

## **Internal Assessment – Guidelines**

### **Design:**

Aspect 1 :defining the problem and selecting the variables

- Your question must come from an open-ended question to investigate.
- You must identify a focused problem or specific research question
  - Ex: You may be asked to investigate the effect of a factor that influences enzyme activity.
- Variables are factors that can be measured and controlled. Independent variables (IV) are those that are manipulated, and the result of this manipulation leads to the measurement of the dependent variable (DV).
- A controlled variable is one that should be held constant so as not to obscure the effects of the IV on the DV.
- The variables need to be explicitly identified – DV, IV and controlled variables (constants)
- Relevant variables are those that can reasonably be expected to affect the outcome.

Aspect 2: controlling the variables

- This refers to the manipulation of the IV and the attempt to maintain the controlled variables at a constant value.
- Explicit reference to how you will control the variables is required.
- If your method is taken from a textbook or other source, it must be cited.

Aspect 3: developing a method for collection of data

- The planned investigation should anticipate the collection of sufficient data – collecting enough data to ensure the use of statistical analysis.
- If error analysis involving the calculation of standard deviation is to be carried out, then a sample size of at least 5 is needed.
- A table must be designed in order to plan for the data to be collected.

### **Data Collection and Processing:**

Aspect 1: recording raw data

- Raw data is actual data obtained – it may include qualitative data as well
- Uncertainties are associated with all raw data and an attempt should always be made to quantify uncertainties.(ex: if there is an uncertainty in a stop watch measurement due to reaction time, you must make an attempt to estimate the magnitude of the uncertainty).
- The number of significant digits recorded should reflect the precision of the measurement. Always use the same number of decimal places.
- State the level of precision in a solution prepared for you.

Aspect 2: processing raw data:

- Combine and manipulate data to determine values (similarities, differences, etc.)

- Transform data into a form suitable for graphical representation. Best-fit lines should be included when appropriate.
- Plotting raw data without a graph line does not constitute processing data.
- Tables must be clearly distinguishable with appropriate titles, units, and uncertainties.

Aspect 3: presenting the raw data

- Use of spreadsheets, tables, graphs, charts, flow diagrams, etc.
- Clear unambiguous headings for calculations, tables and graphs.
- Graphs must have appropriate scales, labeled axes with units, and accurately plotted data points with a suitable best-line or curve.
- Metric units are expected.
- Uncertainties must be taken into account.

**Conclusion and Evaluation**

Aspect 1: concluding

- Analysis may include comparisons of different graphs or descriptions of trends in graphs. The explanation should contain observations, trends or patterns revealed by the data.
- You should draw a conclusion as to the confidence of your results by comparing your results with textbook or literature values. (referenced)

Aspect 2: evaluating procedure(s)

- The design and the method of the investigation must be commented upon as well as the quality of the data.
- State the weaknesses and their relative level of significance.
- Look specifically at the processes, use of equipment, and management of time.

Aspect 3: improving the investigation

- Suggestions for improvements should be based on the weaknesses and limitations in aspect 2.
- Modifications to the experimental techniques and the data range can be addressed here. (realistic and clearly specified)
  - It is not sufficient to state generally that more precise equipment should be used.
- You may also address extensions/future investigations that can branch off of your investigation.
- Always mention more data collection needed – more trails!