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| Marking Checklist: | | | * Completed & Correct | | | X Not complete/ incorrect |
| **Design** | | **Aspect 1: Define the problem and select the variables** | | | | |
| * Research Question or Aim clearly stated * RQ/Aim includes IV and DV * Background to investigation included * IV correctly identified with units/ range * DV correctly identified with units and precision | | *Hypothesis:*   * It is quantitative * A sketch graph is included, with explanation * Prediction is explained using scientific theory * Sources are cited | | |
| **Aspect 2: Controlling variables** | | | | |
| * Method to manipulate IV, including specific details of range or increments * Method for recording results, including units and uncertainty of tools (± \_\_\_\_\_\_\_\_\_\_\_ ) * Annotated photo of equipment or experimental set-up * **Full citation** of published protocol, if used | | | *Controlled variables presented as a table:*   * **List all variables** to be controlled   ***For each variable:***   * How could it impact the results? * Exactly how will it be controlled? (Value, with method for achieving that value. * Control group present (if applicable). | |
| **Aspect 3: Developing a method for collection of sufficient relevant data** | | | | |
| * Results table designed before investigation was planned, to guide Design * How will results be presented? Reason. * What statistical test(s) will be used? Why? * Does plan to collect data address RQ? * **Min. 5 variations** over a suitable range for the IV (unless comparing populations) * **Explain** how range of IV was selected | | | * **Explain** how raw data will be transformed into processed data for comparison/ plotting * Sufficient repeats at each increment to ensure reliability and allow for stats. 5 trials recommended. * Method clearly presented in step-wise format and can be repeated by others. * **Safety/ ethics concerns addressed**, including *animal experimentation policy*. | |

**Checklists modified slightly from i-Biology.net**

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| **Data Collection and Processing** | **Aspect 1: Recording Raw Data** | |
| * Raw data clearly distinguished from processed data (possibly separate table) * Units of IV and DV present and correct * Uncertainties correct (± \_\_ ) * All data are recorded correctly and honestly | * Decimal points consistent throughout * Decimal points consistent with precision of the measuring equipment * **Associated qualitative data** (observations) MUST be recorded or zero awarded. |
| **Aspect 2: Processing Raw Data** | |
| * Calculations to determine DV carried out, if necessary * Calculations or statistical tests appropriate to investigation and address research question * Mathematics correctly applied * Worked example calculations given | * Standard deviations included where appropriate, with appropriate DP. * Uncertainties adjusted to reflect any calculations carried out. * Processed data (and decimal places) consistent with precision of recorded data |
| **Aspect 3: Presenting Processed Data** | |
| * Tables & graphs do not break across pages * Titles self-explanatory and complete * Consistent decimal places * Uncertainties/ errors included * Appropriate choice of graph * Graphs clear, colouring appropriate * Effective use of space | * Axes labeled clearly, including metric/ SI units and uncertainties of values * Axes scaled appropriately * Error bars included, unless insignificant * Error bar source (e.g. standard deviation) stated and s.d. data are correct * Best fit line/curve with equation |

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| **Conclusion and Evaluation** | **Aspect 1: Concluding** | |
| * Patterns and trends in data stated, with reference to the graph/ tables. * Comparisons, if appropriate, are made * Data related to hypothesis or RQ – to what extent to they agree/ disagree? * **Scientific explanation** for results * Comparison with published data and theoretical texts, if possible. | * Appropriate language used *“Supports the hypothesis”* (not ‘proves’ or ‘is correct’) * Associated qualitative data add value to explanations. * Sources cited appropriately * Suggestions for further investigation stated |
| **Aspect 2: Evaluating procedures** | |
| * Reference to error bars (or STDEV) with regard to variability of results * **Analysis** of reliability of results: * Are data sufficient to address the RQ? * Was the range of the IV appropriate? * Identify & Explain anomalous data points * Refer to quantitative data | Evaluate *random biological variation*, *measurement/ instrument errors*, *systematic error* (problems with the method) in terms of:   * Possible effect on data * Significance of the weakness or limitation in terms of the data set   *This can be clearly presented in a table.* |
| *Time management* or *human error* may be mentioned, though these are not scientific errors – they should be eliminated with good practical skills. The focus here should be on *the investigation*. | |
| **Aspect 3: Improving the investigation** | |
| For each weakness or limitation mentioned above, how could improve experimental design remove or reduce the impact of the error in terms of:   * Techniques used to collect and record data, including precision of equipment * Design of the investigation, including range of values chosen and repeats of each IV data point * Realistic, specific and achievable improvements | |