

Name: _____ () Class: _____ Date: _____

Biology: Practical Skills

1 Fundamental Concepts

Variables

- _____ variable: variable with values that are manipulated/selected or changed by investigator
- _____ variable: variable that is being measured/read for each change in the independent variable
- _____ variable: variable that *could affect* the dependent variable has to be kept constant to ensure a fair test
- In a well-designed investigation, **only** the independent variable should affect the dependent variable, and **all other variables** (control variables) should be kept constant.

* Self-practice: look through past investigations in WS or TB and identify the independent, dependent, and control variables.

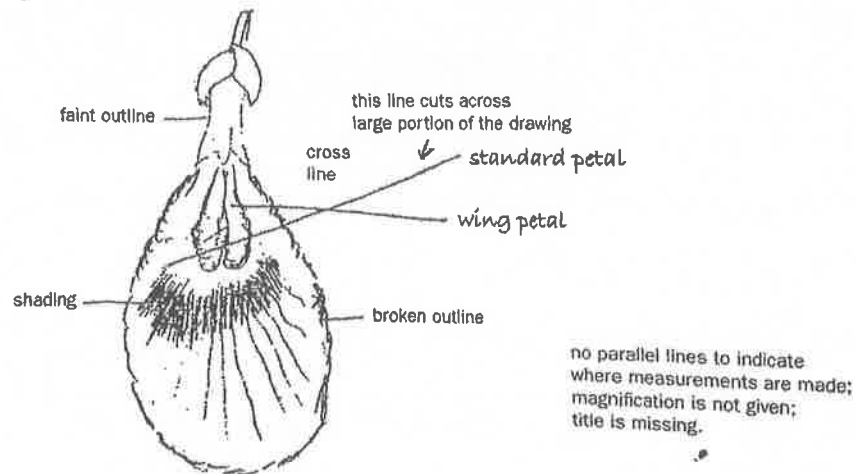
2 Making Observations

Qualitative Data

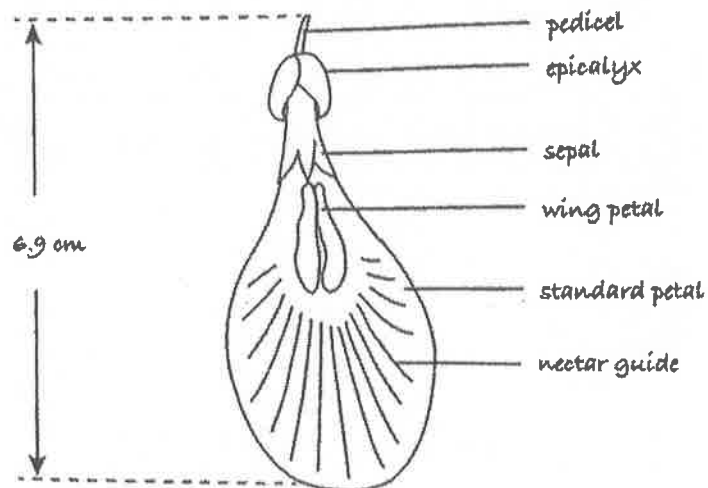
- Descriptions in words

Type of qualitative data	Senses used	What to record
Colour	Sight	Note the colour of contents at the start and end of the reaction. Indicate any intermediate colours during the reaction.
Presence of gases		Observe for bubbling.
Clarity		Notice if solution is clear, cloudy, or opaque.
Texture	Touch	Touch specimen to see if they are rough or smooth.

Example of a poor drawing:



Example of a good biological drawing:



Actual size of flower = 5.8 cm (This varies for different flowers.)

$$\begin{aligned} \text{Magnification} &= \frac{\text{size of drawing (cm)}}{\text{size of actual specimen (cm)}} \times \\ &= \frac{6.9}{5.8} \times \\ &= 1.2 \times (\text{to 1 decimal place}) \end{aligned}$$

Recording Data in Tables

When conducting investigations, you will have to take down raw data, both qualitative observations and quantitative measurements. It is, therefore, important that you present your data in a clear and logical format. One way would be to record data in a table.

- It is important that you spend time to think and work out how you are going to organise your data in a table.
- The table must be easy to read and simple to follow.
- The independent variable is usually placed on the extreme left column of the table. The subsequent columns record the values of the dependent variables or qualitative observations.
- All columns in the table must have a heading stating the variable that is being measured (with SI units) or the quality being observed.
- If there is a need to repeat the experiments, then it is important to group the measurements together so that an average or mean of the measurements can be calculated (see Sample table 1 below). Record the units of the quantity only in the headings (see Sample table 1).

Sample table 1 shows the change in length of potato strips in different salt concentrations. Three readings are taken for each salt concentration.

The independent variable is always recorded in the first column of the table.

The dependent variables will be recorded in subsequent columns.

Units are put only in the header row. Do not put the units in the body of the table, i.e. do not put units for every value that you record.

Concentration of salt solution/ mol/dm ³	Potato strip	Initial length of potato strip/cm	Final length of potato strip/cm	Change in length of potato strip/cm	Average change in length/cm
0.2	1				
	2				
	3				
0.4	1				
	2				
	3				
0.6	1				
	2				
	3				

▲ Sample Table 1