

IB BIOLOGY: Extended Essay Assessment

Name: _____

All extended essays are externally assessed by examiners appointed by the IBO. All extended essays are marked on a scale from 0 to 36. For each criterion, examiners are instructed to identify the level descriptor that is most appropriate (i.e. the best match) for the extended essay under consideration.

Criterion A: Research question

In a biology extended essay, the research question is best stated in the form of a question. The research question should be a precisely formulated question that the research will attempt to answer. The research question can then be used to formulate a hypothesis, which can be tested. A broad statement of the topic of the essay or a statement of the hypothesis is not sufficient on its own to meet the requirement for a research question in a biology extended essay. The research question should be identified clearly and set out prominently EARLY in the introduction. In weaker essays the RQ appears after several pages of introduction and literature review. This is problematic as the reader is unable to identify the significance of the information in the introduction or follow a line of argument. The research question must also appear in the abstract and may be repeated in the later part of the essay or in the conclusion. Problems arise when the RQ is presented in different parts of the essay (title, abstract, and introduction) using slightly different wording. This should be avoided.

- _____ 0 the research question is not stated in the early part of the essay **or** does not lend itself to systematic investigation in the context of an extended essay.
- _____ 1 the research question is stated in the early part of the essay but not in a precise manner **or** the research question is clearly and precisely stated but is too broad in scope to be treated effectively within the word limit.
- _____ 2 the research question is clearly and precisely stated in the early part of the essay and is sharply focused, making it susceptible to effective treatment within the word limit.

Criterion B: Introduction

The purpose of the introduction is to set the research question into context. It is usually appropriate to include the general background and biological theory required to understand how the research question has arisen. There are three aspects to this criterion: the context, the significance and the worthiness of investigation. In order to reach the top level, all three aspects must be adequately dealt with. In order to demonstrate the biological context and significance of the research question the candidate needs to present a summary of literature and other sources that have been accessed. In many cases, students tend to deal only with "worthiness of investigation" and in doing so tend to refer to personal motivation rather than what the results of the study might reveal about the question being investigated. It is helpful to the examiner if the introduction is clearly identified as a subsection of the essay with a chapter heading.

- _____ 0 little or no attempt is made to set the research question into context. There is little or no attempt to explain the significance of the topic.
- _____ 1 some attempt is made to set the research question into context. There is some attempt to explain the significance of the topic and why it is worthy of investigation.
- _____ 2 the context of the research question is clearly demonstrated. The introduction clearly explains the significance of the topic and why it is worthy of investigation.

Criterion C: Investigation

The way in which the investigation is written will depend very much on whether or not the essay is based on experimental work. For essays that are based on data taken from written sources, you should explain clearly how the data has been selected and should comment on its reliability. For experimental work, sufficient information on the methodology should be provided to allow the work to be repeated. You must demonstrate that you understand the theory behind any techniques or apparatus used. In other words, justify the approach do not simply report a method. You are also expected to show an awareness of any limitations or uncertainties inherent in your techniques and apparatus. There must be clear evidence that the investigation was planned by you. You can achieve this by explaining how information obtained from the sources helped to guide your decisions about which approach to follow. A well planned investigation will not have a predetermined outcome and will be free from bias.

Many biology investigations involve the use of solutions and or other chemicals. In these cases it is important to get the basic chemistry and related calculations right. It is disappointing to see biological investigations undermined by a flawed

understanding or flawed computations. Weak investigations often suffer from a poor understanding or application of basic concepts in chemistry such as pH, dilution, concentration and solubility.

- _____ 0 there is little or no evidence that sources have been consulted or data gathered, and little or no evidence of planning in the investigation.
- _____ 1 a range of inappropriate sources has been consulted, or inappropriate data has been gathered, and there is little evidence that the investigation has been planned.
- _____ 2 a limited range of appropriate sources has been consulted, or data has been gathered, and some relevant material has been selected. There is evidence of some planning in the investigation.
- _____ 3 a sufficient range of appropriate sources has been consulted, or data has been gathered, and relevant material has been selected. The investigation has been satisfactorily planned.
- _____ 4 an imaginative range of appropriate sources has been consulted, or data has been gathered, and relevant material has been carefully selected. The investigation has been well planned.

Criterion D: Knowledge and understanding of the topic studied

A biology extended essay should be based on specific, relevant and clearly defined aspects of the biological study of living organisms. The information and ideas should be presented in a way that provides evidence that these have been understood and applied correctly. In order to reach the top level for this criterion, you are expected to show that you understand the topic you are investigating. You can do this for example by providing explanations and justifications for your decisions about the research direction (why was something included, why was something else omitted). This can also be done by presenting relevant background information and explaining how this relates to the RQ. Understanding can be demonstrated with reference to the relevant variables that might affect the investigation as well as with reference to the significance of the outcomes. Essays that consist mainly of tracts of text taken directly from the sources will fail to convince the examiners that there is in fact an appropriate level of understanding. This also applies to highly technical texts that provide no explanation for terminology. You also need to show that you understand how your investigation fits into the existing academic framework. You can do this by referring to texts you've read and showing how you've used the information from these sources to guide your own research.

