Course report 2023

Higher Human 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: 7,008

Number of resulted entries in 2023: 7,035

Statistical information: performance of candidates

Distribution of course awards including minimum mark to achieve each grade

A	Number of candidates	2,084	Percentage	29.6	Cumulative percentage	29.6	Minimum mark required	81
B	Number of candidates	1,466	Percentage	20.8	Cumulative percentage	50.5	Minimum mark required	67
C	Number of candidates	1,443	Percentage	20.5	Cumulative percentage	71	Minimum mark required	53
D	Number of candidates	1,140	Percentage	16.2	Cumulative percentage	87.2	Minimum mark required	39
No award	Number of candidates	902	Percentage	12.8	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

This question paper performed as expected.

Question paper 2

This question paper performed less well than expected. This was taken into account when setting grade boundaries.

There were many candidates who performed well, but there were some candidates who had a limited knowledge and understanding of the course content.

Assignment

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

Section 2: comments on candidate performance

Question paper 1: multiple choice

Question 1

Most candidates demonstrated that they had knowledge and understanding of cell division.

Question 2

Most candidates demonstrated that they had knowledge and understanding of DNA replication.

Question 3

Some candidates were able to apply their knowledge and understanding to answer this grade-A question about PCR correctly.

Question 4

Many candidates demonstrated that they had knowledge and understanding of the nucleic acids involved in translation.

Question 5

Most candidates demonstrated the experimental design skills required to correctly answer this question about setting up a control tube.

Question 6

Some candidates were able to apply their knowledge and understanding to answer this grade-A question about a metabolic pathway correctly.

Question 7

Most candidates were able to make this prediction.

Question 8

Some candidates were able to apply their knowledge and understanding to correctly answer this question on investigation validity.

Question 9

Most candidates were able to process this information.

Question 10

Many candidates demonstrated that they had the knowledge and understanding to identify ATP synthase.

Question 11

Many candidates were able to apply their knowledge and understanding to correctly answer this question on skeletal muscle fibres.

Question 12

Many candidates demonstrated that they had the knowledge and understanding to correctly identify the hormone.

Question 13

Most candidates demonstrated that they had the knowledge and understanding to identify the site of testosterone production.

Question 14

Some candidates were able to apply their knowledge and understanding of sex linkage to the diagram to correctly answer this grade-A question.

Question 15

Most candidates were able to apply their knowledge and understanding to correctly determine the sequence of the IVF steps.

Question 16

Many candidates were able to apply their knowledge and understanding of cardiac output to correctly calculate the heart rate of the child.

Question 17

Many candidates demonstrated that they had knowledge and understanding of the location of peripheral vascular disease.

Question 18

Many candidates were able to read the graph correctly and, as a result, identify the correct statement.

Question 19

Most candidates demonstrated that they had knowledge and understanding of the autonomic nervous system.

Question 20

Most candidates demonstrated that they had knowledge and understanding about the methods of encoding information into long-term memory.

Question 21

Many candidates were able to apply their knowledge and understanding to correctly answer this question about a split-brain patient.

Question 22

Most candidates demonstrated that they had knowledge and understanding of the lymphocytes involved in a hypersensitive response.

Question 23

Some candidates were able to process the information about the R number to correctly predict the answer to this grade-A question.

Question 24

Many candidates were able to apply their knowledge and understanding to correctly answer this question about lymphocytes and the proteins they produce.

Question 25

Some candidates demonstrated that they had the knowledge and understanding of factors that affect the herd immunity threshold to correctly answer this question.

Areas that candidates performed well in

Question paper 2

Questions 1(a)(i), (a)(ii), (a)(iii), and (b)(i)

Most candidates demonstrated good knowledge and understanding of DNA structure and transcription.

Questions 2(a)(i) and (a)(ii)

Most candidates were able to explain why the reaction was catabolic and describe what happens during induced fit.

Question 2(a)(iii)

Some candidates were able to explain that after the reaction, products have a low affinity for the active site. Most candidates indicated that products leave the active site so the enzyme can be reused, despite this information being given in the question stem.

Questions 2(b) and (c)

These were both grade-A questions. Some candidates were able to provide appropriate suggestions to answer these questions.

Question 3(a)(i)

Many candidates were able to look at the design of the investigation and correctly indicate a variable that needed to be controlled.

Question 3(a)(ii)

Some candidates were able to evaluate the design of the investigation and come up with a possible source of error when using DCPIP. This is a grade-A question.

Question 3(a)(iii)

Many candidates were able to evaluate the design of the investigation and suggest how the reliability of the results could be improved.

Question 3(b)

Most candidates were able to correctly draw a line graph to show the results of the investigation.

Question 3(c)

Some candidates were able to apply their knowledge and understanding and describe how the results show that the inhibitor was a competitive inhibitor. This is a grade-A question.

Questions 3(d)(i), (d)(ii), and (d)(iii)

Most candidates knew the location of the citric acid cycle, while many candidates could describe the role of dehydrogenase enzymes and name oxaloacetate.

