Course report 2022

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 appeals.

Grade boundary and statistical information

Statistical information: update on courses

Number of resulted entries in 2022	22575

Statistical information: performance of candidates

Distribution of course awards including grade boundaries

A	Percentage	32.6	Cumulative percentage	32.6	Number of candidates	7350	Minimum mark required	61
B	Percentage	18.7	Cumulative percentage	51.3	Number of candidates	4230	Minimum mark required	49
C	Percentage	20.6	Cumulative percentage	71.9	Number of candidates	4655	Minimum mark required	37
D	Percentage	18.2	Cumulative percentage	90.1	Number of candidates	4105	Minimum mark required	25
No award	Percentage	9.9	Cumulative percentage	N/A	Number of candidates	2240	Minimum mark required	N/A

You can read the general commentary on grade boundaries in appendix 1 of this report.

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 page of SQA's website.

Section 1: comments on the assessment

Question paper

Section 1 multiple choice performed as expected. Section 2 proved to be slightly more demanding than intended. This was taken into account when setting grade boundaries.

Markers commented that the question paper was fair and balanced. Most candidates made a good attempt at answering most of the questions. However, the number of unanswered questions was higher than in previous years, particularly where calculations were required. Candidates 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.

Some candidates could improve their basic knowledge of biological terms and definitions. Candidates' knowledge of practical apparatus and experimental set-up was lower than in previous years.

Marker feedback suggests that some candidates did not read the full question, leading to them giving incorrect or partially correct answers. There should be ample time for candidates to carefully read each question fully.

Some candidates answered questions with information that was not appropriate to what was being asked.

Assignment

The requirement to complete the assignment was removed for session 2021–22.

Section 2: comments on candidate performance

Question paper

Section 1 (multiple choice)

Question 2   Many candidates were able to identify statements applying to active transport.

Question 3   Many candidates were able to identify likely results from an investigation into the effects of different solutions on plant cells.

Question 4   Most candidates were able to identify where mRNA would not be found in a cell.

Question 5   Many candidates found difficulty identifying the structures involved in an enzyme-controlled reaction.

Question 6   Many candidates found difficulty identifying statements relating to cellular respiration.

Question 7   Many candidates were able to identify the correct functions of an area of the brain.

Question 8   Most candidates were able to identify the order in a neural pathway.

Question 9   Many candidates were able to name the target tissue involved in blood glucose regulation.

Question 11   Many candidates could identify when a recessive allele would be expressed.

Question 12   Many candidates were able to identify that lymphocytes produced antibodies.

Question 13   Many candidates found difficulty identifying the pathway of blood through the heart.

Question 14   Many candidates found difficulty naming the blood vessel that supplies the heart tissue with oxygen.

Question 16   Many candidates found difficulty identifying which substances are absorbed into the villi.

Question 18   Most candidates were able to predict the abundance using the data in the table.

Question 19   Most candidates were able to identify features of an organism using a paired statement key.

Question 20   Many candidates were able to identify conditions that would improve plant growth.

Question 22   Many candidates found difficulty identifying the pyramid of energy that represented a food chain.

Question 24   Most candidates could correctly use the data in the graph to select a valid conclusion.

Question 25   Many candidates found difficulty predicting the crop most likely to show the greatest percentage in yield.

Section 2 (structured and extended response)

Question 1(a)(i)   Most candidates were able to name the cell wall using the diagram.

Question 1(b)   Many candidates were unable to describe the difference in structure between a cell carrying out photosynthesis and a cell that does not.

Question 2(a)   Most candidates were able to describe the structure of DNA.

Question 2(b)   Most candidates could use data to identify the base cytosine.

Question 2(c)(i)   Most candidates were unable to name the type of molecule coded for by a section of mRNA.

Question 2(c)(ii)	Most candidates were unable to describe the effect of a mutation on a protein.
Question 3(a)	Many candidates were unable to calculate the change in mass when provided with the initial mass and the percentage change.
Question 3(b)(i)	Most candidates were unable to explain why there was no change in mass when the enzyme used was not specific to the substrate.
Question 3(c)(i)	Most candidates were unable to describe the change in the structure of the active site when it was heated to a high temperature.
Question 4	Many candidates were able to identify similarities and differences between yeast and animal cells.
Question 5(a)	Most candidates could correctly identify the structures and stages involved in genetic engineering.
Question 5(b)	Many candidates were unable to describe the next stage in genetic engineering. They seemed to struggle with placing the plasmid into a new bacterial cell.
Question 6(a)	Most candidates were unable to explain that using the same number of peas would ensure validity. Several used incorrect terms such as 'fair test'.
Question 6(c)	Many candidates were unable to use the results of the experiment to draw a suitable conclusion.
Question 7(a)(i)	Most candidates were able to name the structures that pull the pairs of chromatids apart.
Question 7(a)(ii)	Most candidates were unable to describe that the next stage of mitosis would be the formation of nuclear membranes.
Question 8(a)	Most candidates found difficulty in recognising that the male in the P generation was heterozygous and had the condition (FH).
Question 9(a)	Most candidates were able to identify the organ in animals that produces eggs.
Question 9(b)	Most candidates were able to identify the number of sets of chromosomes a zygote contains.
Question 10(a)(ii)	Many candidates found difficulty explaining that the target tissues had receptors that were specific to each hormone.
Question 11(a)	Most candidates were able to name the gas transported from the body cells to the capillary.
Question 12(a)	Most candidates were unable to give a full definition of a pathogen.
Question 12(b)(ii)	Most candidates could suggest why the uptake of the MMR vaccine had been lower.
Question 12(c)	Most candidates were unable to calculate the simplest whole number ratio.
Question 12(d)	Most candidates found difficulty using the information to explain that the 92% vaccination rate was short of the required 95% rate to achieve measles-free status.
Question 13(a)	Most candidates were unable to name the apparatus as a (bubble) potometer.
Question 13(b)	Most candidates failed to refer to the aim in their conclusion. Many used the table headings to give their conclusion.
Question 13(c)(i)	Many candidates were unable to name transpiration. Many gave 'osmosis' as a response, which refers to the movement of water but not its evaporation from the leaf.

