



National  
Qualifications

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# Biology

## Project-report

### General assessment information

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This pack contains general assessment information for centres preparing candidates for the project-report Component of Advanced Higher Biology Course assessment.

It must be read in conjunction with the specific assessment task for this Component of Course assessment which may only be downloaded from SQA's designated secure website by authorised personnel.

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# Introduction

This is the general assessment information for Advanced Higher Biology project-report.

This project-report is worth 30 marks out of a total of 120 marks available for this Course. The Course will be graded A-D.

Marks for all Course Components are added up to give a total Course assessment mark which is then used as the basis for grading decisions.

This is one of two Components of Course assessment. The other Component is a question paper.

The assessment task will be set and externally marked by SQA and conducted in centres under the conditions specified by SQA.

This document describes the general requirements for the assessment of the project-report Component for this Course. It gives general information and instructions for assessors.

It must be read in conjunction with the assessment task for this Component of Course assessment.

## Equality and inclusion

This Course assessment has been designed to ensure that there are no unnecessary barriers to assessment. Assessments have been designed to promote equal opportunities while maintaining the integrity of the qualification.

For guidance on assessment arrangements for disabled candidates and/or those with additional support needs, please follow the link to the Assessment Arrangements web page: [www.sqa.org.uk/sqa/14977.html](http://www.sqa.org.uk/sqa/14977.html)

Guidance on inclusive approaches to delivery and assessment in this Course is provided in the *Course/Unit Support Notes*.

# What this assessment covers

This project-report is worth 30 marks out of a total of 120 marks available for this Course.

The assessment will assess the skills, knowledge and understanding specified for the project-report in the *Course Assessment Specification*. These are:

- ◆ extending and applying knowledge of biology to new situations, interpreting and analysing information to solve complex problems
- ◆ planning and designing biological experiments/investigations, using reference material and including risk assessments, to test a hypothesis or to illustrate particular effects
- ◆ recording systematic detailed observations and collecting data
- ◆ selecting information from a variety of sources and presenting detailed information appropriately, in a variety of forms
- ◆ processing and analysing biological information (using calculations, significant figures and units, where appropriate)
- ◆ making reasoned predictions and generalisations from a range of evidence/information
- ◆ drawing valid conclusions and giving explanations supported by evidence/justification
- ◆ critically evaluating experimental procedures by identifying sources of error, suggesting and implementing improvements
- ◆ drawing on knowledge and understanding of biology to make accurate statements, describe complex information, provide detailed explanations and integrate knowledge
- ◆ communicating biological findings/information fully and effectively
- ◆ analysing and evaluating scientific publications and media reports

# Assessment

## Purpose

The purpose of this assessment is to generate evidence for the Added Value of this Course by means of a project-report.

## Assessment overview

Assessment should take place when the candidates are ready to be assessed.

In this assessment the candidate will carry out an in-depth investigation of a biology topic. The topic will be chosen by the candidate. The candidate must discuss the selection of possible topics with their assessor to ensure that time is not wasted on researching topics that are unsuitable. The candidate will work individually to investigate/research the underlying biology of the topic. This is an open-ended task which may involve a significant part of the work being carried out without supervision.

The project-report offers challenge by requiring skills, knowledge and understanding to be applied in a context that is one or more of the following:

- ◆ unfamiliar
- ◆ familiar but investigated in greater depth
- ◆ integrating a number of familiar contexts

Prior to starting this assessment candidates should have started a biology investigation. This should normally be as part of the *Investigative Biology* Unit. In that Unit, candidates are required to plan and carry out a biology investigation. Candidates should keep a record of their work as this may form the basis of their project-report. This record should include details of their research, experiments and recorded data.

The project-report submitted to SQA must have a logical structure and must be clear, concise and easy to read.

The project-report should be between 3000 and 3600 words in length excluding the title page, contents page, tables, graphs, diagrams, calculations, references, acknowledgements and any appendices. The word count should be submitted with the project-report. If the word count exceeds the maximum by 10%, a 3 mark penalty will be applied. It should be written in the past tense and the impersonal voice should be used.

Detailed advice on the content of the project-report is given in the *Advanced Higher Biology Project Assessment Task*.

