

## BIOLOGY SUBJECT RUBRIC

	Level 5-6	Level 3-4	Level 1-2	Level 0
<p><b>Criterion A: Focus &amp; Method</b> <i>Biology:</i></p> <p>The research question must be:</p> <ul style="list-style-type: none"> <li>• <b>Answerable</b> within the limitations of resources, time and words at the student's disposal</li> <li>• <b>Identified</b> clearly</li> <li>• Clearly set within the academic <b>framework of biology</b> set out prominently at the <u>start</u> of the essay.</li> </ul> <p><b>Methods:</b> demonstrate that chosen methods &amp; materials are appropriate for addressing the RQ and explain their rationale for choosing practical methods.</p> <p><b>Experimental work: must include sufficient information on their methodology for the work to be repeated.</b></p>	<p><b>The topic is communicated accurately and effectively.</b></p> <ul style="list-style-type: none"> <li>• Identification and explanation of the research topic is effectively communicated; the purpose and focus of the research is clear and appropriate.</li> <li>• <b>Include the general background biological theory required to understand how the research question has arisen.</b></li> </ul> <p><b>The research question is clearly stated and focused.</b></p> <ul style="list-style-type: none"> <li>• The research question is clear and addresses an issue of research that is appropriately connected to the discussion in the essay.</li> <li>• <b>Use the RQ to formulate hypotheses</b></li> </ul> <p><b>Methodology of the research is complete.</b></p> <ul style="list-style-type: none"> <li>• An appropriate range of relevant source(s) and/or method(s) have been applied in relation to the topic and research question.</li> <li>• There is evidence of effective and informed selection of sources and/methods.</li> </ul>	<p><b>The topic is communicated.</b></p> <ul style="list-style-type: none"> <li>• Identification and explanation of the research topic is communicated; the purpose and focus of the research is adequately clear, but only partially appropriate.</li> </ul> <p><b>The research question is clearly stated but only partially focused.</b></p> <ul style="list-style-type: none"> <li>• The research question is clear but the discussion in the essay is only partially focused and connected to the research question.</li> </ul> <p><b>Methodology of the research is mostly complete.</b></p> <ul style="list-style-type: none"> <li>• Source(s) and/or method(s) to be used are generally relevant and appropriate given the topic and research question.</li> <li>• There is some evidence that their selection(s) was informed.</li> </ul> <p><i>If the topic or research question is deemed inappropriate for the subject in which the essay is registered no more than four marks can be awarded for this criterion.</i></p>	<p><b>The topic is communicated unclearly and incompletely.</b></p> <ul style="list-style-type: none"> <li>• Identification and explanation of the topic is limited; the purpose and focus of the research is unclear, or does not lend itself to a systematic investigation in the subject for which it is registered.</li> </ul> <p><b>The research question is stated but not clearly expressed or too broad.</b></p> <ul style="list-style-type: none"> <li>• The research question is too broad in scope to be treated effectively within the word limit and requirements of the task, or does not lend itself to a systematic investigation in the subject for which it is registered.</li> <li>• The intent of the research question is understood but has not been clearly expressed and/or the discussion of the essay is not focused on the research question.</li> </ul> <p><b>Methodology of the research is limited.</b></p> <ul style="list-style-type: none"> <li>• The source(s) and/or method(s) to be used are limited in range given the topic and research question. •There is limited evidence that their selection was informed.</li> </ul>	<p><b>The work does not reach a standard outlined by the descriptors below.</b></p>

**SOURCES:** The sources consulted must be sufficient and each must contribute to the research focus of the essay. If the study is based on the research of secondary data, students need to ensure that their selection of sources is sufficiently wide and reliable. If students have undertaken an investigation under guidance in an external laboratory, they must clearly demonstrate:

- their understanding of the methods and materials applied
- their role in choosing and applying them.

If students are investigating a well-documented or standard topic, they should attempt to look for a new perspective on the issue.

