

Identifying the Context (CXT)

This criterion assesses the extent to which the student establishes and explores an environmental issue (either local or global) for an investigation and develops this to state a relevant and focused research question. Max 6 points – 20% overall of IA grade

Mark	Aspect		
	Research Question	Environmental Issue	Local/Global Connections
0	The student's report does not reach a standard described by the descriptors below		
1-2	States a research question, but there is a lack of focus	Outlines an environmental issue (either local or global) that is linked to the research question	Lists connections between the environmental issue (either local or global) and the research question but there are significant omissions.
3-4	States a relevant research question. The topic of the investigation is identified and a relevant but not fully focused research question is described.	Outlines an environmental issue (either local or global) that provides the context to the research question	Describes connections between the environmental issue (either local or global) and the research question, but there are omissions.
5-6	States a relevant, coherent and focused research question The topic of the investigation is identified and a relevant and fully focused research question is clearly described.	Discusses a relevant environmental issue (either local or global) that provides the context for the research question	Explains the connections between the environmental issue (either local or global) and the research question.
<i>A rough guide to help you achieve in this section</i>	❖ Research question is clearly stated	❖ Background is focused on one environmental issue	❖ Background enhances understanding of connection of research question chosen to one specific environmental issue
	❖ The research question is a precisely formulated question	❖ Background gives sufficient description of the environmental issue	❖ Provides the reader a clear explanation of how the research question was chosen in relation to the environmental issue focused on
	❖ The research question can be used to formulate a hypothesis	❖ Provides sufficient information to describe how the IV and DV chosen relate to the focus environmental issue	
	❖ Common and scientific name of species used	❖ Provides a balanced review including a range of arguments of the focus environmental issue	

Planning (PLA)

This criterion assesses the extent to which the student has developed appropriate methods to gather data that is relevant to the research question. This data could be primary or secondary, qualitative or quantitative, and may utilize techniques associated with both experimental or social science methods of inquiry. There is an assessment of safety, environmental and ethical considerations where applicable *Max 6 points – 20% overall of IA grade*

Mark	Aspect		
	Method	Sampling Strategy	Ethics & Risks
0	The student's report does not reach a standard described by the descriptors below		
1-2	Designs a method that is inappropriate because it will not allow for the collection of relevant data	Outlines the choice of sampling strategy but with some errors and omissions	Lists some risks and ethical considerations where applicable.
3-4	Designs a repeatable* method appropriate to the research question but the method does not allow for the collection of sufficient relevant data .	Describes the choice of sampling strategy	Outlines the risk assessment and ethical considerations where applicable.
5-6	Designs a repeatable* method appropriate to the research question that allows for the collection of sufficient relevant data	Justifies the choice of sampling strategy used	Describes the risk assessment and ethical considerations where applicable.
A rough guide to help you achieve in this section	❖ IV correctly identified with units/range including an explanation of how this range was chosen	❖ Provides evidence to support the sampling strategy chosen. Rationale explained clearly	❖ Refers to the IB animal experimentation policy
	❖ DV correctly identified with units and described how it will be measured	❖ Provides a detailed description of how the sample sizes and strategy were chosen	❖ Takes into account guidelines when working with animal or human subjects
	❖ Important control variables identified and presented as a table. The likely impact of each control variable is discussed	❖ Correct method of sampling chosen. Will collect relevant data	❖ Detailed description of how the experiment upheld ethical standards
	❖ List of apparatus including sizes and uncertainty ** If useful, add an annotated photo or diagram of equipment or experimental set-up	❖ Sufficient trials and ranges chosen to collect enough data to analyze and reach a conclusion	❖ Detailed description of how safety measures were followed throughout the lab
	❖ Specific method to keep each controlled variable constant has been explained clearly.	❖ Sampling strategy is random (unbiased) Technique used to create a random sample is described	
	❖ Method is not generic, but is tailored to answer the research question	❖ Method of sampling is appropriate to the focused research question	
	❖ Method is clear, specific and easily replicated by the reader		

Results, Analysis & Conclusion (RAC)

This criterion assesses the extent to which the student has collected, recorded, processed and interpreted the data in ways that are relevant to the research question. The patterns in the data are correctly interpreted to reach a valid conclusion. *Max 6 points – 20% overall of IA grade*

Mark	Aspect		
	Results & Data Presentation	Analysis	Conclusion
0	The student's report does not reach a standard described by the descriptors below		
1-2	Constructs some diagrams, charts or graphs of quantitative and/or qualitative data, but there are significant errors or omissions	Analyses some of the data but there are significant errors and/or omissions	States a conclusion that is not supported by the data.
3-4	Constructs diagrams, charts or graphs of quantitative and/or qualitative data which are appropriate but there are some omissions.	Analyses the data correctly but the analysis is incomplete	Interprets some trends, patterns or relationships in the data so that a conclusion with some validity is deduced.
5-6	Constructs diagrams, charts or graphs of all relevant quantitative and/or qualitative data appropriately	Analyses the data correctly and completely so that all relevant patterns are displayed	Interprets trends, patterns or relationships in the data, so that a valid conclusion to the research question is deduced.
A rough guide to help you achieve in this section	❖ Includes insightful and thorough qualitative data (observations)	❖ Calculations to determine DV carried out, if necessary	❖ Conclusion is clearly stated
	❖ Tables created appropriately including title, uncertainties, units and decimals	❖ Calculations or statistical tests appropriate to investigation, justified and address research question	❖ Conclusion based on, and refers to the interpretation of processed and raw data
	❖ Graphs created appropriately including title, labels, uncertainties, units and decimals	❖ Standard deviations included where appropriate (a minimum of 5 repeats is required for a valid calculation)	❖ Level of support (strong, weak, no support, inconclusive, etc) for the hypothesis/research question is identified, correct and justified
	❖ Data should be presented in a way that directly answers the research question	❖ Patterns and trends in data described with reference to the graph/tables	❖ Possible impacts of qualitative data discussed
		❖ Variation (such as Std Dev) within the data discussed	❖ Refers to trends or patterns seen in data to support conclusions. Uses data in conclusion statements
		❖ Error bars included, unless insignificant	
	❖ Error bar source (such as standard deviation or min/max values) stated and correct		

