Course report 2024

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 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: 7,035

Number of resulted entries in 2024: 7,451

Statistical information: performance of candidates

Distribution of course awards including minimum mark to achieve each grade

A	Number of candidates	1,735	Percentage	23.3	Cumulative percentage	23.3	Minimum mark required	102
B	Number of candidates	1,445	Percentage	19.4	Cumulative percentage	42.7	Minimum mark required	85
C	Number of candidates	1,627	Percentage	21.8	Cumulative percentage	64.5	Minimum mark required	68
D	Number of candidates	1,504	Percentage	20.2	Cumulative percentage	84.7	Minimum mark required	51
No award	Number of candidates	1,140	Percentage	15.3	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

Overall, this question paper performed as expected. In general, numeracy questions performed better than expected. Some straightforward, demonstrating knowledge questions performed less well than expected.

Question paper 2

Markers' feedback and feedback 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 considered when setting grade boundaries.

Many candidates performed well. However there were some candidates with limited knowledge and understanding of the course content.

Assignment

The assignment performed as expected.

Section 2: comments on candidate performance

Question paper 1: multiple choice

Question 1 Most candidates demonstrated knowledge of cellular differentiation to identify multipotent tissue stems cells differentiate to form red blood cells.

Question 2 Most candidates applied their knowledge of structure of DNA to calculate the number of guanine bases using a ratio.

Question 3 Most candidates demonstrated knowledge of catabolic reactions to answer this question.

Question 4 Many candidates demonstrated problem solving skills to identify an appropriate control for the investigation.

Question 5 Most candidates demonstrated knowledge of pharmacogenetics to answer the question.

Question 6 Most candidates applied their knowledge of feedback and competitive inhibition to answer this question.

Question 7 Most candidates demonstrated knowledge of nonsense mutations.

Question 8 Most candidates could apply knowledge of chromosome mutations to identify the two types of mutation from the diagram.

Question 9 Many candidates demonstrated knowledge of lactate metabolism to identify that lactate is converted to glucose and pyruvate in the liver.

Question 10 Many candidates demonstrated problem solving skills to process and calculate the number of temperature changes required to get 256 copies of DNA.

Question 11 Most candidates demonstrated knowledge of gamete production to identify that sperm are produced by meiosis in the seminiferous tubules.

Question 12 Some candidates applied their knowledge of chemical methods of contraception to identify the structure affected by the progesterone only mini pill.

Question 13 Most candidates applied their knowledge of analysis of patterns of inheritance to identify the individual who confirmed the condition was not sex linked.

Question 14 Many candidates demonstrated knowledge of treatment for infertility to answer the question on artificial insemination.

Question 15 Some candidates demonstrated knowledge of postnatal screening to identify the type of mutation and the reaction affected in the condition phenylketonuria.

Question 16 Many candidates applied their knowledge of cardiac output to correctly calculate the increase in cardiac output after training.

Question 17 Most candidates demonstrated knowledge of thrombosis to identify the first reaction activated by the release of clotting factors.

Question 18 Most candidates demonstrated knowledge of BMI calculations to answer the question.

Question 19 Most candidates demonstrated knowledge of the function of the corpus callosum.

Question 20 Most candidates demonstrated knowledge of the association areas of the brain to identify that coordinating balance is not one of the functions.

Question 21 Some candidates applied their knowledge of dopamine and the reward pathway to answer this grade-A question.

Question 22 Most candidates demonstrated problem solving skills to predict the dopamine levels at 120 minutes.

Question 23 Many candidates demonstrated knowledge of non-specific body defences to identify the types of cells involved.

Question 24 Many candidates demonstrated knowledge of experimental procedures to identify the independent variable.

Question 25 Most candidates demonstrated problem solving skills to identify and process relevant information to identify the population most at risk of measles.

Question paper 2

Areas that candidates performed well in

Questions 1(a), (b)(i), and (c)
Most candidates demonstrated or applied knowledge of DNA structure and the process of PCR to answer these questions.

Questions 2(a)(i) and (b)(i)
Most candidates demonstrated problem solving skills to select information from the graph and process the data to answer these questions.

Question 3(a)(i)
Most candidates demonstrated problem solving skills to identify variables that should be controlled to make the investigation valid.