	Level 5-6	Level 3-4	Level 1-2	Level 0
<p><b>Criterion B: Knowledge and understanding</b></p> <p><b>Biology:</b> Experimental work is <u>not a requirement</u> for a biology EE. However, a <b>theoretical dimension must be part of any empirical investigation.</b></p>	<p><b>Knowledge and understanding is excellent.</b></p> <ul style="list-style-type: none"> <li>The selection of source materials is clearly relevant and appropriate to the research question. <ul style="list-style-type: none"> <li><b>effectively referenced and incorporated into the body of the essay in a way that demonstrates understanding</b></li> <li><b>predominantly from acknowledged scientific sources.</b></li> </ul> </li> <li>Knowledge of the topic/discipline(s)/issue is clear and coherent and sources are used effectively and with understanding.</li> </ul> <p><b>Use of terminology and concepts is good.</b></p> <ul style="list-style-type: none"> <li>The use of subject-specific terminology and concepts is accurate and consistent, demonstrating effective knowledge and understanding. <ul style="list-style-type: none"> <li><b>Avoid excessive use of jargon and focus on communicating clearly</b></li> </ul> </li> <li><b>Any technical terms that are used should be explained and the student must demonstrate an understanding of these terms by using them appropriately within the text.</b></li> <li><b>Symbols, equations, significant digits and SI units should be applied appropriately and consistently.</b></li> </ul>	<p><b>Knowledge and understanding is good.</b></p> <ul style="list-style-type: none"> <li>The selection of source material is mostly relevant and appropriate to the research question.</li> <li>Knowledge of the topic/discipline(s)/issue is clear; there is an understanding of the sources used but their application is only partially effective.</li> </ul> <p><b>Use of terminology and concepts is adequate.</b></p> <ul style="list-style-type: none"> <li>The use of subject-specific terminology and concepts is mostly accurate, demonstrating an appropriate level of knowledge and understanding.</li> </ul> <p>If the topic or research question is deemed inappropriate for the subject in which the essay is registered no more than four marks can be awarded for this criterion.</p>	<p><b>Knowledge and understanding is limited.</b></p> <ul style="list-style-type: none"> <li>The selection of source material has limited relevance and is only partially appropriate to the research question.</li> <li>Knowledge of the topic/discipline(s)/issue is anecdotal, unstructured and mostly descriptive with sources not effectively being used.</li> </ul> <p><b>Use of terminology and concepts is unclear and limited.</b></p> <ul style="list-style-type: none"> <li>Subject-specific terminology and/or concepts are either missing or inaccurate, demonstrating limited knowledge and understanding.</li> </ul>	<p><b>The work does not reach a standard outlined by the descriptors below.</b></p>