Discussion & Evaluation (DEV)

This criterion assesses the extent to which the student discusses the conclusion in the context of the environmental issue, and carries out an evaluation of the investigation. *Max 6 points – 20% overall of IA grade*

Mark	Aspect		
	Discussion	Strengths, Weaknesses & Limitations	Modifications
0	The student's report does not reach a standard described by the descriptors below		
1-2	Describes how some aspects of the conclusion are related to the environmental issue	Identifies some strengths and weaknesses and limitations of the method	Suggests superficial modifications and/or further areas of research.
3-4	Evaluates the conclusion in the context of the environmental issue but there are omissions	Describes some strengths, weaknesses and limitations within the method used	Suggests modifications and further areas of research.
5-6	Evaluates the conclusion in the context of the environmental issue	Discusses strengths, weaknesses and limitations within the method used	Suggests modifications addressing one or more significant weaknesses with large effect and further areas of research.
A rough guide to help you achieve in this section	❖ Relates the conclusion back to the research question and larger environmental issue	❖ Includes an analysis of the effectiveness of the method designed. (choice of variables, materials chosen, sample size, etc)	❖ Improvements appropriate (realistic) and related to the research question/hypothesis
	❖ Discusses level at which the results and conclusion can answer the research question and larger environmental issue	❖ Analysis of sufficiency of data, is the way the DV is measured producing valid results or does it need to be changed?	❖ Improvements are specific (ex: equipment named) and clearly explained
	❖ Refers to validity of conclusions based on weaknesses & strengths to answer the research question and larger environmental issue	❖ Systematic errors (problems with method) i.e. identified controlled or uncontrolled variables, are discussed	❖ Addresses all the identified limitations/weaknesses of the data and sources of error
		❖ Discuss why it's a weakness/limitation (how does it limit the results/conclusion. How did it affect the results obtained)	❖ Suggestions for further investigations are based on the conclusion and are relevant to the research question
		❖ Discuss random error inherent in studying habitats/organisms	❖ What's the next step/question?

Application (APP)

This criterion assesses the extent to which the student identifies and evaluates one way to apply the outcomes of the investigation in relation to the broader environmental issue that was identified at the start of the project. *Max 3 points – 10% overall of IA grade*

Mark	Aspect	
	Application	Strengths, Weaknesses & Limitations
0	The student's report does not reach a standard described by the descriptors below	
1	States one potential application and/or solution to the environmental issue that has been discussed in the context	Describes some strengths, weaknesses and limitations of this solution.
2	Describes one potential application and/or solution to the environmental issue that has been discussed in the context, based on the findings of the study, but the justification is weak or missing	Evaluates some relevant strengths, weaknesses and limitations of this solution.
3	Justifies one potential application and/or solution to the environmental issue that has been discussed in the context, based on the findings of the study	Evaluates relevant strengths, weaknesses and limitations of this solution.
A rough guide to help you achieve in this section	❖ Application/solution discussed is directly linked to the environmental issue highlighted in context/background	❖ Discusses in detail the validity (strengths, weaknesses and limitations) of the solution chosen
	❖ Provides evidence from conclusions and findings in the study to support the application/solution chosen	❖ Focuses on the application/solution provided
	❖ Application/solution chosen is realistic and relevant	❖ States an appraisal after weighing all the strengths and weaknesses

Communication (COM)

This criterion assesses whether the report has been presented in a way that supports effective communication in terms of structure, coherence and clarity. The focus, process and outcomes of the report are all well presented. *Max 3 points – 10% overall of IA grade*

Mark	Aspect		
	Organization	Terminology	Content
0	The student's report does not reach a standard described by the descriptors below		
1	The investigation has limited structure and organization.	The report makes limited use of appropriate terminology and it is not concise.	The presentation of the report limits the reader's understanding.
2	The report has structure and organization but this is not sustained throughout the report.	The report either makes use of appropriate terminology or is concise.	The report is mainly logical and coherent, but is difficult to follow in parts.
3	The report is well-structured and well-organized.	The report makes consistent use of appropriate terminology and is concise.	The report is logical and coherent.
A rough guide to help you achieve in this section	❖ A consistent linguistic style (preferably passive voice/third person) maintained throughout the essay	❖ Essay shows a mastery of, and fluency in, the use of appropriate scientific terminology	❖ Sequential order with logical flow
	❖ Obvious clear structure outlined, for example: clear headings and titles	❖ Avoid excessive use of jargon	❖ Report is easy to read and understand
	❖ Graphs, tables and images included as close as possible to its first reference/use	❖ Non-standard technical terms explained and used in the correct context (to demonstrate understanding)	
	❖ Graphs, tables and images titled Ex: Graph 1 (followed by specific title about what is being presented)	❖ Report attempts to use the language of ESS	
	❖ Tables and graphs do not break across pages		
	❖ Effective use of space leads to clarity of presentation		