Course report 2024

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 with the published assessment documents and marking instructions.

We compiled the statistics in this report before we completed the 2024 appeals process.

Grade boundary and statistical information

Statistical information: update on courses

Number of resulted entries in 2023: 7,072

Number of resulted entries in 2024: 7,129

Statistical information: performance of candidates

Distribution of course awards including minimum mark to achieve each grade

A	Number of candidates	1,992	Percentage	27.9	Cumulative percentage	27.9	Minimum mark required	102
B	Number of candidates	1,565	Percentage	22.0	Cumulative percentage	49.9	Minimum mark required	85
C	Number of candidates	1,479	Percentage	20.7	Cumulative percentage	70.6	Minimum mark required	68
D	Number of candidates	1,228	Percentage	17.2	Cumulative percentage	87.9	Minimum mark required	51
No award	Number of candidates	865	Percentage	12.1	Cumulative percentage	100	Minimum mark required	N/A

We have not applied rounding 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 statistical reports on the statistics and information page of our website.

Section 1: comments on the assessment

Question paper 1: multiple choice

The multiple-choice question paper performed as expected.

Question paper 2

Markers' feedback indicated that question paper 2 was a fair and well-balanced paper. However, some questions were more demanding than intended. This was considered when setting grade boundaries.

Assignment

The assignment performed as expected.

Section 2: comments on candidate performance

Areas that candidates performed well in

Candidates answered well questions involving times greater and percentage decrease calculations, drawing line graphs, and making a prediction from a line graph.

Candidates showed good knowledge and understanding of areas such as structure and organisation of DNA, translation, RNA splicing, mammal hearts and circulation, fermentation and co-operative hunting.

Question paper 1: multiple choice

Most candidates demonstrated good knowledge and understanding in the following areas:

Question 1	structure of DNA
Question 2	organisation of DNA in prokaryotes
Question 3	the events in PCR at the different temperatures used
Question 4	characteristics of introns
Question 5	tissue stem cells
Question 10	the role of dehydrogenase enzymes in glycolysis
Question 13	characteristics of conformers
Question 14	most candidates were able to calculate the actual length of a cell from a microscope image and total magnification
Question 16	culture conditions for micro-organisms
Question 23	identifying mutualistic relationships

Question paper 2

Most candidates demonstrated good knowledge and understanding in the following areas:

Question 1(a)	translation stage of gene expression
Question 1(c)(i)	complementary base pairing in a codon
Question 1(b)	RNA splicing and alternative RNA splicing
Question 2(b)(i)	recognising deletion and duplication chromosome mutations
Question 4(a)	identifying the stage of aerobic respiration that occurs in the matrix of mitochondria

Question 4(b)(i)	induced fit
Question 4(c)	competitive inhibition
Question 6(a)(ii)	hibernation
Question 9A	hearts and circulatory systems of mammals
Question 9B	fermentation
Question 11(a)(ii)	biological control
Question 13(a)(ii)	behavioural indicators of poor animal welfare
Question 13(d)	intensive and free-range farming
Question 14(a)(ii)	cooperative hunting

Most candidates demonstrated competence in skills in the following areas:

Question 5(b)(i)	calculating how many times greater
Question 5(b)(ii)	predicting from a line graph
Question 7(d)	selecting information from a graph
Question 10(a)(ii)	suggesting why a photosynthesis experiment should be carried out in a dark room
Question 10(b)	presenting data in a line graph
Question 12(d)(i)	calculating a percentage decrease

Assignment

Although centres have not delivered the assignment for several years, many candidates performed well in it.

Section 1: aim

Most candidates were able to provide an aim with clearly stated independent and dependent variables.

Section 2: underlying biology

Assignments with expanded descriptions and explanations of underlying knowledge from the course specification scored well in this section.

Section 3(b): sufficient raw data from the candidate's experiment

Most candidates included sufficient raw data from their experiment.

Section 4: graphical presentation

Candidates did well in presenting their data in a graph. Most candidates chose an appropriate format of graph to present their results. In most cases the title made some reference to both the independent and dependent variables. Most candidates produced a graph containing axes with suitable scales, labels and units. Candidates who produced a line graph accurately plotted their data points and joined them, and those who produced a bar graph had clear bar tops.