## Assessment conditions

Assessors must exercise their professional responsibility in ensuring that evidence submitted by a candidate is the candidate's own work.

This assessment will be carried out over a period of time. Candidates should start at an appropriate point in the Course. This will normally be after they have started work on the Units in the Course.

Evidence which meets the requirements of this Component of Course assessment will be between 3000 and 3600 words. The word count should be submitted with the project-report. If the word count exceeds the maximum by 10%, a 3 mark penalty will be applied.

There are no restrictions on the resources to which candidates may have access.

Candidates must undertake the assessment, whatever the nature, independently. However, reasonable assistance may be provided prior to the formal assessment process taking place. The term 'reasonable assistance' is used to try to balance the need for support with the need to avoid giving too much assistance.

Coursework in Advanced Higher may involve learners undertaking a larger amount of autonomous work without close supervision than they have previously undertaken. Assessors may provide guidance and support as part of the normal teaching and learning process. However, assessors should not adopt a directive role or provide specific advice on how to re-phrase, improve responses or provide model answers.

Assessor comments on the selection of a topic are appropriate before the candidate starts the task.

The requirements of the project-report should be made clear to candidates at the outset.

The project-report will be conducted under some supervision and control. This means that although candidates may complete part of the work outwith the learning and teaching setting, assessors should put in place processes for monitoring progress and ensuring that the work is the candidate's own and that plagiarism has not taken place.

Assessors should put in place mechanisms to authenticate candidate evidence. For example:

- ◆ regular checkpoint/progress meetings with candidates
- ◆ short spot-check personal interviews
- ◆ checklists which record activity/progress
- ◆ photographs, film or audio evidence

## Evidence to be gathered

The following candidate evidence is required for this assessment:

- ◆ a project-report

The project-report will be submitted to SQA, within a given timeframe, for marking. The same project-report cannot be submitted for more than one subject.

# General Marking Instructions

In line with SQA's normal practice, the following general Marking Instructions are addressed to the marker. They will also be helpful for those preparing candidates for Course assessment.

Evidence will be submitted to SQA for external marking.

All marking will be quality assured by SQA.

## General Marking Principles for Advanced Higher Biology project-report

*This information is provided to help you understand the general principles you must apply when marking candidate responses to this project-report. These principles must be read in conjunction with the Detailed Marking Instructions, which identify the key features required in candidate responses.*

- (a) Marks for each candidate response must always be assigned in line with these General Marking Principles and the Detailed Marking Instructions for this assessment.
- (b) Marking should always be positive. This means that, for each candidate response, marks are accumulated for the demonstration of relevant skills, knowledge and understanding: they are not deducted from a maximum on the basis of errors or omissions.



## Overview of Marking Instructions

Assessment category and criteria	Marks
<b>Abstract</b> <ul style="list-style-type: none"> <li>◆ a brief abstract stating the main aim(s) and overall finding(s) of the investigation</li> </ul>	1 (1)
<b>Introduction</b> <ul style="list-style-type: none"> <li>◆ clear statement of aim(s) together with relevant hypotheses/questions</li> <li>◆ account of underlying biology is coherent and relevant to aim(s)</li> <li>◆ biological terms/ideas are explained clearly and accurately</li> <li>◆ biological terms/ideas are at an appropriate depth</li> <li>◆ biological importance is explained/justified</li> </ul>	1  4   (5)
<b>Procedures</b> <ul style="list-style-type: none"> <li>◆ appropriate to aim(s)</li> <li>◆ procedures described clearly in sufficient detail to allow the investigation to be repeated</li> <li>◆ appropriate controls</li> <li>◆ control of variables</li> <li>◆ sample size</li> <li>◆ independent replicates</li> <li>◆ complexity, creativity, accuracy and modification</li> </ul>	1 2  1 1 1 1 2 (9)
<b>Results</b> <ul style="list-style-type: none"> <li>◆ relevant to aim(s) of the investigation</li> <li>◆ raw data recorded and within limits of accuracy of measurement</li> <li>◆ appropriate presentation</li> <li>◆ quality of presentation</li> <li>◆ presentation summarises overall results</li> <li>◆ a clear statement of any trends (or the absence of any trend), shown by the data, is given</li> </ul>	1 1 1 1 1 1 (6)
<b>Discussion (conclusion(s) and evaluation)</b> <ul style="list-style-type: none"> <li>◆ conclusion(s) relate to aim(s) of the investigation</li> <li>◆ conclusion(s) is/are valid</li> <li>◆ evaluation of procedures includes comment as appropriate on:               <ul style="list-style-type: none"> <li>— accuracy/sources of error in measurement</li> <li>— adequacy of replication/sampling</li> <li>— adequacy of controls</li> <li>— positive and/or negative aspects of investigation design</li> <li>— solutions to problems and modifications to procedures</li> </ul> </li> <li>◆ evaluation of results includes as appropriate:               <ul style="list-style-type: none"> <li>— analysis of results</li> <li>— interpretation of results</li> <li>— critical and scientific discussion of significance of finding(s)</li> </ul> </li> </ul>	1 1 2    3  (7)
<b>Presentation</b> <ul style="list-style-type: none"> <li>◆ appropriate structure, including informative title, contents page and page numbers</li> <li>◆ references cited in the text and references listed using an established referencing system, acknowledgements, where appropriate</li> </ul>	1  1  (2)
<b>Total marks</b>	<b>30</b>