Question 3(b)
Most candidates demonstrated problem solving skills to present data by drawing the line graph.

Questions 4(a)(i), (ii), and (iii)
Many candidates demonstrated or applied their knowledge of cellular respiration to answer these questions.

Question 4(c)
Most candidates demonstrated their knowledge of muscle fibres.

Questions 5(a)(ii), (iii), (c)(i), and (ii)
Many candidates demonstrated knowledge of hormonal control of reproduction to answer these questions.

Question 5(b)(i)
Most candidates demonstrated problem solving skills to select and process data.

Question 5(b)(ii)
Most candidates demonstrated knowledge of hormonal control of reproduction.

Questions 6(a), (b), and (c)(i)
Many candidates demonstrated or applied their knowledge of antenatal and postnatal screening to answer these questions.

Questions 7(a)(i), (ii), and (b)(i)
Many candidates demonstrated problem solving skills to process the data to answer these questions.

Questions 8(a)(i), (ii), and (c)(ii)
Many candidates applied their knowledge of structure and function of arteries, capillaries, and veins to answer these questions.

Question 8(c)(i)
Many candidates demonstrated knowledge of structure and function of arteries, capillaries, and veins.

Question 9(b)(ii)
Many candidates demonstrated problem solving skills to draw a conclusion from the results.

Question 9(b)(iii)
Many candidates demonstrated problem solving skills to select and process the data.

Question 10(a)(i)
Many candidates demonstrated problem solving skills in improving experimental protocols.

Question 10(b)(ii)
Most candidates demonstrated problem solving skills in selecting data.

Question 10(a)(iii)
Many candidates demonstrated problem solving skills to process data.

Question 11(a)
Many candidates demonstrated knowledge of short-term memory.

Question 11(c)
Many candidates applied knowledge of short-term memory.

Question 11(d)(i)
Many candidates applied knowledge of randomisation to answer this question.

Question 11(e)
Many candidates demonstrated knowledge of long-term memory.

Question 12(b)(i)
Most candidates demonstrated knowledge of structure and function of converging, diverging, and reverberating neural pathways.

Question 12(c)(i)
Most candidates demonstrated knowledge of neurotransmitters at synapses.

Question 12(c)(ii)
Many candidates applied knowledge of structure and function of neurons.

Question 12(d)(iii)
Many candidates demonstrated problem solving skills in processing data to answer this question.

Question 13(b)
Many candidates demonstrated knowledge of lymphocytes.

Question 14(c)(i)
Most candidates demonstrated knowledge of clinical trials of vaccines and drugs.

Question 14(c)(ii)
Many candidates demonstrated knowledge of double-blind procedures used to interpret results of clinical trials of vaccines and drugs.

Question 15(B)
Many candidates demonstrated knowledge of gene expression to answer this question.

Areas that candidates found demanding

Question 1(b)(ii)
Some candidates demonstrated knowledge of the role of primers or DNA polymerase.

Question 2(a)(ii)
Some candidates were able to select and process information from the graph to answer this grade A question.

Question 2(b)(ii)
A few candidates were able to explain that the three countries had populations of different sizes to answer this grade-A question.

Question 3(a)(ii)
A few candidates demonstrated planning and designing investigation skills to suggest a reason why immobilised yeast were used. This is a grade-A question.

Question 3(c)
Some candidates demonstrated conclusion skills to suggest why the yeast beads were left in the solution for 24 hours. This is a grade-A question.

Question 4(b)
Some candidates applied their knowledge of the electron transport chain to answer this question. This question has 1 grade-A mark.

Question 5(a)(i)
Some candidates demonstrated their knowledge of hormonal control of reproduction. This question has 1 grade-A mark.

Question 6(c)(ii)
Some candidates demonstrated their knowledge of genetic terms.

Question 7(a)(iii)
Some candidates applied their knowledge of the structure and function of arteries to answer this question. This question has 1 grade-A mark.

Question 7(b)(ii)
Some candidates demonstrated knowledge of autonomic nervous system to answer this grade-A question.

Question 8(b)
Some candidates applied their knowledge of the structure and function of arteries, capillaries, and veins.