Question 4(a)(i)

Many candidates were able to apply their knowledge of substitution mutations to the information shown in the diagram.

Question 4(c)(iii)

Most candidates were able to process the information and calculate the number of people with sickle cell disease.

Questions 5(a)(i) and (a)(ii)

Most candidates were able to identify the stage of ovulation and name the corpus luteum.

Questions 6(a)(i) and (a)(ii)

Many candidates were able to select information and describe two trends shown in the graph, while most candidates could read the average age of the women from the graph.

Questions 6(b)(i) and (b)(ii)

Most candidates were able to process this information and make the calculations.

Question 6(c)(i)

Many candidates were able to correctly read the figures from the graph and make the calculation.

Question 6(c)(iii)

Many candidates realised that the donor or the eggs would be younger.

Questions 7(a)(i) and (a)(ii)

Many candidates demonstrated good knowledge and understanding of blood vessel structure.

Questions 8(c)(i) and (c)(ii)

Many candidates knew the minimum BMI value that indicates obesity and were able to apply the BMI formula to calculate the mass of the individual.

Question 9(b)

Most candidates were able to process the information given and calculate the individual's target body mass.

Questions 10(a)(i) and (a)(iii)

Most candidates were able to name the axon and glial cells.

Question 10(c)

Many candidates understood that diverging pathways allow impulses to be sent to more than one destination.

Questions 11(a) and (b)(i)

Most candidates could identify the central nervous system, while many knew that the term was antagonistic.

Question 12(a)

Many candidates were able to look at the design of the investigation and identify two additional variables that would need to be controlled.

Question 12(c)

Many candidates were able to evaluate the investigation and describe the control that would have been set up.

Question 12(e)

Many candidates were able to use their knowledge of the serial position effect and indicate that the words would still be in the short-term memory.

Questions 13(a)(i) and (b)

Most candidates were able to select the correct endorphin concentration from the graph and state an activity that would increase endorphin levels.

Question 14(a)

Most candidates knew that 'pathogen' is the term that describes disease-causing organisms.

Questions 14(b) and (c)

Many candidates were able to correctly describe the process of phagocytosis and the function of cytokines.

Question 15A

Many candidates demonstrated good knowledge and understanding when describing the actions of recreational drugs and their effects on the body.

Question 15B

Many candidates demonstrated good knowledge and understanding when describing the content of vaccines and the design of clinical trials.

Areas that candidates found demanding

Question paper 2

Question 1(b)(ii)

Only a few candidates were able to demonstrate knowledge and understanding of alternative RNA splicing.

Question 1(b)(iii)

Some candidates were able to describe the function of tRNA in protein synthesis.

Question 4(a)(ii)

Only a few candidates were able to suggest that the shape or structure of the protein could change. Most candidates said the protein would be shorter. This is a grade-A question.

Question 4(b)

Some candidates were able to compare the effects of frame-shift and missense mutations on the sequence of amino acids. Many candidates described the mutations but did not go on to indicate how the sequence of amino acids would be affected.

Question 4(c)(i)

Only a few candidates were able to apply their understanding of incomplete dominance to the information provided about sickle cell trait.

Question 4(c)(ii)

Only a few candidates were able to suggest why individuals with sickle cell disease have an increased risk of having a stroke. Most candidates focused on the red blood cells carrying less oxygen instead of them being sticky and forming clots. This is a grade-A question.

Questions 5(b)(i) and (b)(ii)

Only some candidates had the knowledge and understanding to correctly describe why progesterone concentration decreases at the end of the menstrual cycle and one effect of this decrease.

Question 5(c)

Only some candidates were able to describe how drugs stimulate ovulation function.

Question 6(b)(iii)

This was a challenging grade-A question. Only a few candidates spotted that the number of embryos transferred for each IVF cycle was different.

Question 6(c)(ii)

Some candidates were able to see the two trends in the graph and make the correct comparison. Many candidates only described one trend. This is a grade-A question.

Question 7(b)

Only a few candidates were able to describe the exchange of materials within capillary networks.

Question 8(a)(i)

Only some candidates were able to identify the coronary artery. Many candidates thought that this was the pulmonary artery.

Question 8(a)(ii)

Some candidates understood that a blockage in the coronary artery would deprive the muscle cells of oxygen.

Question 8(b)

Only some candidates understood that statins reduce cholesterol levels and so reduce the chances of a clot forming.

Question 9(a)

Only some candidates knew that the glucose tolerance test is used to diagnose diabetes.

Question 9(c)

Only some candidates demonstrated the knowledge and understanding to describe how type 2 diabetes affects liver cells. This question had 1 grade-A mark.

Question 9(d)

Only a few candidates had the knowledge and understanding necessary to describe how untreated diabetes would damage the retina. This is a grade-A question.

Question 10(a)(ii)

Some candidates knew that the myelin sheath increases the speed of impulses.

Question 10(b)

Only some candidates were able to relate that a one-year-old child would have less myelin and therefore could not move their muscles so well. This is a grade-A question.