Section 8: structure

Most candidates wrote a clear and concise report with an informative title that had some reference to both the independent and dependent variables.

Areas that candidates found demanding

Question paper 1: multiple-choice

Question 21

Few candidates were able to suggest how to improve the design of a field trial which showed a lot of variability in results within a treatment.

Question paper 2

Question 1(c)(ii)

Few candidates were able to identify a nonsense mutation and explain the effect this would have on the mature transcript and the protein synthesised.

Question 2(b)(ii)

Few candidates were able to explain why a deletion chromosome mutation can have a major effect on the development of body systems. Some candidates realised that it would result in a missing gene, but did not develop their answer to state that the gene would not be expressed, or that the protein would not be synthesised.

Question 2(c)(i) and 2(c)(ii)

Few candidates described how a duplication mutation occurred or explain why duplication mutations are important in evolution.

Question 3(b)(i)

Some candidates were able to name a type of analysis used in bioinformatics.

Question 4(b)(ii)

Few candidates explained why it is important that products have a lower affinity for active sites than substrates.

Question 5(c)

Few candidates were able to explain why high diffusion rates are important for regulators.

Question 6(b)(i)

Few candidates could calculate an average monthly decrease in air temperature.

Question 8(a)(ii)

Some candidates could describe the function of the origin of replication in recombinant DNA technology.

Question 8(c)

Some candidates could give an example of a selectable marker gene and explain how it allows transformed bacteria to be identified.

Question 10(a)(i)

Few candidates were able to identify the dependent variable in an investigation. Some candidates gave the indirect measure of the dependent variable, in this case absorbance.

Question 11(b)(ii)

Few candidates stated a benefit of applying fungicides based on a disease forecast.

Question 11(c)(ii)

Some candidates stated why F_1 hybrids are not usually bred together.

Question 12(b)

Few candidates were able to give the definition of an invasive species. Some candidates stated that invasive species may eliminate native species but did not state that they spread rapidly.

Question 13(b)

Few candidates were able to suggest how to modify an investigation to improve reliability. Some candidates simply gave a National 5 level response.

Question 14(b)(iii)

Few candidates gave an advantage of living in a social hierarchy other than reducing conflict.

Assignment

A few candidates selected topics more suited to the National 5 level for the assignment, such as temperature or pH and enzymes.

Section 2: underlying biology

Some candidates did not give expanded descriptions or explanations of relevant biology, even though they were able to use extracts from internet/literature sources to support this.

Section 3(a): a brief summary of the approach used to collect experimental data

Some candidates were unable to write a brief summary of the approach used to collect the experimental data. In some cases, this was because they included excessive details, while others did not name the equipment used to measure the dependent variable.

Section 3(c): data, including mean/average values, presented in a correctly produced table(s)

Many candidates were not able to present their data in a correctly produced table. Some candidates put the heading 'average' above the column of average values, rather than an overarching heading to show what they were averages of. Others incorrectly rounded the calculated averages.

Section 3(d): data relevant to the aim from an internet/literature source; and

Section 3(e): a citation and reference for a source of internet/literature data

Some candidates were not able to select relevant data, or where the relevance was not clear, did not include a statement to indicate how it related to the aim.

Many candidates did not cite and reference their internet/literature data. Some candidates incorrectly included the full reference alongside the data, and others did not state when the internet data was accessed.

Section 5: analysis

Few candidates were able to produce a valid comparison or an appropriate calculation linked to the aim of the investigation. Where comparisons were given, some candidates did not compare results from both sources for ranges of the independent variable they had in common.

Where a calculation was given, some candidates did not provide a statement linking the result of the calculation to the aim of the investigation.

Section 6: conclusion

Many candidates did not produce a valid conclusion that related to the aim and was supported by both sources of data. Where there was a change in the trend, for example decreasing or remaining constant after an increase, some candidates did not include this in the conclusion.

Section 7: evaluation

Some candidates did not use the terms 'accurate', 'valid' and 'reliable' correctly. A few candidates incorrectly commented on the robustness of the internet/literature source rather than commenting on experimental procedures or results.