## Detailed Marking Instructions for the project-report

These Detailed Marking Instructions provide the basis on which the General Marking Principles should be applied. The following table shows how the 30 marks are allocated to each of the categories against which the evidence will be assessed.

The project-report should be between 3000 and 3600 words in length. The word count should be submitted with the project-report. If the word count exceeds the maximum by 10%, a 3 mark penalty will be applied.

Category	Expected response	Max mark	Additional guidance
Abstract	<ul style="list-style-type: none"> <li>◆ a brief abstract stating main aim(s) and overall finding(s)/conclusion(s) of the investigation</li> </ul>	1	<ul style="list-style-type: none"> <li>◆ A brief abstract must immediately follow the contents page and should be under a separate heading. The 'abstract' must contain a clear statement of the main aims(s) and overall finding(s)/conclusion(s) of the investigation and must be separate from and placed before the 'introduction'.</li> </ul> <p>The overall finding(s) must be consistent with the conclusion(s) given in the 'discussion' and should relate to the aim(s).</p>
Introduction	<ul style="list-style-type: none"> <li>◆ clear statement of aim(s) together with relevant hypotheses/questions (1)</li> </ul>	5	<ul style="list-style-type: none"> <li>◆ Aim(s) and hypotheses/questions must be explicitly stated.</li> </ul> <p>This is treated in a holistic way so that an introduction weak in all four components could still attain marks. It is an opportunity to give marks for 'quality'. Professional judgement should be used, eg if only two points were covered and done well, then 2 marks should be awarded. If all four points were covered but with omissions or inaccuracies, then 2 marks could still be appropriate.</p> <p>Allow minor errors but not if fundamental to the biology behind the investigation.</p>

Category	Expected response	Max mark	Additional guidance
	<ul style="list-style-type: none"> <li>◆ account of underlying biology is coherent and relevant to aim(s)</li> <li>◆ biological terms/ideas are explained clearly and accurately</li> <li>◆ biological terms/ideas are at an appropriate depth</li> <li>◆ biological importance is explained/justified (4)</li> </ul>		<ul style="list-style-type: none"> <li>◆ The candidate should provide enough information in this section to allow an appropriate level of analysis, interpretation or discussion of results.</li> <li>◆ The background theory must be relevant; ie the information must be coherent and link clearly to the aim(s).</li> <li>◆ The biological importance is explained/justified. The candidate must address issues that explain why the investigation is worth doing. An investigation need not be justified in terms of an immediate benefit to humans or the environment. It could be one seeking to extend knowledge or to replicate and confirm other researchers' findings.</li> <li>◆ Copying of lengthy sections of original text should not be rewarded. Candidates should use their own words wherever possible.</li> <li>◆ Downloading directly from the internet or copying directly from books may suggest that the candidate has not understood the biology involved and will be considered as plagiarism. Where the vast majority is believed to have been copied verbatim then the candidate is not demonstrating understanding and should be marked accordingly.</li> <li>◆ Complicated diagrams copied and pasted from an internet source are perfectly acceptable. Where their source is acknowledged, these cannot count as the cited references.</li> </ul>

