

Checklist of Expectation			
	Personal Engagement (2 Marks)	Not Met	Met
	Assessed throughout report. Includes aspects of creativity and “making it your own”..		
	Assessed throughout report. Includes aspects such as a discussion of changes made to the <i>Procedure</i> in the midst of carrying it out (at the end of the <i>Procedure</i> section) and thoughtful extensions/improvements in the <i>Evaluation</i> .		
	<i>Background</i> paragraph about what led you to your research question and/or reasons for your interest in the dependent and independent variables. Also include a description of any preliminary investigation that steered you toward your research question.		
Exploration (5-6 Marks)			
		Not Met	Met
Background and Hypothesis			
	<p><i>Background</i> paragraphs to investigation are “appropriate to the HL level”, including:</p> <ul style="list-style-type: none"> ○ factors that affect the dependent variable of interest (with references). ○ reason(s) why dependent variable and independent variable (factor) were chosen. ○ scientific names of any organisms used in the investigation. ○ any special equipment needed to vary or measure variables. ○ explanations of any scientific terms or concepts essential for understanding the investigation. 		
	<p>Research Question (RQ) clearly stated and concise.</p> <ul style="list-style-type: none"> ○ Independent variable (IV) correctly identified with units and range. ○ Dependent variable (DV) correctly identified, as directly recorded, with units. (Statement may be made if further calculations need to be performed on DV, but not means, standard deviation, etc.) 		
	<p><i>Research Hypothesis</i> predicts relationship between DV and IV (If...then...because...).</p> <ul style="list-style-type: none"> ○ Prediction explained using scientific theory. ○ Sources are referenced appropriately (assessed in Communication). 		
Variables			
	<p>Variables section includes outline of IV, DV and all relevant control variables (CVs).</p> <ul style="list-style-type: none"> ○ Each condition/increment of IV stated and brief explanation of <u>why</u> this range was chosen (<i>ie.</i> large enough range). ○ Repeat of DV (from RQ) and <u>how</u> it will be measured. ○ Brief explanation/potential impact included about <u>why</u> the CVs need to be kept constant or monitored. (<u>How</u> these will be controlled should be in the Procedure.) 		
Materials			
	Materials includes requirements for precise recording of DV results, including units and uncertainty as appropriate (\pm ___)		
	All Equipment (including glassware) is described in detail (eg. size, type/brand)		

	Exploration ...continued	Not Met	Met
Procedure			
	Step by step Procedure to manipulate IV includes specific detail of changing increments precisely.		
	Procedure refers to annotated diagram (or photo) of complex equipment set-up (if helpful).		
	Considered (thought about) which results must be collected that will be transformed into processed data for graphing and/or comparison in the Analysis.		
	Reference for published protocol, if used.		
	Procedure specifies how to keep each CV constant, including recording measured values using equipment needed to keep a variable constant.		
	2-5 increments / conditions over a suitably large range for the IV dependent on the nature of the investigation, including difficulty of gathering data.		
	Minimum 10 trials/repeats at each increment to ensure reliability.		
	State which specific/relevant qualitative data should be collected (eg. colour, state, gender, etc.)		
	Consider if Procedure is specific and clear enough for to be easily repeated by a non-Biologist.		
Safety, Ethical or Environmental Issues			
	Potential risks waiver for human investigations stapled to back of report		
	Safety/ethical/environmental concerns addressed, including animal experimentation policy.		
	Appropriate disposal of waste and/or live specimens to prevent environmental contamination.		
Analysis (5-6 marks)			
	This criterion assesses the extent to which the student's report provides evidence that the student has selected, recorded, processed and interpreted the data in ways that are relevant to the research question and can support a conclusion.	Not Met	Met
	All data are recorded precisely in titled tables (and sometimes figures), correctly and honestly (raw data is signed).		
	Relevant qualitative data (observations) MUST be recorded or not at all/0 awarded.		
	Decimal places recorded consistent with precision of the measuring equipment.		
	Self-explanatory and numbered titles and headings written for tables and figures (assessed in Communication (Comm)).		
	Raw data clearly distinguished from processed data, use separate tables as appropriate. Generally, processed data must be presented in the Analysis section.		

