Course report 2022

Subject	Human Biology
Level	Higher

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	7010

Statistical information: performance of candidates

Distribution of course awards including grade boundaries

A	Percentage	28.3	Cumulative percentage	28.3	Number of candidates	1985	Minimum mark required	78
B	Percentage	22.5	Cumulative percentage	50.8	Number of candidates	1570	Minimum mark required	63
C	Percentage	21.4	Cumulative percentage	72.2	Number of candidates	1505	Minimum mark required	49
D	Percentage	16.5	Cumulative percentage	88.7	Number of candidates	1155	Minimum mark required	34
No award	Percentage	11.3	Cumulative percentage	N/A	Number of candidates	795	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.

1

Section 1: comments on the assessment

Question paper 1: multiple choice

This paper performed as expected.

Question paper 2

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

There were some candidates who performed well, but overall, there was a marked decrease in candidate knowledge and understanding of the course content. Candidates found the applying knowledge questions more challenging than the demonstrating knowledge questions. Many candidates were able to demonstrate good problem-solving skills.

Assignment

The assignment was removed from the course for session 2021–22.

Section 2: comments on candidate performance

Question paper 1: multiple choice

Question 1
Most candidates demonstrated that they had knowledge and understanding of this topic.

Question 2
This was a grade A question and many candidates thought that the percentage increase in ovarian cancer treatment was 300%, so chose option C.

Question 3
Many candidates were able to apply their knowledge and understanding to answer these questions correctly.

Question 4
Many candidates demonstrated that they had knowledge and understanding of this topic.

Question 5
Many candidates were able to apply their knowledge and understanding to answer these questions correctly.

Question 6
Most candidates demonstrated that they had knowledge and understanding of this topic.

Question 7
Most candidates were able to apply their knowledge and understanding to answer this question correctly.

Question 8
Many candidates were able to apply their knowledge and understanding to answer this question correctly.

Question 9
Most candidates demonstrated that they had knowledge and understanding of this topic.

Question 10
This was a grade A question, and many candidates thought the larger bar represented improvement in performance and chose option D.

Question 11
Many candidates thought that the pituitary gland and not the hypothalamus triggered the onset of puberty in males.

Question 12
Most candidates were able to apply their knowledge and understanding to answer this question correctly.

Question 13
This was a grade A question. Many candidates chose 25% rather than 50% because they did not spot that the question referred to the son being colour blind and not the child being colour blind.

Question 14
Some candidates were able to identify where pressure filtration occurs in a capillary network.

Question 15
Many candidates demonstrated that they had knowledge and understanding of this topic.

Question 16
Most candidates demonstrated that they had knowledge and understanding of this topic.

Question 17
This was a grade A question. Many candidates thought the answer was C because they did not spot that the units in the table were in thousands. Consequently, the yearly average increase in England was 100 000 new cases not 100.

Question 18
Most candidates demonstrated that they had knowledge and understanding of this topic.
Question 19
Most candidates were able to apply their knowledge and understanding to answer this question correctly.
Question 20
Many candidates demonstrated that they had knowledge and understanding of this topic
Question 21
Many candidates demonstrated that they had knowledge and understanding of this topic.
Question 22
Most candidates demonstrated that they had knowledge and understanding of this topic.
Question 23
Most candidates demonstrated that they had knowledge and understanding of this topic.
Question 24
Many candidates demonstrated the skills required to correctly answer this question
Question 25
Many candidates did not know that using a suitable group size reduces the magnitude of experimental error in a clinical trial.

Question paper 2
Question 1(a)(i), (a)(ii), (a)(iii)
Many candidates demonstrated good knowledge and skills in naming germline cells, identifying mitosis and explaining why embryonic cells are pluripotent.
Question 1(b)
Many candidates did not realise that specific genes need to be switched on to trigger differentiation in tissue stem cells.
Question 1(c)
This was a grade A question. Most candidates did not spot that the question focused on the benefit to the patient of using stem cells and instead gave examples of therapeutic treatments.
Question 2(a)
Many candidates were unable to describe the temperature change occurring during step 2. Often candidates simply indicated a temperature for step 2.
Question 2(b)(i), (b)(ii), (c)
Many candidates demonstrated good knowledge and skills in identifying DNA polymerase, suggesting an advantage of using heat tolerant DNA polymerase and calculating the number of DNA molecules produced after 10 cycles of PCR.
Question 3(a), (c)(i), c(iii)
Many candidates demonstrated good knowledge and skills in stating variables to control, drawing a line graph, and making a prediction from data in a table.
Question 3(b)
This was a challenging grade A question. Most candidates were unable to evaluate the design of the investigation and come up with a valid reason for diluting the yeast cell suspension.
Question 3(c)(ii)
Most candidates were unable to draw a conclusion that related to the aim of the investigation. Many simply described the results.