Category	Expected response	Max mark	Additional guidance
Procedures	<ul style="list-style-type: none"> <li>◆ appropriate to aim(s) (1)</li>   <li>◆ procedure(s) described clearly in sufficient detail to allow the investigation to be repeated (2)</li> </ul>	9	<ul style="list-style-type: none"> <li>◆ In broad terms, the procedure(s) should allow the aim(s) to be achieved. If there is no stated aim this mark may still be awarded if the aim is obvious from the title of the project-report.</li> <li>◆ At least one procedure must be clearly described. If more than one procedure is carried out, then the major one used in the investigation must be described. The procedure should be described well enough for another competent Advanced Higher Biology candidate to be able to repeat the procedure from the description.</li> <li>◆ 2 marks can be awarded if a full and clear description of all stages in the procedure(s) is provided. 1 mark can still be awarded if some minor details are omitted but not where an essential part of the procedure is omitted.</li> <li>◆ The project-report should be written in the past tense and impersonal voice. If the project-report is not written in past tense and impersonal voice, eg if written as a set of instructions in the imperative voice then a maximum of 1 mark can be given for 'procedures'. Consider use of first person on one occasion only as a minor error.</li> <li>◆ Bulleted/numbered points are only acceptable if statements are in sentences and are meaningful and coherent, ie must make sense if numbers or bullet points were to be removed, but must not be a list of instructions.</li> <li>◆ Safety issues should only be considered if they have a bearing on validity/reliability etc.</li> <li>◆ Appropriate controls should be identified. If no controls are used (eg if the relative effect of two treatments is being compared), then justification must be given.</li> </ul>

Category	Expected response	Max mark	Additional guidance
	<ul style="list-style-type: none"> <li>◆ appropriate controls (1)</li> <li>◆ control of variables (1)</li> <li>◆ sample size (1)</li> <li>◆ independent replicates (1)</li> <li>◆ complexity, creativity, accuracy and modification (2)</li> </ul>		<ul style="list-style-type: none"> <li>◆ Confounding variables that affect the validity have been controlled.</li> <li>◆ Sample size is appropriate /adequate for the procedure. This will vary according to the type of investigation. In some investigations, simple duplication may constitute a minimum requirement.</li> <li>◆ Evidence of independent replicates. A separate data set must be obtained, eg by repeating the experiment on a separate occasion or by sampling from a different location. A replicate set of data recorded from the same subjects to establish baseline variation prior to treatment is acceptable.</li> <li>◆ Combinations of the following elements, allow 2 marks to be awarded: <ul style="list-style-type: none"> <li>— complexity</li> <li>— creativity/originality</li> <li>— appropriate accuracy</li> <li>— pilot study or experiments based on previous findings</li> </ul> </li> <li>◆ A complex protocol or difficult/unfamiliar techniques have been used (eg use of colorimeter/ spectrophotometer or aseptic microbial techniques may be sufficient to award here).</li> <li>◆ A novel way of using a simple procedure has been developed.</li> <li>◆ Evidence of originality/creativity in the design of the investigation.</li> <li>◆ Evidence of a pilot study that was used to test/develop procedures.</li> <li>◆ Procedures/apparatus used are able to deliver an appropriate level of accuracy to test the aim(s).</li> </ul>

Category	Expected response	Max mark	Additional guidance
Results	<ul style="list-style-type: none"> <li>◆ relevant to the aim(s) of the investigation (1)</li> <li>◆ raw data recorded and within limits of accuracy of measurement (1)</li> <li>◆ appropriate presentation (1)</li> <li>◆ quality of presentation (1)</li> <li>◆ presentation summarises overall results (1)</li> <li>◆ a clear statement of any trends (or the absence of any trend), shown by the data, is given (1)</li> </ul>	6	<ul style="list-style-type: none"> <li>◆ Extensive raw data may be recorded in an appendix. Average results must not have an excessive number of decimal places or a claimed degree of accuracy greater than that of the raw data.</li> <li>◆ Raw and processed results must be presented clearly and concisely in appropriate formats. The graphs and tables are appropriate for linking the data and the aim(s).</li> <li>◆ The quality of presentation is adequate, including headings/units/scales/labels/clarity. Computer generated graphs may require scientific formatting to ensure that axes and scales are appropriate and are of adequate quality. Calculations must be correct; minor errors should not be penalised.</li> <li>◆ Data presented should summarise the overall results. Where raw data are presented in an appendix, any graph of processed data <b>must</b> be supported by an appropriate table in the body of the project-report.</li> <li>◆ Clear descriptions are given of trends and patterns (or their obvious absence) in results tables or graphs.</li> </ul>