Question 14(a)(ii)	Most candidates could calculate the number of seeds germinating.
Question 14(a)(iii)	Most candidates were unable to give a sufficient explanation of why the competition was the greatest. Many gave responses describing the number of seeds germinated instead of the percentage of seeds germinated.
Question 14(c)	Many candidates were unable to explain that lack of resources results in competition in ecosystems.
Question 15(b)(ii)	Many candidates were unable to explain that taking three readings at each site improved the reliability of the results.
Question 15(c)	Most candidates were able to identify an abiotic factor.
Question 16(a)	Most candidates were able to name the substance released from leaves as a result of photosynthesis.
Question 16(b)	Most candidates were unable to describe the energy change that occurs in the first stage of photosynthesis. Many candidates gave generic responses about photosynthesis.
Question 17(b)	Most candidates were unable to identify that the conclusion was invalid. Most had difficulty handling the data where the growth was a percentage of the control and gave responses that suggested the higher number of bacteria was a result of the treatment being successful.
Question 18(a)(i)	Most candidates were unable to describe the use of nitrates correctly.
Question 18b(i)	Most candidates were able to give the term 'algal bloom'.
Question 18(b)(ii)	Many candidates found difficulty explaining why the algal bloom results in plant death. Many referred to the algae preventing oxygen entering the river.

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.

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

Question paper

Despite the modifications to course assessment, learners should have the opportunity to learn the entire course specification. Learners need to develop the skills associated with practical work to be able to tackle all aspects of the question paper and be well prepared for progression.

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 sufficient 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 with care and attention, not just the introduction, so they do not miss important pieces of information. Too often candidates incorrectly interpret what they need 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'. Many candidates gave inadequate answers 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 coped well with question 4, the extended-response question. The revision support gave candidates information about the key area from the course specification that would be assessed in this question.

Candidates coped well with question 12, the scientific literacy question. This type of question mirrors the research skills used in the assignment and aims to help develop candidates' scientific and critical thinking. Candidates struggled with the definition of a pathogen but coped well with the rest of the question. Teachers and lecturers should encourage candidates 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 did not respond well to questions involving calculations compared to previous years. Some candidates did not attempt these questions. Centres are encouraged to provide examples of these for candidates to practise and to remind candidates that data handling is an important part of science. Candidates should review their responses to calculations, checking to see if they are plausible, as some answers were unrealistic.

Candidates should be familiar with the terms 'control', 'validity' and 'reliability', and be able to comment on these in experimental set-up questions. The course specification will be updated to include definitions of these terms. Candidates' responses to experimental set-up questions showed a lack of understanding, particularly when referring to validity and reliability. Teachers and lecturers are encouraged to incorporate practical work into the course wherever possible to reinforce learning and provide opportunities for data analysis and evaluation.

Candidates should be aware of the skills they are developing, and teachers and lecturers can provide advice on opportunities to practise and improve them.

Candidates should have opportunities to extract, process and interpret information presented in numerous formats, including tabular and graphical, and draw sensible conclusions.

Candidates can analyse and evaluate experiments or fieldwork and data by reviewing the process, identifying issues, and forming valid conclusions. They can demonstrate understanding and application of concepts by explaining and interpreting information and data.

Appendix 1: 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 including assessment modifications and revision support, was introduced to support candidates as they returned to formal national exams and other forms of external assessment. This was designed to address the ongoing disruption to learning and teaching that young people have experienced as a result of the COVID-19 pandemic. In addition, SQA adopted a more generous approach to grading for National 5, Higher and Advanced Higher courses than it would do in a normal exam year, to help ensure fairness for candidates while maintaining standards. This is in recognition of the fact that those preparing for and sitting exams have done so in very different circumstances from those who sat exams in 2019.

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 2022. 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 revision support.

The grade boundaries used in 2022 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 2022 Awarding — Methodology Report.