



Course report 2019

Subject	Biology
Level	National 5

This report provides information on candidates' performance. Teachers, lecturers and assessors may find it useful when preparing candidates for future assessment. The report is intended to be constructive and informative and to promote better understanding. It would be helpful to read this report in conjunction with the published assessment documents and marking instructions.

The statistics used in this report have been compiled before the completion of any post-results services.

Section 1: comments on the assessment

Question paper

Overall, the question paper proved to be slightly more demanding than intended. Some questions proved to be less demanding, especially in section 1, while others were slightly more demanding than intended. This was taken into account when setting grade boundaries. This was the second year of the revised National 5 Biology Course. Candidates, teachers and lecturers are more familiar with the structure of the revised question paper.

Markers commented that the question paper was fair and balanced. Most candidates made a good attempt at answering most of the questions; the number of unanswered questions was fairly low. Candidates, however, should be encouraged to attempt all questions.

The question paper was designed to provide a spread of marks across the course and to give candidates the opportunity to display a range of skills, as well as demonstrating and applying their knowledge and understanding.

It was evident this year that candidates' numerical skills have improved. Some candidates could improve their basic knowledge of biology.

As in previous years, candidates confused the command words 'describe' and 'explain'. This cost them marks, as their responses were not appropriate to the question.

A substantial number of candidates answered questions with information that was not appropriate to what was being asked. Ample time is provided to allow candidates sufficient time to read all questions in the question paper fully and with care.

Assignment

Overall, the performance of candidates in the assignment was similar to last year.

It was evident from the structure of the assignments that candidates have made good use of the 'Instructions for candidates' section of the *Assignment Assessment Task* when working on their reports.

Some sections of the assignment proved challenging for a number of candidates, and centres should concentrate on these sections with future candidates.

The underlying biology section should contain information at National 5 level to allow candidates to access all of the available marks.

There was a reduction in the variety of experiments this year, with many centres conducting enzyme experiments. Although it is acceptable to carry out enzyme experiments, centres should ensure candidates have the appropriate level of knowledge to allow them to access the marks available for the underlying biology section. Centres should look in detail at the way they deliver this area of the course, and consider other areas to carry out practical work.

Section 2: comments on candidate performance

Areas that candidates performed well in

Question paper

Section 1 (objective test)

- Question 1 Most candidates were able to identify the consequences of placing animal cells in a solution of lower water concentration.
- Question 3 Most candidates were able to identify the locations of the stages of protein production in a cell.
- Question 6 Most candidates were able to predict the result of the experiment when more worms were added.
- Question 8 Most candidates were able to identify the number of daughter cells produced, and their chromosome number, following mitosis.
- Question 10 Most candidates could identify that hormones are released by endocrine glands.
- Question 11 Most candidates were able to select a correct conclusion from the information in the graph.
- Question 14 Most candidates were able to select two features of phloem.
- Question 15 Most candidates were able to name the blood vessel and chamber of the heart.
- Question 16 Most candidates could carry out a 'times greater' calculation.
- Question 21 Most candidates could identify the greatest increase in the rate of photosynthesis from the information given.
- Question 22 Most candidates could identify the effects of applying fertiliser and pesticides.
- Question 23 Most candidates were able to identify the consequences of fertiliser leaching into a pond.
- Question 24 Most candidates could calculate the number of predators required to kill whitefly from the given information.

Section 2 (structured and extended response)

- Question 1(a)(i) Most candidates demonstrated knowledge of the function of the cell membrane.
- Question 1(a)(ii) Some candidates were able to identify that a ribosome would also be present in all of the cells.
- Question 1(b)(i) Nearly all candidates could calculate an average from the data in the table.
- Question 4(a)(ii) Most candidates could name the substance required for yeast to respire aerobically.
- Question 4(a)(iii) Most candidates were able to identify at which stage the larger quantity of ATP was released.
- Question 4(b)(i) Most candidates were able to produce a scale and label, with units, for the graph. The most common error was inappropriately joining the line to the origin, indicating a point at zero minutes.
- Question 5(a) Most candidates were able to name stem cells as the type that develop into specialised cells.
- Question 5(b) Most candidates could complete the flowchart to show organs in the correct level of organisation within a multicellular organism.
- Question 6(a) Nearly all candidates were able to identify the maximum value from the information given in the graph.
- Question 9(a) Nearly all candidates demonstrated the ability to select a particular value from a complex graph.
- Question 10(a) Most candidates could suggest a question that could lead to the research described.
- Question 10(b) Most candidates could identify that a bar graph was the correct format for the given data.
- Question 10(c) Most candidates could suggest a reason for the limitations of the study.
- Question 11(b)(i) Most candidates could calculate the percentage correctly.
- Question 12(a) Most candidates could describe a relationship. However, some did get cause and effect the wrong way round.
- Question 12(c)(ii) Most candidates could name an abiotic factor that can affect plant growth.