4

Question 4(a)
Many candidates demonstrated good knowledge and skills in naming exons in the primary transcript.

Question 4(b)
This was a challenging grade A question, and it was encouraging that some candidates were able to apply their knowledge of splicing and codons to complete the calculation correctly.

Question 4(c)(i), (c)(ii)
A much larger number of candidates than expected did not realise that it is alternative RNA splicing that results in a gene expressing different proteins. This meant that these candidates were unable to describe that the process retains different exons.

Question 4(d)(i)
Most candidates were unable to compare the mature mRNA transcript here with the transcript in the stem of the question and spot that an intron had been retained.

Question 4(d)(ii)
Many candidates were unable to describe how the mutation would affect the structure of the protein. Instead, many answers referred to the protein being non-functional.

Question 5(a), (d), (e)
Many candidates demonstrated good knowledge and skills in suggesting why using two tablets of different painkillers would have a negative effect on design validity, identifying the painkiller that had the greatest inhibitory effect, and describing how to improve the reliability of the results.

Question 5(b)
Although this was a grade A question, fewer candidates than expected were able to describe that a control tube would contain water instead of the painkiller solution.

Question 5(c)
This grade A question asked candidates to describe how the results were calculated. Many candidates simply stated that the mass of egg white broken down was calculated rather than describing how this calculation was made.

Question 6(a)(i), (a)(ii), (b)(ii)
Many candidates demonstrated good knowledge and skills in naming the matrix, naming the electron transport chain, and identifying that slow-twitch muscle fibres are most affected by mitochondrial disease.

Question 6(a)(iii)
Most candidates said that the mitochondrion contained ribosomes but did not go on and explain that ribosomes are the site of protein synthesis.

Question 6(b)(i)
Most candidates did not compare muscle to other tissues and indicate that muscle tissue contains more mitochondria or requires more ATP.

Question 6(b)(iii)
This grade A question required candidates to phrase their answers to explain why individuals were unable to carry out endurance activities. Many candidates found this difficult and did not indicate a lack of ATP was available or not enough ATP was produced.

Question 6(c)
This challenging grade A question asked candidates to use the information given and apply it to their knowledge of respiration. Few candidates were able to do this and identify the substrate and product of the enzyme.

5

Question 7(a)(i), (a)(ii)
Many candidates demonstrated good knowledge and skills in stating the functions of FSH and oestrogen in the menstrual cycle and identifying that it is the corpus luteum that produces progesterone.

Question 7(b)(i)
Many candidates were able to indicate that FSH concentrations would decrease but most were unable to explain that this was due to the pill inhibiting the pituitary gland.

Question 7(b)(ii)
Most candidates did not know that the inactive pills do not contain hormones.

Question 7(c)
Most candidates indicated that the morning-after pill prevents implantation. This is not correct, and the course specification was altered to reflect this in 2020.

Question 8(a), (b), (c)(i), (c)(ii), (e)
Many candidates demonstrated good knowledge and skills in taking a reading from a graph with two vertical axes and calculating a decrease and an increase from the graph. Stating that ovulation occurs before the body temperature increases and giving another indicator of a woman's fertile period.

Question 8(d)(i)
More candidates than expected did not know that the large spike in an ECG trace represents ventricular systole.

Question 8(d)(ii)
This challenging grade A question involved candidates having to analyse two graphs to get the answer. Only some candidates could do this.

Question 9(a), (b)
Many candidates demonstrated good knowledge and skills in identifying the hormone glucagon and the liver from the flow chart. Describing how the glucose tolerance test is carried out.

Question 10(a), (c)(i), (c)(ii)
Many candidates demonstrated good knowledge and skills in identifying the cell body and axon on the neuron diagram. Stating the function of the myelin sheath and naming the cells that produce myelin.

Question 10(b)(i)
Many candidates did not know how neurotransmitters are removed from a synaptic cleft.