- _____ 0 the essay demonstrates no real knowledge or understanding of the topic studied.
- _____ 1 the essay demonstrates some knowledge but little understanding of the topic studied. The essay shows little awareness of an academic context for the investigation.
- _____ 2 the essay demonstrates an adequate knowledge and some understanding of the topic studied. The essay shows some awareness of an academic context for the investigation.
- _____ 3 the essay demonstrates a good knowledge and understanding of the topic studied. Where appropriate, the essay successfully outlines an academic context for the investigation.
- _____ 4 the essay demonstrates a very good knowledge and understanding of the topic studied. Where appropriate, the essay clearly and precisely locates the investigation in an academic context.

Criterion E: Reasoned Argument

You 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.

Many candidates struggle to sustain a line of argument throughout the essay. In order to achieve a more fluent and coherent argument, you need to be explicit about your reasoning. Students tend to leave it up to the reader to see the significance of the information they are providing or to make the connections between the research question and the conclusions reached. Key elements of the argument include answers to the following questions: "What am I trying to find out?"; "How am I going about finding out?"; "What did I find out?" and "What does this new information tell me?" These need to be linked clearly throughout the text of the essay.

- _____ 0 there is no attempt to develop a reasoned argument in relation to the research question.
- _____ 1 there is a limited or superficial attempt to present ideas in a logical and coherent manner, and to develop a reasoned argument in relation to the research question.
- _____ 2 there is some attempt to present ideas in a logical and coherent manner, and to develop a reasoned argument in relation to the research question, but this is only partially successful.
- _____ 3 ideas are presented in a logical and coherent manner, and a reasoned argument is developed in relation to the research question, but with some weaknesses.
- _____ 4 ideas are presented clearly and in a logical and coherent manner. The essay succeeds in developing a reasoned and convincing argument in relation to the research question.

Criterion F: Application of analytical and evaluative skills appropriate to the subject

The stated conclusion(s) must be based on the data, information and/or evidence presented in the essay. The data must be analyzed and presented in such a way that the argument leading to the conclusion is supported and clarified. Tables of raw data will generally not achieve this on their own. It is often helpful, if there is a large body of raw data, for this to be included in an appendix and for summary charts and tables to be in the main body of the essay. Raw data must be analyzed, processed and presented in a way that relates clearly and directly to the central argument of the essay. This analysis should allow for an assessment of the validity of the hypothesis. You are encouraged to use statistical analysis where appropriate, explain and justify your approach. Errors and uncertainties arising from the methodology, instruments and/or techniques should be analyzed and critically evaluated.

- _____ 0 the essay shows no application of appropriate analytical and evaluative skills.
- _____ 1 the essay shows little application of appropriate analytical and evaluative skills.
- _____ 2 the essay shows some application of appropriate analytical and evaluative skills, which may be only partially effective.
- _____ 3 the essay shows sound application of appropriate analytical and evaluative skills.
- _____ 4 the essay shows effective and sophisticated application of appropriate analytical and evaluative skills (such as the use of deductive reasoning, graphical analysis and statistical approaches).

Criterion G: Use of language appropriate to the subject

There are in fact two aspects to this criterion: the use of clear and precise language on the one hand and the use of terminology appropriate to the topic on the other. You must maintain a consistent linguistic style throughout the essay and show mastery and fluency in the use of appropriate terminology. You must show an ability to write in a formal style and to accurately use the key terms. Avoid excessive use of jargon. Any technical terms should be explained and used appropriately within the text. Problems arise with very technical investigations where an essay consists largely of descriptions of detailed experimental protocols with little or no attempt to explain the technical language. There is no requirement to write in the passive voice. Writing in the first person singular, active voice may be clearer and may in fact be easier to sustain.

- _____ 0 the language used is inaccurate and unclear. There is no effective use of terminology appropriate to the subject.
- _____ 1 the language used sometimes communicates clearly but does not do so consistently. The use of terminology appropriate to the subject is only partly accurate.
- _____ 2 the language used for the most part communicates clearly. The use of terminology appropriate to the subject is usually accurate.
- _____ 3 the language used communicates clearly. The use of terminology appropriate to the subject is accurate, although there may be occasional lapses.
- _____ 4 the language used communicates clearly and precisely. Terminology appropriate to the subject is used accurately, with skill and understanding.

