Course report 2023

Higher Biology

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. You should read the report in conjunction with the published assessment documents and marking instructions.

The statistics in the report were compiled before any appeals were completed.

Grade boundary and statistical information

Statistical information: update on courses

Number of resulted entries in 2022: 7,339

Number of resulted entries in 2023: 7,072

Statistical information: performance of candidates

Distribution of course awards including minimum mark to achieve each grade

A	Number of candidates	2,431	Percentage	34.4	Cumulative percentage	34.4	Minimum mark required	83
B	Number of candidates	1,573	Percentage	22.2	Cumulative percentage	56.6	Minimum mark required	68
C	Number of candidates	1,327	Percentage	18.8	Cumulative percentage	75.4	Minimum mark required	54
D	Number of candidates	1,061	Percentage	15	Cumulative percentage	90.4	Minimum mark required	39
No award	Number of candidates	680	Percentage	9.6	Cumulative percentage	100	Minimum mark required	N/A

Please note that rounding has not been applied to these statistics.

You can read the general commentary on grade boundaries in the appendix.

In this report:

- ‘most’ means greater than 70%
- ‘many’ means 50% to 69%
- ‘some’ means 25% to 49%
- ‘a few’ means less than 25%

You can find more statistical reports on the statistics and information page of SQA’s website.

Section 1: comments on the assessment

Question paper 1: multiple choice

The multiple-choice question paper performed as expected.

Question paper 2

Feedback from the marking team and from teachers and lecturers indicated that question paper 2 was a fair and well-balanced paper. However, some questions were more demanding than intended. This was taken into account when setting grade boundaries.

Assignment

The requirement to complete the assignment was removed for session 2022–23.

Section 2: comments on candidate performance

Areas that candidates performed well in

Question paper 1: multiple choice

Question 1
Most candidates demonstrated good knowledge and understanding of ribosomal RNA.

Question 4
Most candidates demonstrated good knowledge and understanding of frame-shift mutations.

Question 5
Most candidates demonstrated good knowledge and understanding of natural selection.

Question 9
Many candidates were able to draw a valid conclusion.

Question 10
Many candidates demonstrated good knowledge of enzyme inhibition.

Question 11
Many candidates demonstrated good knowledge of dehydrogenase enzymes.

Question 12
Many candidates demonstrated good knowledge of feedback inhibition.

Question 13
Many candidates demonstrated good knowledge of thermoregulation.

Question 15
Most candidates were able to describe a suitable control experiment.

Question 17
Many candidates demonstrated good knowledge of photosynthetic pigments.

Question 18
Many candidates demonstrated good knowledge of RuBisCO.

Question 20
Most candidates demonstrated good knowledge and understanding of perennial weeds.

Question 21

Many candidates were able to make a prediction from a line graph.

Question 23

Most candidates demonstrated good knowledge and understanding of free range and intensive farming.

Question 25

Most candidates demonstrated good knowledge and understanding of social behaviour.

Question paper 2

Question 1(a)

Most candidates demonstrated good knowledge and understanding of DNA polymerase

Question 1(c)(ii)

Most candidates demonstrated good knowledge and understanding of PCR temperatures.

Question 1(d)

Many candidates were able to carry out a PCR calculation.

Question 2(b)

Many candidates demonstrated good knowledge of splice site mutations.

Question 3(a)(i)

Most candidates demonstrated good knowledge and understanding of uses of stem cells.

Question 3(a)(iii)

Most candidates demonstrated good knowledge and understanding of embryonic stem cells.

Question 4(a)

Most candidates demonstrated good knowledge and understanding of phylogenetics.

Question 4(b)(ii)

Most candidates demonstrated good knowledge and understanding of inversion mutations.

Question 5(a)

Many candidates demonstrated good knowledge of organisation of DNA.

Question 5(b)

Many candidates demonstrated good knowledge and understanding of translation.

Question 6

Most candidates demonstrated good knowledge and understanding of glycolysis and fermentation.

Question 7(a), (f)

Most candidates demonstrated good knowledge and understanding of conformers.

Question 7(a)(ii)

Most candidates demonstrated good knowledge and understanding of hibernation.

Question 8(a)(i)

Most candidates were able to calculate a simple whole number ratio.