Category	Expected response	Max mark	Additional guidance
Discussion (conclusion(s) and evaluation)	<ul style="list-style-type: none"> <li>◆ conclusion(s) relate to aim(s) of the investigation (1)</li>   <li>◆ conclusion(s) is/are valid (1)</li>   <li>◆ evaluation of procedures (2) includes comment, as appropriate, on: <ul style="list-style-type: none"> <li>— accuracy/sources of error in measurement</li> <li>— adequacy of replication/sampling</li> <li>— adequacy of controls or recognition of the effects of confounding variables</li> <li>— positive and/or negative aspects of investigation design</li> <li>— solutions to problems and modifications to procedures</li> </ul> </li> <li>◆ evaluation of results (3) includes, as appropriate: <ul style="list-style-type: none"> <li>— analysis of results</li> <li>— interpretation of results</li> <li>— critical and scientific discussion of significance of finding(s)</li> </ul> </li> </ul>	7	<ul style="list-style-type: none"> <li>◆ Comments/inferences on perceived trends should be relevant to the aim(s) and supported by data in the project-report. If the mark for trends ('results' section) has already been awarded, additional credit cannot be gained here by simple repetition.</li> <li>◆ A valid conclusion(s) is/are stated. Validity depends on an appropriate method, adequate control of variables and evidence of repeatable results from sufficient replication and sample size.</li> <li>◆ 2 marks may be awarded for an evaluation that considers the essential aspects of experimental design that were required for valid conclusions and were planned into the investigation.</li> <li>◆ A maximum of 1 mark should be awarded if a major aspect of the procedure(s) that compromises validity has not been considered during the course of the investigation; eg the inadequacy of sample size, lack of independent replicates, lack of controls or failure to control a confounding variable.</li> <li>◆ Variation in results obtained from replicates and the degree of accuracy of results should be discussed. Credit may be given for attempts to carry out appropriate statistical evaluation including use of error bars.</li> <li>◆ The validity, reliability and significance of the results should be discussed by considering the role of controls and the variability of replicates.</li> <li>◆ Discussion here is expected to be critical/analytical. In discussing the investigation finding(s) as a whole, candidates should make effective use of their biological knowledge, drawing particularly on the background they presented in the 'introduction'.</li> </ul>

Category	Expected response	Max mark	Additional guidance
Presentation	<ul style="list-style-type: none"> <li>◆ appropriate structure, including informative title, contents page and page numbers (1)</li>   <li>◆ references cited in the text and references listed using an established referencing system, acknowledgements, where appropriate (1)</li> </ul>	2	<ul style="list-style-type: none"> <li>◆ The project-report structure should be easy to follow. The title must include two of 'Input', 'Outcome' and 'Process/Context/Organism', eg 'Effect of garlic on lipase activity' is acceptable; 'Pollution and plants' is not.</li> <li>◆ A contents page and structure are essential – the contents page must show page numbers and the pages throughout the project-report must be numbered. Occasional missing page numbers (eg on hand-drawn graphs) should not be penalised.</li> <li>◆ At least three references must be cited correctly in the main body of the project-report and the same ones also listed correctly at the end of the project-report. Any additional references cited or listed incorrectly should not be penalised. The Harvard or Vancouver system of referencing must be used. References may include books, journals/periodicals and websites and should be listed at the end of the project-report. Note that it must not be the same book/website referred to on two or three occasions even if the reference is to different page numbers. The candidate must find at least three references, ideally at the planning stage.</li> </ul>
	<b>Total marks</b>	<b>30</b>	



# Administrative information

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## History of changes

Version	Description of change	Authorised by	Date
1.1	Detailed Marking Instructions updated to further exemplify Marking Instructions.	Qualifications Manager	September 2016

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