- Question 13(b) Most candidates could name the product of carbon fixation that is converted to starch.
- Question 14(a)(i) Most candidates could calculate the number of successful treatments from a 48% success rate, using the data provided.
- Question 14(b)(i) Most candidates could sequence the stages in evolution.

Assignment

Section

- 1 Nearly all candidates were able to state an appropriate aim.
- 2 Most candidates could write at least one expanded description or explanation of biology relevant to their aim.
- 3(b) Nearly all candidates could include sufficient raw data (number and range of values) that was appropriate to their aim.
- 3(e) Most candidates included data/information from an internet/literature source that was relevant to their aim.
- 3(f) Most candidates could reference their internet/literature source.
- 4(a) Nearly all candidates could select the correct format for their graphical presentation.
- 4(b) Most candidates could provide suitable scales for their graph.
- 4(c) Most candidates could provide suitable labels and units for the axes of their graph.
- 8(a) Most candidates were able to provide an informative title for their assignment.
- 8(b) Most candidates could write a clear and concise report.

Areas that candidates found demanding

Question paper

Section 1 (objective test)

- Question 2 Some candidates found difficulty in identifying the parts found in a fungal cell from the diagram.
- Question 12 Many candidates found difficulty in identifying the type of variation described.
- Question 13 Some candidates were unable to apply their knowledge of genetics to the given scenario.
- Question 17 Many candidates found difficulty in predicting the estimated population. Many candidates gave the population in 2018 rather than 2020.
- Question 18 Some candidates found difficulty in defining 'interspecific competition'.
- Question 25 Some candidates found difficulty in identifying the possible consequences of mutation.

Section 2 (structured and extended response)

- Question 1(b)(ii) Many candidates found difficulty in fully answering the question. There was a tendency to apply their reasoning to only one of the cell types, rather than both.
- Question 2(b)(i) Many candidates did not attempt this question. They were expected to complete the diagram by adding an arrow.
- Question 2(b)(ii) Many candidates found difficulty in naming protein as the type of molecule involved in active transport.
- Question 4(b)(ii) Although most candidates were able to give a correct prediction, they were unable to give the reason in terms of enzymes being less active.
- Question 5(d) Some candidates found difficulty in describing the differences between the ways that lymphocytes and phagocytes destroy pathogens.
- Question 6(c) Many candidates found difficulty in describing the correct sequence of events in returning low glucose levels to normal in the body. A number of candidates disregarded the situation given and gave explanations suited to lowering blood glucose levels using insulin production.

- Question 7(a)(i) Many candidates were unable to explain the term 'homozygous'. They made incorrect references to genes rather than alleles.
- Question 7(a)(ii) Many candidates were unable to give a sufficient explanation regarding the recessive characteristic, using the information provided.
- Question 8(a) Many candidates were unable to name a type of molecule absorbed in each part of the villus. A number of candidates mixed up the two answers, putting them in the wrong places.
- Question 8(b) Many candidates were unable to explain how efficiency of absorption was improved by having a large number of villi.
- Question 8(c) Many candidates were unable to link their knowledge of villi to their knowledge of alveoli to identify a common feature.
- Question 9(c) Many candidates struggled to express differences in the antibody production after the two injections. A number of candidates restated the information given at the start of the question.
- Question 9(d) Many candidates were unable to predict a value based on the continuation of a given trend.
- Question 10(d) Some candidates' answers suggested changing too many variables at a time, rather than describing how to keep one variable constant in order to improve validity.
- Question 12(b) Many candidates were unable to suggest how the investigation could be improved to make the results more reliable. Some candidates stated that they would use more quadrats, but did not include increasing the soil moisture sampling as well. 'Use more quadrats', 'repeat the experiment' or 'repeat it' were all unacceptable in this instance, as there were two aspects to the investigation: estimation of ground cover of moss and measurement of soil moisture.
- Question 12(c)(i) Most candidates were unable to describe the correct use of a soil thermometer to ensure valid results. Instead, they gave answers related to soil moisture meters.
- Question 12(d)(i) Many candidates were unable to give a full definition of an indicator species.
- Question 13(a)(i) Many candidates found difficulty in identifying which plants would have starch in them, in the range of conditions provided.
- Question 13(a)(ii) Many candidates found difficulty in explaining the purpose of the control in this experimental set-up. A number of candidates gave very generic responses.