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	Raw data clearly distinguished from processed data, use separate tables as appropriate. Generally, processed data must be presented in the Analysis section.		
	Have original sheet of observations signed/copied by the teacher and submitted with lab report, and that it matches data tables.		
Data Processing			
	Calculations to determine IV and DV carried out as appropriate to the investigation.		
	One worked sample calculation given for each type. <ul style="list-style-type: none"> ○ Variables/symbols defined for each calculation. ○ Sample numbers included, as appropriate, with units and correct precision where significant digits (<i>eg.</i> decimal places) are consistent with recorded data. ○ Mathematics correctly applied 		
	Sample t-test or chi-squared test includes a H_0		
	One screenshot/print out of a web-based t-test included at the end of the report – corresponds to the sample t-test calculation in the Analysis.		
	Website-calculator referenced appropriately (Comm).		
Measurement and Uncertainty			
	Correct uncertainties (\pm _____) for observed IV, DV, and CVs, often in table headings.		
Data Interpretation and presentation			
	Numbered titles and headings with units written for tables and figures (Comm)		
	Consistent decimal places within each table column (Comm).		
	Choice of graph type is appropriate, with bars / best-fit line / trendline.		
	Graph axes labeled clearly, including metric/SI units (Comm).		
	Axes scaled appropriately.		
	Error bars correctly included on any graphed means.		
	Statement that error bars represent plus or minus 1 standard deviation.		
	Tables and graphs do not break across pages; graphs min 1/2 page (Comm).		
	Graphs clear, with colouring and legend, as appropriate.		
	Complete summary table for statistics, including correct critical values.		

Evaluation (5-6 marks)		Not Met	Met
	This criterion assesses the extent to which the student's report provides evidence of evaluation of the investigation and the results with regard to the research question and the accepted scientific context.		
Conclusion			
	Make a clear conclusion that addresses the research question or hypothesis – to what extent is it supported? There is no need for a detailed summary of how the investigation was carried out.		
	Appropriate language used “supports the hypothesis” (not ‘proves’ or ‘is correct’)		
	State patterns and trend(s) in data, keeping in mind the overall conclusion, by referring to all tables and figures, including: <ul style="list-style-type: none"> ○ Raw data (as presented in the Observations section) and relevant qualitative data, as appropriate. ○ Means and variability, <i>ie.</i> standard deviation size compared to difference between the means and/or overlap of graphed error bars on means. ○ Refer to actual t-test and critical values. Group these into those that were significant and those that were not. ○ Explain t-test results, including random variation allowed in $p=0.05$. 		
Conclusion correctness			
	Comparison, <i>ie.</i> scientific explanation, of results using published data and theoretical texts .		
	Sources are referenced appropriately (assessed in Communication).		
Strengths and Weaknesses			
	A discussion of the strengths – this might be quite general or it might refer to specific parts that worked well or data that was consistent.		
	The actual effect of specific trials – with reference to the data table(s) – on the mean(s), and t-value are discussed, which are examples of: <ul style="list-style-type: none"> ○ Anomalous data (<i>eg.</i> outliers) and/or qualitative data that points to problems with the reliability or even validity of the conclusion ○ Particularly high variability of results, <i>ie.</i> very large standard deviations (error bars) ○ Inappropriateness of the range of IV values with regard to the Purpose/Research Question or other systemic limitations of the investigation /procedure /method. ○ Measurement/instrument/time limitations that cannot otherwise be eliminated with effective lab skills. 		

Communication (3-4 marks)		Not Met	Met
	This criterion assesses whether the investigation is presented and reported in a way that supports effective communication of the focus, process and outcomes.		
Errors			
	Proper spelling, grammar, syntax, <i>etc.</i>		
Structure			
	Sections in order and logical flow of information within each section.		
	Titles and page numbers present		
Focus and Concise			
	12 pages or less overall, but being concise also includes writing with an appropriate level of detail and without being <i>unnecessarily</i> repetitive.		
Terminology and Conventions			
	Self-explanatory titles for the overall report, tables (including list of headings), and figures that include the independent and dependent variables and the context of the investigation (eg. organism, group characteristics, etc).		
	The title bar/page <u>must not include</u> any personal or school information – only the title. You may still use your name for filenames for submission to Turnitin.		
	Appropriate decimal places (eg. significant digits only) throughout <i>Observations</i> and <i>Analysis</i> , and units shown in table headings (not with each value) and in sample calculations.		
	Sufficient and appropriate labels for figures (eg. graphs, images, <i>etc.</i>) with units as necessary.		
	Sources referenced consistently using an accepted format.		
	Website-calculator referenced appropriately.		