Question 10(b)(ii)
Many candidates could not explain why neurotransmitters had to be removed from a synaptic cleft.

Question 10(d)
Candidates found it challenging describing two different trends between the number of cases of males and females. Many candidates compared single age groups instead of looking for patterns in the number of cases.

Question 11(a)
Most candidates could not describe the function of a sensory neuron. Many indicated that they carry impulses to the CNS but did not indicate where the impulses originate.

Question 11(b)(i)
Many candidates could not explain why the pathway was a converging neural pathway. Instead of referring to cell numbers, many candidates mentioned four pathways meeting one pathway.

6

Question 11(b)(ii)
This question was very poorly answered. Candidates were unable to apply their knowledge of summation of weak stimuli resulting in a threshold of neurotransmitters being released.

Question 11(c)
This was a grade A question as it involved integration of knowledge from two different areas of the course. Most candidates found this challenging.

Question 12(a), (b)
Many candidates demonstrated good knowledge and skills when identifying that skiing can increase an individual's endorphin production and that the endorphins can reduce the intensity of pain.

Question 12(c)(i)
Many candidates gave a general description of an agonist instead of linking their answer to endorphins.

Question 12(c)(ii)
Many candidates could not describe the effect of desensitisation on receptors.

Question 13(a)
This skills question proved to be more demanding than expected. Many candidates did not spot that the number of cases of cervical cancer increased to 30–39 and then decreased. Instead, they simply described a decrease from 20–29 to 90–99. In addition, many candidates did not give figures from the graph to support their description.

Question 13(b)(ii)
This was a challenging grade A question. Many candidates simply indicated that many females would have died from old age by 90–99. Candidates had to focus on the death rate from cervical cancer and realise that there are fewer cases of it among females aged 90–99.

Question 13(b)(i), (c), (d)
Many candidates demonstrated good knowledge and skills in calculating a decrease from a bar graph and calculating a simple whole number ratio using readings from a graph. Explaining how secondary tumours can develop.

Question 13(e)
Many candidates did not spot that the graph showed there were no cases of cervical cancer below age 20.

Question 14(a)(i)
Most candidates were unable to apply their knowledge of cells and nucleic acids to indicate that damage would stop the virus replicating or causing influenza.

Question 14(a)(ii)
Most candidates did not realise that the surface proteins of the virus were antigens that lymphocytes recognise before forming antibodies.

Question 14(b)(i)
This skills question proved to be more demanding than expected. Many candidates did not describe two differences between the antibody concentration after vaccination compared to after virus exposure.

Question 14(b)(ii)
Few candidates were able to indicate that memory cells produce B lymphocytes, which lead to the production of antibodies.

Question 14(a)(iii), (c)
Many candidates demonstrated good knowledge and skills in describing why an adjuvant is often added to a vaccine and describing the process of phagocytosis.

Question 15A

Many candidates demonstrated good knowledge and skills in discussing the formation of a thrombus and how it can damage the body.

Question 15B

Many candidates demonstrated good knowledge and skills in discussing the production, transport, and role of cholesterol in the body.

8

Section 3: preparing candidates for future assessment

Question paper

There were more examples this year of candidates focusing on certain words in a question and not actually answering the question. Centres should spend time teaching candidates about the different command words used in questions and how to prepare suitable answers. Common command words used in question paper 2 include: name, describe, explain, calculate, and suggest. The responses candidates are expected to provide to each of these command words are included in the marking instructions.

Candidate performance in the skills-based questions was quite varied this year. Drawing graphs, taking readings from graphs, and making calculations were generally done well. However, candidates continue to struggle with drawing a conclusion from investigation results. Centres must stress to candidates that the conclusion must be based on the aim of the investigation. Too many candidates continue to restate results when they write a conclusion. Centres should also emphasise to candidates that when they have to describe trends using data provided, they must provide relevant figures to support each trend.

Centres should try to do more practical work with candidates. It was evident this year that questions about designing and evaluating practical investigations were not as well done as in previous years. Candidates should be familiar 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.

Centres should note that, as a result of expert advice, the information on how the morning-after pill works was updated in the course specification in 2020. Any reference to implantation was removed and the course specification now states that emergency hormonal contraceptive pills prevent or delay ovulation.

This year there was a marked increase in candidate responses that were difficult to read. Centres should ensure that candidates whose writing is not particularly legible have the appropriate additional support.

9

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.