IA Template: Investigation Title

Background Information:

☐ Topic selected is of suitable complexity (i.e. is not basic that could be done by internet searching)
☐ Relate your idea to published research – does it take it further or approach from a different angle (creativity)
☐ Predication explained using **scientific theory/principles**
☐ Sources are cited appropriately in text
☐ Background information provided is **relevant**
☐ Background information **explains** the **context** of the investigation clearly.

Aim: Clearly describe the point of your investigation

Research Question:

☐ Relate research question to personal experience
☐ Statement that indicates independent thought in choice of topic and/or method or inquiry and/or presentation of findings
☐ Research Question or Aim **clearly stated**
☐ RQ/Aim includes IV and DV (and scientific name of organism if relevant)

Research Hypothesis with Explanation:

☐ It is quantitative
☐ Is formatted as a **Research Hypothesis**
☐ It may be in the form of Null and Alternative Hypothesis **(ONLY if statistical test involved)**

Independent Variable: Describe and then give the "levels" – identify which one will be your baseline/control for comparison

☐ IV correctly identified with **units/range**
☐ **Minimum 5 increments** over a suitable range for the IV (unless comparing populations)

Dependent Variable: Describe and then given HOW you will be measuring this

☐ DV correctly identified with **units** and **precision**

Constants: Minimum of five constants

State WHY the variable must be controlled and HOW you will control it

☐ List all variables to be controlled and present them as a table. For each variable:
  o How could it **impact** the results?
  o Exactly **how** will it be **controlled**? (Value, with method for achieving that value)

Materials:

Procedure:

Include a diagram/annotated photo of experimental set up

☐ Does plan to collect data **address RQ/Aim?**
☐ Method to manipulate IV, including specific details of **range and increments**
☐ Explain how range of IV was selected
☐ Annotated photo of equipment or experimental set-up
☐ Method for recording results, including units and uncertainty of tools (± _)
☐ Method clearly presented in step-wise format and can be repeated by others
☐ What statistical test(s) will be used? Why?
☐ Sufficient **repeats** at each increment to ensure **reliability** and allow for statistics
☐ Results table designed **before investigation is planned**, to guide procedure
☐ Full citation of published protocol, if used
☐ Safety/ethics/environmental concerns addressed, including **animal experimentation policy**

Baseline Test:

If you did a preliminary test for your baseline that allowed you / encouraged you to make adjustments to your plan, include that information here (see exemplar online)

Data Analysis:

Raw Data Table as appropriate including uncertainty measurements

☐ Raw data clearly distinguished from processed data (possibly in a separate table)
☐ Table title is **specific** and **clear**, including IV and DV
☐ Raw data collected is **sufficient** to support a **detailed** and **valid** conclusion
☐ 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

Qualitative Data Fully Described

☐ **Associated qualitative data** (observations) **MUST** be recorded

Sample Worked Calculations, including statistics calculations

☐ Calculations to determine DV carried out, if necessary
☐ Table title is **specific** and **clear**, including IV and DV
☐ Calculations or statistical tests appropriate to investigation to address RQ
☐ Mathematics correctly applied
☐ Worked example calculations given

☐ Standard deviations included where appropriate
☐ Processed data (and decimal places) consistent with precision of recorded data

Graphs as appropriate

☐ Titles self-explanatory and complete
☐ Appropriate choice of graph
☐ Axes labeled clearly, including metric/SI units and uncertainties of values
☐ Axes scaled appropriately
☐ Error bars included, unless insignificant
☐ Error bar source (i.e. standard deviation) stated and data are correct
☐ Line or curve of best fit included (if appropriate)

General Checklist for the Entire Data Analysis Section:

☐ Uncertainties adjusted to reflect any calculations carried out
☐ Uncertainties/errors included in tables and graphs
☐ Uncertainties/errors justified
☐ **Patterns and trends** in data stated, with **specific numerical reference** to the graph/tables
☐ Comparisons, if appropriate, are made

Conclusion:

Evaluation of Investigation

☐ Data related to hypothesis or research question – to what extent do they agree/disagree?
☐ Appropriate language used *"Supports my hypothesis…"* (not "proves" or "is correct")
☐ **Patterns and trends** in data are stated, with reference to graphs/tables
☐ **Comparisons** made within the dataset, where appropriate
☐ **Comparison** with published data and theoretical texts, if possible
☐ **Scientific explanation** for results, with **justification**
☐ Associated **qualitative data** add value to explanations
☐ Suggestions for further investigations stated
☐ Sources cited appropriately

Evaluation of Procedures

☐ Reference to **error bars** (or **standard deviation**) with regard to **variability** or results and **validity** of conclusion
☐ Analysis of sufficiency of data to address the aim/RQ
☐ Analysis of appropriateness of the range of IV values with regard to aim/RQ
☐ Anomalous points (outliers) identified and explained, where appropriate
☐ Associated qualitative data referred to where appropriate

Any of the following could be addressed in a table format – this is the evaluation of possible effect on data and magnitude of error, including suggestions for control if investigation is repeated.

- ☐ Random biological variation
- ☐ Measurement/instrumentation errors
- ☐ Systemic errors (problems with methodology)
- ☐ All other limitations relevant to the investigation

Investigation Improvements and Extensions

Improvements for the limitations/sources of error/investigation:

- ☐ Are realistic and achievable
- ☐ Address the Research Question or Aim **quantitatively** (improving control of IV, DV and CV)
- ☐ Are specific and clearly explained
- ☐ Are cited where improvement relate to published protocols or techniques

References:

Minimum of FOUR peer-reviewed journal references

NO Wikipedia, NO "About.com," Avoid ".com" sites

Use .gov, .edu or see Media Specialist for Galileo Password and how to use this to pull peer-reviewed journals

Overall Assessment for the IA:

COMMUNICATION				
Band	Presentation of investigation:	Report structure:	Understanding:	Subject-specific terminology:
0	Standard not reached.	Standard not reached.	Standard not reached.	Standard not reached.
2	Is **unclear**, making it difficult to understand the **focus, process and outcomes.**	Not well structured and is unclear: the necessary information on **focus, process and outcomes** is missing or is presented in an **incoherent** or **disorganized** way.	Of focus, process and outcomes of the investigation is **obscured** by the presence of **inappropriate** or **irrelevant** information.	Many errors in subject-specific terminology and conventions. Example: incorrect/missing labeling of graphs, tables, images; use of units, decimal places.
4	Is **clear**. Any errors do not hamper	Well structured and clear: the	Of report is **relevant** and	Use of **terminology and**

	understanding of the **focus, process and outcomes.**	necessary information on **focus, process and outcomes** is present and presented in a **coherent** way.	**concise** thereby facilitating a ready understanding of the focus, process and outcomes of the investigation.	**conventions** is appropriate and correct. Any errors do not hamper understanding.