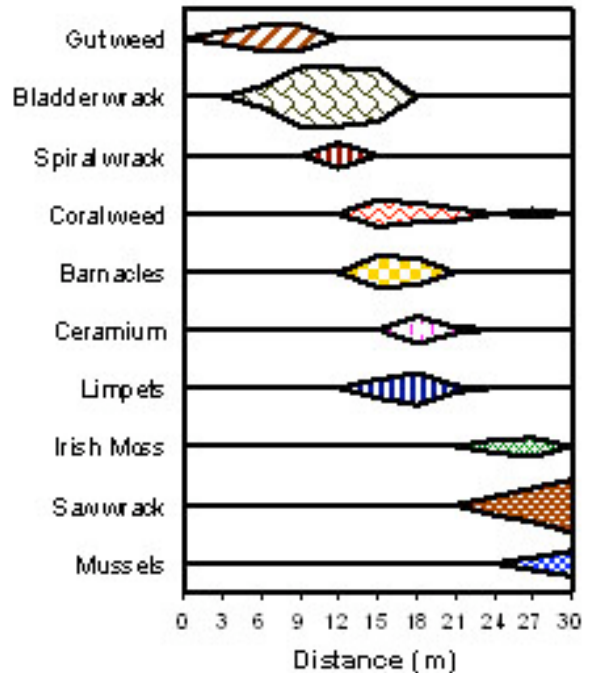
When you are trying to compare multiple data sets, it is most useful to do so on the same axes:

- If the two data sets use the same measurement units and a similar range of values for the independent variables, one scale on the y-axis is used.
- If the two data sets use different units and/or have a very different range of values for the independent variable, two scales for the y-axis are used (see example provided). The scales can be adjusted if necessary to avoid overlapping plots.
- The two curves must be distinguished (use a legend!)



Kite graphs are ideal for representing distributional data (e.g. abundance along an environmental gradient). They are elongated figures drawn along a baseline. Important features of kite graphs include:

- Each kite represents changes in species abundance across a landscape. The abundance can be calculated from the kite width.
- They often involve plots for more than one species; this makes them good for highlighting probable differences in habitat preferences between species.
- A thin line on a kite graph represents species absence (zero value).
- The axes can be reversed depending upon preference.
- Kite graphs may also be used to show changes in distribution with time, for example with daily or seasonal cycles of movement.



Note – MS Excel will only do a kite graph if you have the Merlin Add-In. (PC only)

Scatter Graphs are a common way to display continuous data where there is a relationship between two interdependent variables. Important features of scatter graphs include:

- The data for the graph must be continuous for both variables.
- There is no independent (manipulated) variable, but the variables are often correlated, i.e. they vary together in some predictable way.
- Scatter graphs are useful for determining the relationship between two variables.
- The points on the graph need not be connected, but a line of best fit is often drawn through the points to show the relationship between the variables.
  - This may be drawn by eye or computer-generated.

**Handspan by Age**