- Question 13(a)(iii) Many candidates found difficulty in recognising that there were two variables changed in the experimental set-up, rather than just one.
- Question 13(a)(iv) Many candidates stated that light intensity was being investigated, rather than light. This is incorrect as the light level was not being varied — it was either present or absent.
- Question 14(a)(ii) Many candidates found difficulty in suggesting a reason for the antibiotics having no effect. They should have used the given information to formulate their answer.
- Question 15(a) Many candidates were unable to name the structure in a source cell from which a required gene is extracted.
- Question 15(b) Many candidates found difficulty in sequencing the stages involved in genetic engineering. A number of candidates missed the information in the question and included detail about the extraction of the gene from the source cell. In particular, they seemed to struggle with the correct use of enzymes in this process.

Assignment

Section

- 2 Some candidates found difficulty in providing an account of the relevant biology worth more than one mark. Some wrote simple statements of fact, without giving expanded descriptions and/or explanations. This does not demonstrate relevant understanding. Candidates must ensure the information they include in the underlying biology is relevant to their aim. Some candidates included everything they knew about a subject, whether it was relevant or not. Irrelevant information is not awarded marks.
- 5 Many candidates found difficulty in giving a valid comparison in their analysis of the data they had gathered with data/information from the internet/literature. Often their statements just restated the results. On many occasions, there was no comparison of the actual data. Candidates did not fully comment on similarities between the two sets of data, and often ignored differences, especially when the researched data did not completely support their experimental data.
- 6 Many candidates found difficulty in drawing a valid conclusion. Sometimes their conclusion did not relate to their aim and at times it was not supported by the data in the report. The conclusion needs to be drawn from all the data/information in the report and be relevant to the original aim.
- 7 Many candidates struggled with the evaluation. Some opted for increasing the number of repeats to increase reliability. Unless there is clear evidence that the repeats already carried out have failed to establish reliability, then this would not be a suitable response. Some candidates did manage to correctly identify a factor

that would affect the results, but did not go on to describe what was done or what could have been done to minimise that effect. Some candidates did not gain marks through the incorrect use of the terms 'valid', 'reliable' and 'accurate'. It is not essential that these terms are used in the evaluation.

Section 3: preparing candidates for future assessment

The [National 5 Biology Course Specification](#) explains the overall structure of the course, including its purpose and aims as well as information on the skills, knowledge and understanding required. Course support notes are provided as an appendix to the document. Both the key areas **and** the depth of knowledge **can be assessed in the question paper**.

The [National 5 Biology Assignment Assessment Task](#) explains the requirements for the assignment. This document provides guidance by including instructions for teachers and lecturers, as well as instructions for candidates.

Centres must ensure that they are using the most up to date versions of all documents, which are available on SQA's website.

Question paper

Candidates need to spend time consolidating the mandatory knowledge and understanding of the course. Centres are encouraged to build revision exercises into their delivery of the course to ensure that candidates are spending enough time learning terminology and definitions.

As well as demonstrating their knowledge and understanding, candidates must be able to apply their knowledge, which allows them to show greater understanding. Many candidates find this difficult and do not cope well with questions of this nature. Centres should provide opportunities for candidates to practise questions set in new and unfamiliar situations.

Teachers and lecturers should encourage candidates to take time to read all parts of each question, not just the introduction, with care and attention so they do not miss important pieces of information. Too often candidates incorrectly interpret what they have to do and, therefore, their responses are not appropriate to the question asked.

As in previous years, candidates had difficulty distinguishing between questions that ask them to 'describe' and those that ask them to 'explain'. A large number of candidates gave an inadequate answer to these types of questions. Teachers and lecturers should practise both types of questions with candidates. Information on valid responses to command words can be found in the general marking principles within the marking instructions.

Candidates should have opportunities to practise questions involving extended writing. Many struggled to express their ideas logically. Questions 6(c) and 15(b) were poorly answered by some candidates, both in terms of incorrect biology and incorrect sequencing. In question 6(c), a large number of candidates overlooked the situation described in the question and used the space to write down everything they knew about the action of insulin. Others perhaps did not read the question carefully, and gave information about blood glucose levels after meals. These questions are an opportunity for candidates to show their understanding and application of biology and candidates should be encouraged to consider the question carefully before providing an answer.

Candidates coped well with the scientific literacy question (question 10). This type of question mirrors the research skills used in the assignment and aims to help develop

scientific and critical thinking in candidates. Candidates performed well in the first three parts of the question, but some struggled with the final part. Candidates should be encouraged to be critical of the research they encounter.

Centres are reminded that the table of apparatus and techniques included in the course specification is an assessable part of the course.

Candidates' responses to questions involving calculations continue to improve. Centres are encouraged to provide examples of these for candidates to practise and remind candidates that data handling is an important part of science. This year, candidates were especially strong in calculating an average. Candidates should review their responses to calculations, checking to see if they are feasible, as some answers were unrealistic.