		Level 7-9	Level 4-6	Level 1-3	Level 0
<p><b>Criterion C: Critical Thinking</b></p> <p><b>Use of data</b> The student is expected to analyse the data and sources and related uncertainties. This analysis will often include:</p> <ul style="list-style-type: none"> <li>• mathematical transformations</li> <li>• statistical analysis such as standard deviations and t-tests</li> <li>• tables of processed data graphs</li> </ul> <p>If the data are analysed <b>statistically</b>, the student must clearly show understanding in the body of the essay of:</p> <ul style="list-style-type: none"> <li>• why that particular measure or test was chosen</li> <li>• how it was applied</li> <li>• what the results mean in this context.</li> </ul>	<p><b>The research is excellent.</b></p> <ul style="list-style-type: none"> <li>• The research is appropriate to the research question and its application is consistently relevant.</li> </ul> <p><b>Analysis is excellent.</b></p> <ul style="list-style-type: none"> <li>• The research is analysed effectively and clearly focused on the research question; the inclusion of less relevant research does not significantly detract from the quality of the overall analysis.</li> <li>• Conclusions to individual points of analysis are effectively supported by the evidence.</li> </ul> <p><b>Discussion/evaluation is excellent.</b></p> <ul style="list-style-type: none"> <li>• An effective and focused reasoned argument is developed from the research with a conclusion reflective of the evidence presented.</li> <li>• This reasoned argument is well structured and coherent; any minor inconsistencies do not hinder the strength of the overall argument or the final summative conclusion.</li> <li>• The research has been critically evaluated.</li> </ul>	<p><b>The research is good.</b></p> <ul style="list-style-type: none"> <li>• The majority of the research is appropriate and its application is clearly relevant to the research question.</li> </ul> <p><b>Analysis is good.</b></p> <ul style="list-style-type: none"> <li>• The research is analysed in a way that is clearly relevant to the research question; the inclusion of less relevant research rarely detracts from the quality of the overall analysis.</li> <li>• Conclusions to individual points of analysis are supported by the evidence but there are some minor inconsistencies.</li> </ul> <p><b>Discussion/evaluation is good.</b></p> <ul style="list-style-type: none"> <li>• An effective reasoned argument is developed from the research, with a conclusion supported by the evidence presented.</li> <li>• This reasoned argument is clearly structured and coherent and supported by a final or summative conclusion; minor inconsistencies may hinder the strength of the overall argument.</li> <li>• The research has been evaluated, and this is partially critical.</li> </ul>	<p><b>The research is adequate.</b></p> <ul style="list-style-type: none"> <li>• Some research presented is appropriate and its application is partially relevant to the Research question.</li> </ul> <p><b>Analysis is adequate.</b></p> <ul style="list-style-type: none"> <li>• There is analysis but this is only partially relevant to the research question; the inclusion of irrelevant research detracts from the quality of the argument.</li> <li>• Any conclusions to individual points of analysis are only partially supported by the evidence.</li> </ul> <p><b>Discussion/evaluation is adequate.</b></p> <ul style="list-style-type: none"> <li>• An argument explains the research but the reasoning contains inconsistencies.</li> <li>• The argument may lack clarity and coherence but this does not significantly hinder understanding.</li> <li>• Where there is a final or summative conclusion, this is only partially consistent with the arguments/evidence presented.</li> <li>• The research has been evaluated but not critically.</li> </ul>	<p><b>The research is limited.</b></p> <ul style="list-style-type: none"> <li>• The research presented is limited and its application is not clearly relevant to the RQ.</li> </ul> <p><b>Analysis is limited.</b></p> <ul style="list-style-type: none"> <li>• There is limited analysis.</li> <li>• Where there are conclusions to individual points of analysis these are limited and not consistent with the evidence.</li> </ul> <p><b>Discussion/evaluation is limited.</b></p> <ul style="list-style-type: none"> <li>• An argument is outlined but this is limited, incomplete, descriptive or narrative in nature.</li> <li>• The construction of an argument is unclear and/or incoherent in structure hindering understanding.</li> <li>• Where there is a final conclusion, it is limited and not consistent with the arguments/evidence presented.</li> <li>• There is an attempt to evaluate the research, but this is superficial.</li> </ul> <p><i>If the topic or research question is deemed inappropriate for the subject in which the essay is registered no more than three marks can be awarded for this criterion.</i></p>	<p><b>The work does not reach a standard outlined by the descriptors below.</b></p>

**NOTE:** Students must make a special effort to maintain a reasoned, logical argument that focuses on the research question. Essays that attempt to deal with a large number of variables are unlikely to be focused and coherent. A clear and logical argument can be achieved by making repeated reference to the research question and to the hypotheses derived from it. An assessment of the extent to which the hypotheses are supported, or the question is answered, by the data or information accessed should form part of the argument. The stated conclusion(s) must be based on, and consistent with, the research presented in the essay. Biological research often reveals unexpected outcomes and these should be pointed out. The original research question may not be fully answered by the investigation. In these cases, the student may point out unresolved issues and may make suggestions as to how these might be further investigated. The student must comment on the quality, balance and quantity of the secondary sources and data used. They are also expected to show an awareness of any limitations or uncertainties inherent in their approach. In particular, they should critically comment on the validity and reliability of their data relative to their management of variables within the investigation.