Question 8(b)

Many candidates demonstrated good knowledge of aestivation.

Question 8(c)

Most candidates demonstrated good knowledge and understanding of daily torpor.

Question 9(b)

Many candidates were able to identify the independent variable.

Question 9(d)(ii)

Many candidates were able to make a prediction from a line graph.

Question 10(a)(i)

Many candidates demonstrated good knowledge of vectors in recombinant DNA technology.

Question 10(c)

Most candidates demonstrated good knowledge and understanding of ligase.

Question 11(a)

Most candidates demonstrated good knowledge and understanding of photosynthetic pigments.

Question 12(c)(i)

Most candidates demonstrated good knowledge and understanding of habitat corridors.

Question 13(a)

Many candidates could describe changes using values from a line graph.

Question 13(b)

Many candidates could select a value from a line graph with two vertical axes.

Question 13(c)

Most candidates were able to calculate a percentage increase.

Question 14(a)

Most candidates demonstrated good knowledge and understanding of parasitism.

Question 14(b)(ii)

Many candidates demonstrated good knowledge of field trial design (question 14(b)(ii)).

Areas that candidates found demanding

Question paper 1: multiple choice

Question 22

Few candidates were able to identify ways of reducing use of crop protection chemicals.

Question 19

Few candidates were able to describe how to ensure valid results in an investigation.

Question paper 2

Question 1(c)(i)

Few candidates were able to demonstrate knowledge and understanding of why two different primers are required for PCR.

Question 2(a)(i)

Few candidates were able to demonstrate knowledge and understanding of alternative RNA splicing.

Question 3(a)(iii)

Few candidates were able to demonstrate knowledge and understanding of ethical reasons in favour of using embryonic stem cells in medical research.

Question 3(b)(iii)

Few candidates could identify evidence for a viable cell count.

Question 7(b)

Few candidates could describe how to improve an investigation to give more reliable results.

Question 7(c)

Few candidates could calculate an average increase.

Question 7(d)

Few candidates were able to explain how increasing environmental temperature increases metabolic rate in conformers.

Question 10(a)(ii)

Few candidates could give a reason for using artificial chromosomes in recombinant DNA technology.

Question 10(d)

Few candidates could describe how a selectable marker gene allows culture of modified cells to grow.

Question 12(b)

Few candidates were able to explain how the bottleneck effect may lead to local extinctions.

Question 15(a)

Few candidates were able to write notes on inbreeding and crossbreeding.

Section 3: preparing candidates for future assessment

Question paper

It is important that candidates learn the required knowledge in the course specification, particularly use of primers in PCR, alternative RNA splicing, ethics of stem cell use, viable cell counts, why metabolic rate in conformers changes with environmental temperature, artificial chromosomes and selectable marker genes in recombinant DNA technology, chemical protection of crops, bottleneck effect effects, inbreeding and crossbreeding. Candidates will find questions assessing these areas in the past papers section on SQA's website. They should complete the past papers and check the marking instructions to ensure they are answering the questions to the required standard.

Teachers and lecturers should give candidates opportunities to carry out calculations from scientific data, particularly those involving averages, ratios, percentages, percentage changes, times greater and average increases and decreases. There are several examples of these in the past papers section on SQA's website.

There are examples of candidates' question papers, along with a commentary explaining why candidates were or were not awarded marks on the Understanding Standards website.

Teachers and lecturers should give candidates opportunities to carry out practical investigations, where possible. In this year's question paper, many candidates did not answer questions based on practical investigations correctly. Candidates should be familiar with the terms 'validity' and 'reliability' and be able to comment on these in experimental set-up questions. Definitions of these terms can be found in the Higher Biology Course Specification.

Teachers and lecturers should ensure that candidates are able to describe improvements to reliability by repeating investigations at each value of the independent variable rather than simply repeating the experiment. It is important that candidates state conclusions in relation to the stated aim rather than simply restating results. For experimental questions, teachers and lecturers should remind candidates to identify the aim in the stem of the question and then state a conclusion related to this aim, supported by the experimental results. Improved understanding of them should help candidates in the completion of their assignment next session.

Assignment

We removed the assignment from the Higher Biology course for session 2021-22 and session 2022-23. From session 2023-24 the Higher Biology course will return to full assessment requirements.

