Dealing With Data
SNC2D

- **Qualitative** observations are _____
  e.g., "The amplitude of the pendulum decreased slowly over 10 swings."

- **Quantitative** observations contain _____ measurements:
- e.g., "The mass of the pendulum was 150 g."

Quantitative data should contain all the digits that were measured.

E.g., if a length is measured to the nearest millimetre, the nearest millimetre needs to be recorded: 10.0 cm should NOT be recorded as 10 cm. That .0 was measured!
Both qualitative and quantitative data can be recorded and presented in **tables**.

| Table 1: Position-time Information For a Dynamics Cart Traveling Along a Level Surface							
Position (cm)	0	1.6	2.9	4.3	6.2	7.2	9.1
Time (s)	0	0.1	0.2	0.3	0.4	0.5	0.6

Guidelines for creating tables:

- Tables are _____ in the order in which they appear in the experiment.

- A _____ explains in detail what information is presented in the table.

- The table is divided into columns and rows outlined by _____, ruler-drawn borders.

- The rows and/or columns have identifying _____.

- The _____ used in the table are shown in the headings.

Quantitative data may be presented and analysed using **graphs**.

Guidelines for creating graphs:

- Graphs are _____ and _____.

- A graph takes up at least _____ and preferably an entire page. The horizontal and vertical ruler-drawn axes should be placed approximately 2 cm from the edge of the page.

- The axes are labeled with the _____. *Unless otherwise directed* the independent variable is placed on the _____ axis and the dependent variable on the vertical axis.

- The scale is chosen so that all of the points plotted fit on the graph and take up as much space as possible on the graph. The increments of the scale should be in multiples of _____.

- The points are plotted in pencil with a surrounding each sharp dot. A ruler-drawn _____ _____ (or if appropriate, a curve of best fit) is drawn through the points.
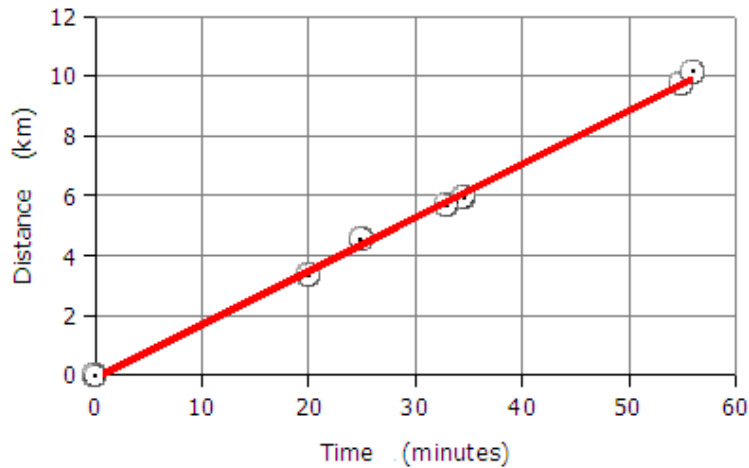
Remember that a line of best fit should have as many points _____ and that the displacements between the points and the line should not form a trend (all points below the line should not be the points to the left and all points above the line should not be the points to the right).

If (0, 0) is a known data point, *use that information* when drawing the line.

Note also that the line should extend beyond the points to allow for _____.

Trends in Graphs

This graph shows a linear increase:

as the independent variable increases,
the dependent variable increases linearly.

Here, as the independent variable increases,
the dependent variable decreases linearly:

Here, as the independent variable increases,
the dependent variable increases at an increasing rate:
This is not necessarily an exponential increase.
It could be a quadratic increase.
The two are not the same thing!

Here, as the independent variable increases,
the dependent variable increases at an decreasing rate:

Here, as the independent variable increases,
the dependent variable decreases at an increasing rate:

Here, as the independent variable increases,
the dependent variable decreases at an decreasing rate:

This graph shows NO RELATIONSHIP
between the independent and dependent variables:

Statements like "as the independent variable increases, the dependent variable increases linearly," are
conclusions, not observations, and appear in the Discussion or the Conclusion section(s).

★ THIS IS SURPRISINGLY CLOSE TO HOW REAL SCIENTISTS ACT AT CONFERENCES.