Graphical representations in
VCE Environmental Science

Graphical representations can be used to more clearly show whether any trends, patterns or relationships exist in data. Conclusions drawn from data must be limited by, and not go beyond, the data available.

The type of graphical representation used by students will depend on the type of scientific investigation methodology and the type of variables investigated:

* pie graphs and bar charts can be used to display data in which one of the variables is categorical
* scattergrams can be used to show an association between two variables
* line graphs can be used to display data in which both the independent and dependent variables are continuous
* lines, or curves, of best fit can be used to illustrate the underlying relationship between variables
* sketch graphs (not necessarily on a grid; no plotted points; labelled axes but not necessarily scaled) can be used to show the general shape of the relationship between two variables.

When drawing graphs, students should note that:

* pie charts should be drawn with the sectors in rank order, largest first, beginning at ‘noon’ and proceeding clockwise
* pie charts should preferably contain no more than six sectors
* bar charts should be drawn when one of the variables is not numerical
* bar charts should be made up of narrow blocks of equal width that do not touch
* common types of relationships in environmental science include linear, non-linear and cyclic patterns
* not all experiments will show a correlation between variables; it is possible that another variable causes them both or the correlation may be attributable to chance alone
* the existence of a correlation does not necessarily establish that there is a causal relationship between two variables
* unless instructed otherwise, or unless other conventions or usefulness apply, the independent variable should be plotted on the x-axis (horizontal axis) while the dependent variable should be plotted on the y-axis (vertical axis)
* all graphs should have a title that includes reference to the independent and dependent variables
* all graph axes should be labelled with the physical quantity and the appropriate unit, for example, time (seconds)
* the scales for the axes should be appropriately spaced to allow more than half of the graph grid to be used in both directions
* points on a graph should be clearly marked: students may use crosses (×), dots (•) or circled dots (🞊)
* a line of best fit (trend line) should be a single, thin, smooth straight-line or curve and does not need to coincide exactly with any of the points; a roughly even distribution of points either side of the line over its entire length should be drawn
* points that are clearly anomalous should be further investigated in order to ethically deal with data; if possible, the experiment to generate the data point should be repeated
* graphs should not be forced through (0, 0) even if this is a data point.