Question 11(b)(ii)

This question had 1 grade-A mark allocated to it. Candidates had to apply their understanding of two sympathetic nervous system effects to indicate their benefit to the body during exercise. Only some candidates could do this.

Question 12(b)

This proved to be a challenging calculation. Candidates had to total the number of students recalling the word in each group and divide the totals by 20, as there were 20 students in each group, so getting a difference of 1. Only a few candidates did this. Many candidates divided the totals by 10, using the positions of the words in the list, and got a difference of 2.

Question 12(d)

Drawing a conclusion from an investigation continues to be a skill that many candidates struggle with. Only some candidates related their conclusion to the aim of the investigation. Instead, most candidates simply described the results of the investigation.

Question 13(a)(ii)

Only some candidates were able to select the correct lactate concentrations from the graph and process these readings to obtain the percentage increase. This is a grade-A question.

Question 13(a)(iii)

Only some candidates were able to explain why lactate concentration increases as exercise increases.

Questions 14(d) and (e)

Only some candidates were able to apply their knowledge and suggest a valid explanation for how the binding of the toxin would decrease impulse transmission and explain why herd immunity would not protect unvaccinated individuals. These are grade-A questions.

Section 3: preparing candidates for future assessment

Question papers

Overall, there was a noticeable improvement in candidate knowledge and understanding as well as in their performance in skills-based questions. Processing skills and spelling were also much better this year, which was encouraging and indicates that candidates prepared well for the exam.

There continues to be some candidate responses that are difficult for markers to read. Centres should make sure that candidates whose writing is not particularly legible have the appropriate additional support.

Candidates can use pencils to draw graphs and diagrams. Candidates should not use pencils for their other responses as markers can find these responses difficult to read.

A noticeable number of candidates struggle to phrase their answers using the correct biological terminology. Centres should make candidates aware that answers that do not use terms from the course specification will not gain marks.

Centres should be aware that the question papers can assess all the information in the key areas and depth of knowledge sections of the course specification. This year, there were some demonstrating knowledge and understanding questions that very few candidates answered correctly, for example exchange of materials in capillary networks and retinal damage caused by high blood glucose levels.

Candidate performance in the skills-based questions was much improved this year. However, candidates continue to struggle with drawing a conclusion from investigation results. Centres should continue to emphasise to candidates that the conclusion must be based on the aim of the investigation. Many candidates continue to restate results when they write a conclusion. Centres should also emphasise to candidates that when they are expected to describe trends using a graph, they should firstly describe the increase in the x-axis and then relate that to the corresponding change in the y-axis.

Candidates' use of the terms 'control', 'validity' and 'reliability' improved this year. We updated the course specification to include definitions of these terms last year and improved understanding of them should help candidates with their assignments next session.

Assignment

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

The Higher Human 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 preparing candidates for the assignment.

Centres should be aware that experiments chosen must be at Higher level. The assignment must link to the key areas of human biology contained in the course specification. Memory-based assignments scored fewer marks than laboratory-based assignments. These non-practical assignments do not align well with the requirements of the Assignment Assessment Task and centres that have used them in previous years should consider changing to a laboratory-based assignment in future. The following advice relates to the specific sections of the assignment.

Aim

When writing the aim, candidates should refer to the independent and dependent variables, specifying what is being changed and what is being measured. If a specific substance or enzyme is indicated in the aim, then this needs to be referred to in subsequent sections including the internet/literature source.

Underlying biology

This must be written in the candidate's own words and not be reorganised sentences from texts.

Data collection and handling

Summary

Candidates should avoid too much detail. There is no need to include volumes, concentrations or temperatures in the summary, unless they refer to the independent variable. Candidates must describe how the dependent variable is measured. In memory-based experiments, this is done by writing down and collating the results.

Raw data

Candidates do not need to have five values for the independent variable. Three may be enough to show a trend. Data must include at least two sets of measurements. In memory experiments, using 20 people represents an adequate sample size, but it does not indicate the experiment was repeated.

Data presentation

The table produced must contain clear headings, units and correctly calculated averages. If averages are rounded up, for ease of presenting the figures in a graph, then the rounding must be consistent for all the averages.

Internet/literature source

The source selected must link to both aspects of the aim of the investigation. It is good practice to encourage candidates to insert statements indicating how their selected data source links to their aim.

Citation and reference

Candidates must cite their data source and link it to the reference at the end of the report. 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.

Graphical presentation

Candidates should take care in how they plot log scales and should be encouraged to place tick marks on each of the axes.

Analysis

The x-axis values (with units) used in the analysis must be given for a comparison or a calculation. Candidates must link the analysis to their aim. When doing a comparison, any measurements being compared must, in turn, be linked to the aim. Similarly, when a calculation is being made, candidates must link the results obtained to their investigation aim.

Conclusion

The conclusion must relate to the aim and be supported by all the data in the report. This means that candidates must refer to both their experimental data and source data if it is relevant.

Evaluation

Candidates can evaluate experimental controls, variables, errors and potential improvements. In all cases, there must be an appropriate justification to support any evaluative comment. 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.

Structure

The title must make sense for it to be deemed informative.

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.