	Level 5-6	Level 3-4	Level 1-2	Level 0
<p><b>Criterion D: Presentation</b></p> <p>This criterion assesses the extent to which the presentation follows the standard format expected for academic writing and the extent to which this aids effective communication.</p>		<p><b>Presentation is good.</b></p> <ul style="list-style-type: none"> <li>The structure of the essay clearly is appropriate in terms of the expected conventions for the topic, the argument and subject in which the essay is registered.</li> <li>Layout considerations are present and applied correctly.</li> <li>The structure and layout support the reading, understanding and evaluation of the extended essay.</li> </ul>	<p><b>Presentation is acceptable.</b></p> <ul style="list-style-type: none"> <li>The structure of the essay is generally appropriate in terms of the expected conventions for the topic, argument and subject in which the essay is registered.</li> <li>Some layout considerations may be missing or applied incorrectly.</li> <li>Weaknesses in the structure and/or layout do not significantly impact the reading, understanding or evaluation of the extended essay.</li> </ul>	<p><b>The work does not reach a standard outlined by the descriptors below.</b></p>
<p><b>Criterion E: Engagement</b></p> <p>This criterion assesses the student's engagement with their research focus and the research process.</p> <p>It Will be applied by the examiner at the end of the assessment of the essay, after considering the student's Reflections on planning and progress form.</p>	<p><b>Engagement is excellent.</b></p> <ul style="list-style-type: none"> <li>Reflections on decision-making and planning are evaluative and include reference to the student's capacity to consider actions and ideas in response to setbacks experienced in the research process.</li> <li>These reflections communicate a high degree of intellectual and personal engagement with the research focus and process of research, demonstrating authenticity, intellectual initiative and/or creative approach in the student voice.</li> </ul>	<p><b>Engagement is good.</b></p> <ul style="list-style-type: none"> <li>Reflections on decision-making and planning are analytical and include reference to conceptual understanding and skill development.</li> <li>These reflections communicate a moderate degree of personal engagement with the research focus and process of research, demonstrating some intellectual initiative.</li> </ul>	<p><b>Engagement is limited.</b></p> <ul style="list-style-type: none"> <li>Reflections on decision-making and planning are mostly descriptive.</li> <li>These reflections communicate a limited degree of personal engagement with the research focus and/or research process.</li> </ul>	<p><b>The work does not reach a standard outlined by the descriptors below.</b></p>

**Structure:** Students may use numbered and headed paragraphs to impose a clear structure. Subheadings should not distract from the overall structure of the essay or argument presented.

**Recording experiments:** Aim for scientific paper style, rather than a cookery book recipe approach. The **record should include:** a scientific annotated diagram to introduce key elements of the set-up; relevant details of key equipment; a summary of the essential procedural steps.

- Students should avoid including minor or irrelevant details and repetitions, but must include those elements needed for reliability and replicability.

**Charts, images, graphs and tables (SEE NEXT PAGE)**

**Charts, images, graphs and tables:**

- Any graphs, figures or tables generated by students or taken from literature sources must be carefully selected and labelled. They should only be used if they are directly relevant to the research question, contribute towards the understanding of the argument and are of a good graphic quality.
- Students must accompany images, charts and tables with analysis and discussion to show how they further the essay’s argument.
- Only processed data that is central to the argument of the essay should be included in the body of the essay, as close as possible to its first reference.
- Tables should enhance a written explanation but not themselves include significant bodies of text. If they do, then these words must be included in the word count.
- Clarity in tables and graphs (legend) is important and students should not use unnecessary “over-formatting” that may detract from communication.
- A representative sample of raw data collected in large amounts by the student must be included in the core of the essay in a data table, including uncertainties and units. Any table should be designed to clearly display the information in the most appropriate form.
- Large tables of raw data collected by the student are best included in an appendix, where they should be carefully labelled.
- Graphs or charts drawn from the analysed data should be selected to highlight only the most pertinent aspects related to the argument. Too many graphs, charts and tables will detract from the overall quality of the communication.
- The use of a summary table and the combination of multiple graphs into one graph (family of curves) will avoid unnecessary repetitions.
- Students should illustrate key mathematical transformations with examples. Equations referred to in the text should be numbered.