Assignment

The choice of topic for the assignment needs to be carefully considered to ensure candidates have the opportunity to access all of the marks. As mentioned previously, there was an increase in enzyme experiments this year. Although many candidates carried out successful experiments, knowledge of the underlying biology could be improved. Centres should consider a variety of topics that lend themselves to carrying out experimental work. This not only gives more experience at engaging in practical work to increase skills, but could allow candidates a choice of topic for their assignment.

An appropriate title should be provided for the report. This should provide information about the content of the report, but not be a reiteration of the aim.

Centres must discuss the aim with each candidate and advise them on the suitability of the aim before the candidate proceeds. Teachers and lecturers should not assist candidates in relation to the wording of the aim, but they can check to ensure that it is a feasible investigation. Centres should discourage candidates from providing multiple aims as they rarely manage to address all of them in the conclusion section.

All candidates are required to take an active part in experimental work or fieldwork. The nature of this must allow candidates to gather data that they can use in the report stage. Conditions for assessment are provided in the *Assignment Assessment Task*.

Although candidates are showing improvement in averaging their results, many are losing marks due to inappropriate rounding of figures. If candidates cannot accurately plot average figures on the available graph paper and need to apply rounding, they should make sure that they do so correctly and consistently.

Candidates should practise the skills involved in graph drawing more, as some struggle with this. Teachers and lecturers should encourage candidates to use a ruler. Candidates often use inappropriate abbreviations. Teachers and lecturers should discourage candidates from using abbreviations. The use of a common zero needs to be explained more carefully to candidates, as often it is used inappropriately in a bar graph. There are still instances where candidates produce a scale that is not linear.

Candidates often fail to gain marks in sections 5 (analysis) and 6 (conclusion). These involve skills that can be developed through practical work carried out during the course. Evaluation

skills can also be developed in this way. Candidates must ensure that in the analysis and conclusion sections they are not just restating results, but discussing trends and patterns and highlighting similarities and differences. Conclusions must relate to the aim and be supported by all of the evidence in the report.

There is no word count for the assignment, however, candidates are permitted 1 hour and 30 minutes to complete their report. The report stage must be conducted under a high degree of supervision and control. It may be completed in one session or over more sessions. Candidates' work must be retained and stored securely between sessions. Giving any kind of feedback to candidates, marking by centre staff, or redrafting by candidates is not permitted.

Centres must ensure that they are adhering to the conditions of assessment in the *Assignment Assessment Task* and are applying them fully. The issuing of pre-prepared tables for candidates is not permitted. Candidates must prepare their own tables, individually, to record the data they collect. The instructions for candidates must not be altered and template answer sheets for candidates are not allowed.

SQA takes very seriously its obligation to ensure fairness and equity for all candidates in all qualifications through consistent application of assessment conditions and investigates all cases alerted to us where conditions may not have been applied.

Grade boundary and statistical information:

Statistical information: update on courses

Number of resulted entries in 2018	20928
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Number of resulted entries in 2019	21549
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Statistical information: performance of candidates

Distribution of course awards including grade boundaries

Distribution of course awards	Percentage	Cumulative %	Number of candidates	Lowest mark
Maximum mark				
A	29.5%	29.5%	6355	84
B	20.7%	50.2%	4457	71
C	20.4%	70.5%	4387	59
D	18.2%	88.8%	3926	46
No award	11.2%	-	2424	-

General commentary on grade boundaries

SQA's main aim is to be fair to candidates across all subjects and all levels and maintain comparable standards across the years, even as arrangements evolve and change.

SQA aims to set examinations and create marking instructions that allow:

- ◆ a competent candidate to score a minimum of 50% of the available marks (the notional C boundary)
- ◆ a well-prepared, very competent candidate to score at least 70% of the available marks (the notional A boundary)

It is very challenging to get the standard on target every year, in every subject at every level.

Therefore, SQA holds a grade boundary meeting every year for each subject at each level to bring together all the information available (statistical and judgemental). The principal assessor and SQA qualifications manager meet with the relevant SQA head of service and statistician to discuss the evidence and make decisions. Members of the SQA management team chair these meetings. SQA can adjust the grade boundaries as a result of the meetings. This allows the pass rate to be unaffected in circumstances where there is evidence that the question paper has been more, or less, challenging than usual.

- ◆ The grade boundaries can be adjusted downwards if there is evidence that the question paper is more challenging than usual.
- ◆ The grade boundaries can be adjusted upwards if there is evidence that the exam is less challenging than usual.
- ◆ Where standards are comparable to previous years, similar grade boundaries are maintained.

Grade boundaries from question papers in the same subject at the same level tend to be marginally different year to year. This is because the particular questions, and the mix of questions, are different. This is also the case for question papers set by centres. If SQA alters a boundary, this does not mean that centres should necessarily alter their boundary in the question papers that they set themselves.