Question 8(d)(i)
A few candidates demonstrated knowledge of the structure and function of arteries, capillaries, and veins to answer this question.

Question 8(d)(ii)
A few candidates applied knowledge of the structure and function of arteries, capillaries, and veins to answer this grade-A question.

Question 9(a)
Only a few candidates demonstrated knowledge of blood pressure changes in the aorta during the cardiac cycle to answer this question. This is a highlighted technique in the *Higher Human Biology Course Specification*. This question has 1 grade-A mark.

Question 9(b)(i)
Some candidates demonstrated knowledge of experimental set-up.

Question 9(c)
Some candidates demonstrated knowledge of blood pressure changes in the aorta during the cardiac cycle to answer this question.

Question 10(a)(ii)
Only a few candidates demonstrated problem solving skills to evaluate the experimental protocol. This is a grade-A question.

Question 10(a)(iv)
Some candidates demonstrated problem solving skills to describe how the reliability of the study could be improved.

Question 10(b)(i)
Some candidates demonstrated problem solving skills to select data from the graph. This question has 1 grade-A mark.

Question 11(b)
Some candidates demonstrated knowledge of short-term memory.

Question 11(d)(ii)
A few candidates applied knowledge of long-term memory.

Question 12(a)
Some candidates applied knowledge of neurotransmitters at synapses to answer the question. Some candidates gave incorrect answer of ‘dendrites’.

Question 12(b)(ii)
A few candidates applied knowledge of structure and function of converging, diverging and reverberating neural pathways to answer this grade-A question.

Question 12(d)(i)
A few candidates applied knowledge of neurotransmitters at synapses to answer the question. Some candidates lacked National 5 level knowledge and stated that the impulse could not cross the synapse. Few candidates mentioned neurotransmitters or receptors. This is a grade-A question.

Question 12(d)(ii)
Few candidates applied knowledge of lymphocytes to answer the question. This question has 1 grade-A mark.

Question 13(a)
Some candidates demonstrated knowledge of B lymphocytes. A few candidates confused the action of B lymphocytes with T lymphocytes.

Question 14(a)
Some candidates applied knowledge of genes to answer the question.

Question 14(b)
Some candidates demonstrated knowledge of immunisation.

Question 14(d)
Some candidates applied knowledge of immunisation to answer the question. This question has 1 grade-A mark.

Question 15(a)
Some candidates demonstrated knowledge of division of somatic and germline cells.

Assignment

Areas that candidates performed well in

Section 1 Aim
Most candidates provided an appropriate aim that detailed the independent and dependent variables that clearly described the purpose of the investigation.

Section 2 Underlying biology
Many candidates provided an account of the underlying biology at Higher level that was relevant to the aim.

Section 3(b) Sufficient raw data from the candidate's experiment
Most candidates had sufficient raw data including a replicate. The number and range of the data was appropriate for the aim.

Section 3(d) Data relevant to the aim from an internet/literature source
Most candidates provided a second source of data that was relevant to the aim.

Section 4 Graphical presentation
Most candidate selected an appropriate format for their graphical representation. They used suitable scales on the axes of their graphs. They used appropriate labels and units for the axes of their graphs, and accurately plotted their data points.

Section 8 Structure
Most candidates provided a clear and concise report with an informative title.

Areas that candidates found demanding

Section 3(a) A brief summary of the approach used to collect experimental data
Some candidates demonstrated the ability to summarise their procedure.

Section 3(c) Data, including mean/average values, presented in a correctly produced table(s)
Some candidates presented data in a correctly produced table with clear headings and mean/average values calculated correctly.

Section 3(e) A citation and reference for a source of internet/literature data
Some candidates provided a citation within the body of the report and the full reference later in the report.

Section 5 Analysis
Some candidates provided a valid comparison or appropriate calculation linked to the aim of the investigation.

Section 6 Conclusion
Some candidates provided a valid conclusion that related to the aim. The conclusion was supported by all the data in the report.

Section 7 Evaluation
Some candidates provided valid evaluative statements supported by appropriate justifications.