Grade A	Grade B	Grade C	Grade D	Grade E
<p>Demonstrates effective research skills resulting in a well-focused and appropriate research question that can be explored within the scope of the chosen topic; effective engagement with relevant research areas, methods and sources; excellent knowledge and understanding of the topic in the wider context of the relevant discipline; the effective application of source material and correct use of subject-specific terminology and/or concepts further supporting this; consistent and relevant conclusions that are proficiently analysed; sustained reasoned argumentation supported effectively by evidence; critically evaluate research; excellent presentation of the essay, whereby coherence and consistency further supports the reading of the essay; and present and correctly applied structural and layout elements.</p> <p>Engagement with the process is conceptual and personal, key decision-making during the research process is documented, and personal reflections are evidenced, including those that are forward-thinking.</p>	<p>Demonstrates appropriate research skills resulting in a research question that can be explored within the scope of the chosen topic; reasonably effective engagement with relevant research areas, methods and sources; good knowledge and understanding of the topic in the wider context of the relevant discipline; a reasonably effective application of source material and use of subject-specific terminology and/or concepts; consistent conclusions that are accurately analysed; reasoned argumentation often supported by evidence; research that at times evidences critical evaluation; and a clear presentation of all structural and layout elements, which further supports the reading of the essay.</p> <p>Engagement with the process is generally evidenced by the reflections and key decision-making during the research process is documented.</p>	<p>Demonstrates evidence of research undertaken, which has led to a research question that is not necessarily expressed in a way that can be explored within the scope of the chosen topic; partially effective engagement with mostly appropriate research areas, methods and sources—however, there are some discrepancies in those processes, although these do not interfere with the planning and approach; some knowledge and understanding of the topic in the wider context of the discipline, which is mostly relevant; the attempted application of source material and appropriate terminology and/concepts; an attempted synthesis of research results with partially relevant analysis; conclusions partly supported by the evidence; discussion that is descriptive rather than analytical; attempted evaluation; satisfactory presentation of the essay, with weaknesses that do not hinder the reading of the essay; and some structural and layout elements that are missing or are incorrectly applied.</p> <p>Engagement with the process is evidenced but shows mostly factual information, with personal reflection mostly limited to procedural issues.</p>	<p>Demonstrates a lack of research, resulting in unsatisfactory focus and a research question that is not answerable within the scope of the chosen topic; at times engagement with appropriate research, methods and sources, but discrepancies in those processes that occasionally interfere with the planning and approach; some relevant knowledge and understanding of the topic in the wider context of the discipline, which are at times irrelevant; the attempted application of source material, but with inaccuracies in the use of, or underuse of, terminology and/or concepts; irrelevant analysis and inconsistent conclusions as a result of a descriptive discussion; a lack of evaluation; presentation of the essay that at times is illogical and hinders the reading; and structural and layout elements that are missing.</p> <p>Engagement with the process is evidenced but is superficial, with personal reflections that are solely narrative and concerned with procedural elements.</p>	<p>Demonstrates an unclear nature of the essay; a generally unsystematic approach and resulting focused research question; limited engagement with limited research and sources; generally limited and only partially accurate knowledge and understanding of the topic in the wider context of the relevant discipline; ineffective connections in the application of source material and inaccuracies in the terminology and/or concepts used; a summarizing of results of research with inconsistent analysis; an attempted outline of an argument, but one that is generally descriptive in nature; and a layout that generally lacks or incorrectly applies several layout and structural elements.</p> <p>Engagement with the process is limited, with limited factual or decision-making information and no personal reflection on the process.</p>