Section 3: preparing candidates for future assessment

Question papers 1 and 2

Candidates should be prepared to answer questions that demonstrate and apply the mandatory knowledge that can be assessed in the question paper. The mandatory knowledge is outlined in the Higher Biology Course Specification, available on the SQA website.

Candidates should be better-prepared to answer questions that require knowledge of the importance of duplication mutations in evolution, the importance of high diffusion rates in regulators, origin of replication, selectable marker genes and invasive species.

Many candidates continue to have difficulty answering experimental questions. Candidates found it particularly difficult to suggest improvements to an investigation to improve reliability, to identify the dependent variable, and in drawing a conclusion relating to the aim.

Candidates should be advised to identify the aim of the investigation and use the aim in drawing the conclusion. They should be advised not to answer questions on reliability at National 5 level. When identifying the dependent variable, they should be advised not to give the indirect measure of the dependent variable.

Centres should give candidates practice of calculating an average decrease.

Candidates should learn the required knowledge outlined in the course specification and self-assess this knowledge using past papers available on the SQA website. They should complete the past papers and check the marking instructions to ensure they are answering the questions to the required standard.

The Understanding Standards website has examples of candidates' question papers, with a commentary explaining why marks were or were not awarded.

Assignment

Teachers and lecturers are reminded that there are example materials available to help them develop their understanding of the standards required for assessment. These materials are published on the Understanding Standards website.

Most candidates provided a concise aim with clear independent and dependent variables. A few candidates provided a very precise aim with an enzyme or inhibitor named in the independent variable. This made it more difficult for them to find a relevant source of data from the internet or literature. Teachers and lecturers should advise candidates that it may be better not to name the chemicals in the aim.

Teachers and lecturers should advise candidates to avoid selecting topics more suited to the National 5 level for the assignment, as they will be unlikely to access sufficient relevant underlying biology marks at Higher level.

In the brief summary, candidates should be advised not to provide detail of volumes and concentrations of chemicals, but to remember to name the equipment used to measure the dependent variable.

When presenting data in a table, teachers and lecturers should advise candidates to state in the heading for the averages column what the column contains averages of. Alternatively, candidates should use an overarching heading to include the individual measurements and averages.

Candidates should be advised to select a source of data from the internet or literature that is clearly relevant to the aim, or make a clear statement showing relevance. In making a citation and reference, teachers and lecturers should show candidates how to cite the data and include the reference at the end of the report, including the date accessed for internet data.

Few candidates achieved the mark for analysis. Although only one mark can be awarded in the analysis section, teachers and lecturers could advise candidates to do a calculation and compare both sources of data. The calculation should have a statement linking the result of the calculation to the aim. Candidates should compare the internet/literature data with their experimental data, stating the values of the independent variable between which the comparison is being made.

Teachers and lecturers should teach candidates to refer to the aim in drawing the conclusion. They should state a conclusion which relates clearly to the aim, and is supported by both sources of data, including any changes in the trend in the results. Teachers and lecturers should give candidates practice of drawing concise conclusions relating to the aim.

In the evaluation section, teachers and lecturers should direct candidates to provide justifications for evaluative statements relating to experimental procedures. When commenting on reliability of their own results, candidates should make reference to variability or concordance in values. If the terms ‘reliability’, ‘accuracy’ and ‘validity’ 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.

Every year, we evaluate the performance of our assessments in a fair way, while ensuring standards are maintained so that our qualifications remain credible. To do this, we measure evidence of candidates' knowledge and skills against the national standard.

During the pandemic, we modified National Qualifications course assessments, for example we removed elements of coursework. We kept these modifications in place until the 2022–23 session. The education community agreed that retaining the modifications for longer than this could have a detrimental impact on learning and progression to the next stage of education, employment or training. After discussions with candidates, teachers, lecturers, parents, carers and others, we returned to full course assessment for the 2023–24 session.

SQA's approach to awarding was announced in March 2024 and explained that any impact on candidates completing coursework for the first time, as part of their SQA assessments, would be considered in our grading decisions and incorporated into our well-established

grading processes. This provides fairness and safeguards for candidates and helps to provide assurances across the wider education community as we return to established awarding.

Our approach to awarding is broadly aligned to other nations of the UK that have returned to normal grading arrangements.

For full details of the approach, please refer to the National Qualifications 2024 Awarding — Methodology Report.