Section 3: preparing candidates for future assessment

Question papers

Centres should be aware that the question papers can assess all the information in the *Higher Human Biology Course Specification*. This year, there were many demonstrating knowledge and understanding questions that very few candidates answered correctly, for example working memory model of short-term memory, pressure filtration in the exchange of materials between tissue fluid and cells, and the function of B lymphocytes.

In addition to the key areas and depth of knowledge sections, the apparatus and techniques section can also be examined. This year, few candidates demonstrated knowledge of the use of a sphygmomanometer. Centres should ensure candidates have knowledge of the pieces of apparatus and have opportunities to become familiar with the techniques listed in the *Higher Human Biology Course Specification*.

Overall, there was a noticeable improvement in candidate performance in skills-based questions, especially selecting, processing, and presenting. However, candidates continue to struggle with questions relating to experimental investigations. Centres should give candidates opportunities to carry out practical investigations, where possible.

Candidates struggled 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 and not on an indirect measurement of the dependent variable. Many candidates continue to restate results when they write a conclusion. Many candidates were unable to identify the dependent variable in an investigation.

There continues to be some candidate responses that are difficult for markers to read. Centres should make sure that candidates with handwriting that is not particularly legible have the appropriate additional support. Candidates should not use pencils for their responses as the papers are scanned and pencil does not scan well.

A noticeable number of candidates struggled 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 encourage candidates to use past papers for revision, comparing their responses with the marking instructions. The Understanding Standards website has example candidate responses along with the marks awarded. This should help candidates understand the standard required to successfully answer questions.

Assignment

In session 2023–24, the Higher Human Biology returned to full assessment requirements.

The *Higher Human Biology Coursework Assessment Task* outlines the assessment conditions for the assignment. It is important to note that the assessment requirements have not changed since 2019. These standards were exemplified in the Understanding Standards

events in 2023 and are published on the Understanding Standards website. Centres should consult these resources before undertaking the delivery of 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 current course specification. Centres should be aware that memory-based assignments scored fewer marks than laboratory-based assignments. These non-practical assignments do not align well with the requirements of the coursework 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 or literature source.

Underlying biology

Knowledge must be at Higher level or above and must relate to the aim. This must be expanded descriptions written in the candidate's own words and not be reorganised sentences from texts.

Data collection and handling summary

The summary must allow the reader to visualise the experiment. Candidates should avoid too much detail but should name the independent variable and any key chemicals used. 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, for example a stopwatch to measure the time for a disc to rise or a colorimeter to measure absorbance. In memory-based experiments, this is done by writing down and collating the results.

Some candidates did not have a clear understanding of the experiments they were carrying out, especially complicated enzyme experiments. Centres should ensure candidates understand the practical investigation they are performing as this will help them gain marks in the report stage. Some candidates doing the effect of substate concentration on enzyme activity, confused the measurement of concentration and volume of hydrogen peroxide.

Raw data

Candidates must repeat their experiment and include at least two sets of measurements. Raw data must contain an appropriate number and range of values; however, candidates do not need to have five values for the independent variable, three may be enough to show a trend. 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 a chemical is used for the independent variable, it must be named in the table. If averages are rounded, for ease of presenting the figures in a graph, then the rounding must be consistent for all the averages. Candidates must not construct a pre-populated table in the research stage. They must calculate the averages and write the headings in the report stage.

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 '1', or Author, Author (year), 1(date accessed). The citation must be distinct from the report heading. The full reference, linked to the citation, should be given at the end of the report. Some markers reported that all assignments from some centres had the citation below the source and not at the end of the report.

Graphical presentation

Candidates should use bar graphs for discrete data and line graphs for continuous data.

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 an indirect measurement of the dependent variable is made, candidates must link this measurement to their aim. For example, in enzyme experiments where enzyme activity is measured indirectly by time for a disc to rise, the candidates must link the indirect measurement (time to rise) to the dependent variable (enzyme activity).

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.

If the candidate chooses an indirect measurement in their experiment, the conclusion cannot simply describe the results. Instead, the conclusion must refer to the dependent variable given in the aim.

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.

If candidates are evaluating their source, they must evaluate the data and not the source itself. Only 1 mark can be awarded for an appropriate evaluation of the data or information from the internet or literature source.

Structure

The title must provide information about the investigation and 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.

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.