CAIE Chemistry A-Level

4.2.2 Practical Skills for Paper 3 - Presentation of Data and Observations

Notes

Presentation of data and observations

Data Tables

Tables of data are the most common form of recording observations in chemistry. This type of data is referred to as **qualitative data**. A table should be set up before the experiment starts, and should have the correct rows so that there is enough space to record all of your observations. A student must therefore have a good idea of how many observations they will make as well as what they will be observing. Tables can contain **quantitative** or qualitative data or both, they help to organise the data so conclusions can more easily be made. The table below is an example of a table containing qualitative data.

	Solution A	**Solution B**	**Solution C**
Test with $AgNO_3$	No reaction	White Precipitate	Yellow Precipitate
Test with $Ba(NO_3)_2$	White Precipitate	No reaction	No reaction
Test with NH_3	Blue precipitate	Pink/Buff precipitate	Green Precipitate

Using the above table, we can conclude that solution A contains $CuSO_4$, solution B contains $MnCl_2$, and solution C contains FeI_2. Always bring a ruler and pencil to the exam in order to draw these tables.

Graphs

Introduction

A **table** is a good way of **recording results** and **observations** during the experiment and for **qualitative data** it is also a good way of **presenting** the data. However, for **quantitative data**, a **graph** is generally best used to present the data, as it clearly shows patterns and trends and how the dependent variable varies with the independent variable.

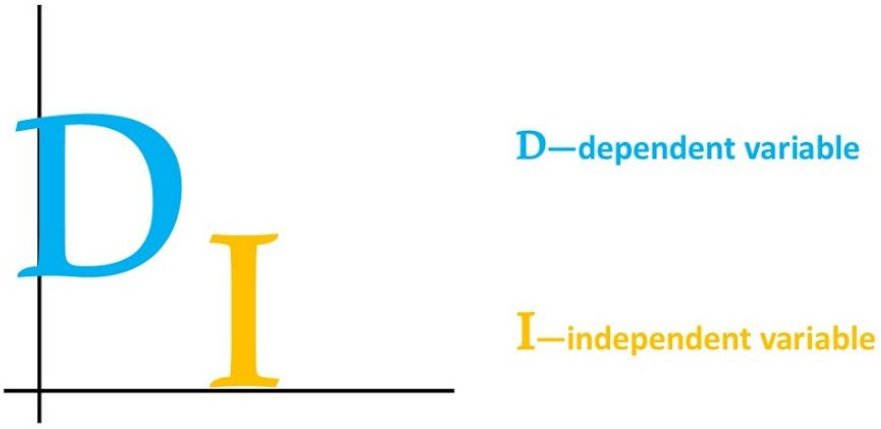
Drawing graphs

You will not only need to be able to **read and interpret** graphs given to you in the exam, you may also be expected to **draw** a graph from a set of data given. Here are some important tips for drawing graphs:

- Always use a **sharpened pencil** and **ruler** to draw the axis and line of best fit.
- **Label** the **axis** with its variable and its **units.**
- Draw your graph a **sensible size.**
    - Use up at least half of the graph paper given.
- Use a sensible **scale.**
- The **dependent variable** goes on the **vertical y axis.**
- The **independent variable** goes on the **horizontal x axis.**
- Determine the **ranges** of the axis so you can include all the data points collected.
- Give the graph an appropriate **title .**
- Indicate any **anomalies** but identify them as anomalous.
    - Ignore these when drawing your line of best fit.

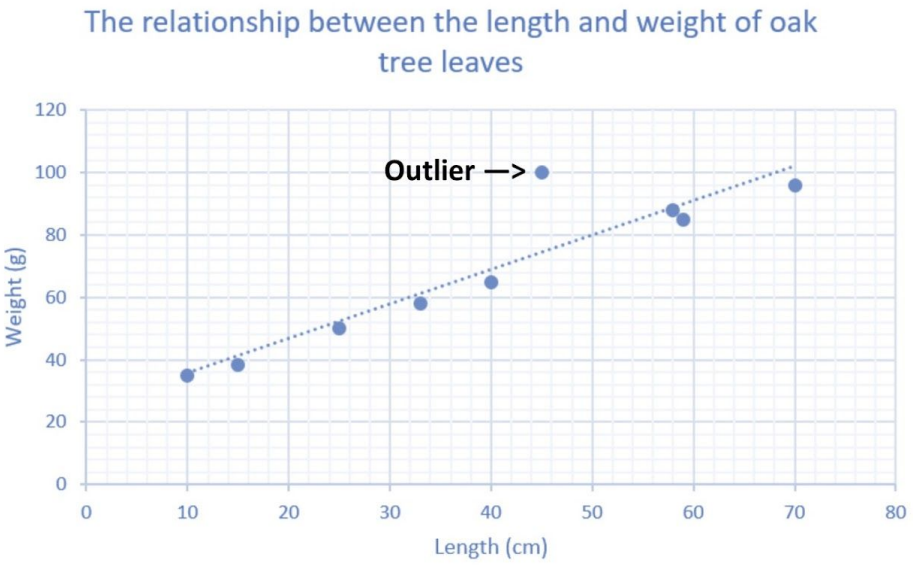
- Draw a **line of best fit** if possible.
    - The 'line' could be **straight or curved.** If the line of best fit is not a straight line, a freehand continuous curve must be drawn.
    - **Never** just connect the points like a dot-to-dot.
    - Bring a long, **clear** ruler to the exam so you can see the data points when drawing a straight line of best fit.

A helpful way to remember which axis the independent and dependent variables go on is to imagine the letters 'I' and 'D' sat on their respective axis as shown:



Shown below is an example graph drawn for the following table of results:
Notice that the **units** of measurements are only included in the title of each column. Each measurement of the same type must be given to the same **degree of accuracy** - e.g. in the table below, each weight value is given to three significant figures. The **graph** to represent this data:

Length (cm)	Weight (g)
10	35.0
15	38.5
25	50.0
33	58.0
40	65.0
45	100
58	88.0
59	85.0
70	96.0



An example conclusion:

The data collected shows that as the length of oak leaves increases, the weight of them also increases linearly. For instance, a leaf which measured 10 cm weighed only 35.0 g whereas a leaf which measured 59 cm weighed 85.0 g. The explanation for this is that longer leaves have a larger surface area and, therefore, a greater mass. If I were to repeat this experiment I would measure longer leaves to investigate whether the trend remains the same and if it remains linear for lengths past 80 cm.

This conclusion includes:

- The **pattern/trend**
- **Data points** to illustrate the trend
- A **scientific explanation** for the trend
- A short **evaluation**

Exam questions

As well as drawing graphs you will need to be able to **interpret and read graphs** given to you in the exam. Possible skills you could be tested on include:

- **Reading data points** off a graph
- **Drawing** an appropriate **line of best fit**
    - Remember it may not be straight!
- Suggesting the **type of graph** you would use for a given set of data
    - General rule of thumb - if **quantitative** use a **scatter graph**, if **qualitative** use a **bar chart.**
- Identifying **patterns** and **trends**
- **Drawing conclusions** from the graph which must include **referencing data points**
- **Comparing** 2 similar graphs
    - For instance, comparing 2 graphs which have the same dependent and independent variables but a different subject of study (e.g. for the example above, comparing that graph to another graph which shows the lengths and weights for a different species of leaf).