Criterion H: Conclusion

The conclusion should relate directly to the research question and should point out the main findings of the research. Express the conclusions carefully and do not overstate your findings. Outline the extent to which the research question has been answered. Where possible the conclusions should be verified by reference to the literature. Biological research often reveals unexpected outcomes and these should be pointed out, even if they were not part of the original plan. The original research question may not be fully answered by the investigation. In these cases, the student should point out unresolved issues and make suggestions as to how these might be further investigated.

- _____ 0 little or no attempt is made to provide a conclusion that is relevant to the research question.
- _____ 1 a conclusion is attempted that is relevant to the research question but may not be entirely consistent with the evidence presented in the essay.
- _____ 2 an effective conclusion is clearly stated; it is relevant to the research question and consistent with the evidence presented in the essay. It includes unresolved questions where appropriate to the subject concerned.

Criterion I: Formal presentation

- Biological investigations often require the support of referenced material, not only in the form of text or data, but also as diagrams or drawings. Care must be taken to supply references for illustrations taken from sources. Illustrative material should only be included if it enhances the argument or supplies information that cannot be easily provided in another way. Original photographs, photocopies or downloaded images that are not labeled or put into the context of the investigation are unlikely to enhance the essay.
- Biological investigations often result in large quantities of raw data. Large tables of raw data can be presented in an appendix but should be referred in the text of the essay.
- 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. The details of calculations associated with this can be in an appendix. If you reports the results of statistical analysis in an appendix but make no reference to it in the text then the statistics will not be taken into consideration when assessing the essay (since the appendix is not part of the essay).
- All of the sources accessed must be included in the bibliography. For the majority of the items in the bibliography there should be some in-text reference. Care needs to be taken to provide appropriate and complete bibliographic entries for online sources – simply providing the URL is not sufficient.
- Some essays have no obvious structure. This is often reflected in a less than helpful table of contents along the lines of: “introduction”, “body”, and “conclusion”. Headings used in the table of contents should appear in the text of the essay and candidates should carefully check the page numbers for chapters. Candidates tend to use the heading “conclusion” for the section in which they interpret and discuss their data. Often only the final paragraph of this section is the conclusion proper. You are discouraged from using the titles of the internal assessment criteria as chapter headings.

- _____ 0 the formal presentation is unacceptable, or the essay exceeds 4,000 words.
- _____ 1 the formal presentation is poor.
- _____ 2 the formal presentation is satisfactory.
- _____ 3 the formal presentation is good.
- _____ 4 the formal presentation is excellent.

Criterion J: Abstract

For a biological investigation, the abstract must include the research question and a conclusion that directly relates to the research question. In addition, the description of how the research was conducted must include a description of the methodology and the scope of the study.

- _____ 0 the abstract exceeds 300 words or one or more of the required elements of an abstract (listed above) is missing.
- _____ 1 the abstract contains the elements listed above but they are not all clearly stated.

_____ 2 the abstract clearly states all the elements listed above.

Criterion K: Holistic judgment

The purpose of this criterion is to assess the qualities that distinguish an essay from the average, such as intellectual initiative, depth of understanding and insight. Qualities that are rewarded under this criterion include the following.

- Intellectual initiative: Ways of demonstrating this in biology essays include the choice of topic and research question, and the use of novel or innovative approaches to address the research question.
- Insight and depth of understanding: These are most likely to be demonstrated as a consequence of detailed research and thorough reflection, and by well-informed and reasoned argument that consistently and effectively addresses the research question.
- Originality and creativity: These will be apparent by clear evidence of a personal approach backed up by solid research and reasoning.

_____ 0 the essay shows no evidence of such qualities.

_____ 1 the essay shows little evidence of such qualities.

_____ 2 the essay shows some evidence of such qualities.

_____ 3 the essay shows clear evidence of such qualities.

_____ 4 the essay shows considerable evidence of such qualities.

OTHER NOTES:

- If you have human subjects, you must provide evidence of informed consent having been obtained.
- Essays based on practical work carried out at a university or other research institution must be accompanied by a covering letter from a qualified person at the external institution. The cover letter should outline the role of the candidate in deciding the research approach as well as the type and extent of guidance provided at the institution. The person responsible should be made fully aware of the nature of the extended essay requirement. When work of this type is submitted, clear evidence must be provided (in the form of a covering letter), that the candidate has had a sufficient level of input into decisions about the research approach and selection of methodology and sources. The candidate should justify these decisions within the text of the essay. The person(s) responsible at the outside institution should be aware of the extended essay requirements and be asked to ensure that the candidate will have ample opportunity to plan and work independently.
- Extended essays in biology must comply with the *IB Animal experimentation policy*. This outlines minimum standards related to working with animal and human subjects. These standards apply regardless of whether the work is carried out on site or at a research institution or university which might have more far-reaching approval with regard to animal research.

Grade:
Mark
range
(2012)

E
0 - 7

D
8 - 15

C
16 - 22

B
23 - 28

A
29 - 36

Predicted Total: _____