The Higher Biology Assignment Assessment Task outlines the assessment conditions for the assignment. It is important to note that the assessment requirements have not changed. The information below, from section 3 of the 2019 course report may support centres in preparing candidates for the assignment.

The following advice relates to the specific sections of the assignment.

Aim
Candidates should make sure they provide an aim that has a clear independent and dependent variable.

Underlying biology
Only underlying biology that is relevant to the aim should be included.

Data collection and handling
The summary of the method should not include too much experimental detail of, for example, concentrations and volumes used, but should name any chemicals used and the equipment used to measure the dependent variable.

As a mark is awarded for selecting a suitable range of values, candidates should not all have the same values of the independent variable.

Candidates must state what they have calculated an average of clearly in their table headings.

Candidates should be careful to select data or information from an internet source that is relevant to the aim of their investigation and to cite and reference this rather than include the reference alongside the data or information. The citation entered alongside their chosen source could be: ‘Source 1’, ‘Ref 1’ or simply ‘1’. The full reference, linked to the citation, should be given at the end of the report.

Analysis
When analysing data by comparing the experiment and data from the internet or literature, candidates should be careful to compare the data over a common range of values of the independent variable. Where a calculation has been done, it should be outlined how this relates to the aim and for which values of the independent variable the calculation refers.

Conclusion
The conclusion must relate clearly to the aim of the assignment, rather than restating the results. The conclusion must be supported by all the data in the report.

Evaluation
In the evaluation, candidates should be directed to appropriately justify evaluative comments, such as stating why named variables should be controlled and stating how results would be affected if this was not done. There is no requirement for candidates to use the terms ‘valid’, ‘reliable’ and ‘accurate’. However, if these terms are used, they must be used correctly.

Appendix: general commentary on grade boundaries

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

For most National Courses, SQA aims to set examinations and other external assessments and create marking instructions that allow:

- a competent candidate to score a minimum of 50% of the available marks (the notional grade C boundary)
- a well-prepared, very competent candidate to score at least 70% of the available marks (the notional grade 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 for each course to bring together all the information available (statistical and qualitative) and to make final decisions on grade boundaries based on this information. Members of SQA's Executive Management Team normally chair these meetings.

Principal assessors utilise their subject expertise to evaluate the performance of the assessment and propose suitable grade boundaries based on the full range of evidence. SQA can adjust the grade boundaries as a result of the discussion at these meetings. This allows the pass rate to be unaffected in circumstances where there is evidence that the question paper or other assessment has been more, or less, difficult than usual.

- The grade boundaries can be adjusted downwards if there is evidence that the question paper or other assessment has been more difficult than usual.
- The grade boundaries can be adjusted upwards if there is evidence that the question paper or other assessment has been less difficult than usual.
- Where levels of difficulty 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 on year. This is because the specific questions, and the mix of questions, are different and this has an impact on candidate performance.

This year, a package of support measures was developed to support learners and centres. This included modifications to course assessment, retained from the 2021–22 session. This support was designed to address the ongoing disruption to learning and teaching that young people have experienced as a result of the COVID-19 pandemic while recognising a lessening of the impact of disruption to learning and teaching as a result of the pandemic. The revision support that was available for the 2021–22 session was not offered to learners in 2022–23.

In addition, SQA adopted a sensitive approach to grading for National 5, Higher and Advanced Higher courses, to help ensure fairness for candidates while maintaining

standards. This is in recognition of the fact that those preparing for and sitting exams continue to do so in different circumstances from those who sat exams in 2019 and 2022.

The key difference this year is that decisions about where the grade boundaries have been set have also been influenced, where necessary and where appropriate, by the unique circumstances in 2023 and the ongoing impact the disruption from the pandemic has had on learners. On a course-by-course basis, SQA has determined grade boundaries in a way that is fair to candidates, taking into account how the assessment (exams and coursework) has functioned and the impact of assessment modifications and the removal of revision support.

The grade boundaries used in 2023 relate to the specific experience of this year's cohort and should not be used by centres if these assessments are used in the future for exam preparation.

For full details of the approach please refer to the National Qualifications 2023 Awarding — Methodology Report.