



Course Report 2016

Subject	Human Biology
Level	Higher

The statistics used in this report have been compiled before the completion of any Post Results Services.

This report provides information on the performance of candidates which it is hoped will be useful to teachers, lecturers and assessors in their preparation of candidates for future assessment. It 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.

Section 1: Comments on the Assessment

Component 1: Question paper

Section 1 (Objective test): this section performed as expected.

Section 2: this section performed slightly less well than expected. This was taken into account when setting grade boundaries.

Candidates were generally good at demonstrating knowledge but found applying their knowledge more challenging. It is encouraging that many candidates were able to demonstrate good numeracy skills, but literacy skills let down a significant number of candidates. These candidates tended to misinterpret questions or found it difficult to correctly phrase their answers.

Component 2: Assignment

Candidates demonstrated a real improvement in their performance. This was mainly due to an improvement in the applying knowledge and processing/presenting sections. The analysis, conclusion and evaluation sections continue to be the most challenging.

Section 2: Comments on candidate performance

Areas in which candidates performed well

Component 1: Question paper

Section 1 (Objective test)

- ◆ Questions 1, 3, 5, 8, 13 and 19: most candidates demonstrated that they had knowledge and understanding of these topics.
- ◆ Questions 2, 4, 7, 14, 18 and 20: most candidates could apply their knowledge and understanding and answered these questions correctly.
- ◆ Questions 6 and 9: most candidates had the skills required to solve these problems.

Section 2

Most candidates demonstrated good knowledge of the following course areas:

Question 1(a)	structure of DNA
Question 2	DNA transcription and translation
Question 3(b)	cancer development and spread through the body
Question 5(c)	electrical activity in the heart
Question 7	obesity, benefits of exercise and BMI

Question 8(b), (c)	using a placebo and double-blind trials
Question 9(a)	identification of the cerebrum
Question 10	identification of the axon and naming fast-twitch muscle fibres
Question 11	explanation of why widespread vaccination programmes against measles are not always possible
Question 13A	atherosclerosis
Question 13B	Type 1 and Type 2 diabetes

Most candidates performed well in the following skill areas:

- ◆ Selecting information: Questions 3(a)(ii) and 11(a) — candidates were generally good at selecting data from graphs.
- ◆ Presenting information: Question 4(d) — the majority of candidates were able to draw a bar graph correctly.
- ◆ Processing information: Questions 3(a)(i), 4(b), 6(a)(i), 6(a)(iii), 6(a)(iv) and 11(c) — candidates were generally good at performing calculations.
- ◆ Designing practical investigations: Question 4(a) — most candidates could identify two variables that needed to be kept constant during the investigation.
- ◆ Providing supported explanations: Question 8(a) — the majority of candidates were able to provide explanations supported by evidence in the table.

Component 2: Assignment

- Section 1: Almost all candidates produced an appropriate aim for their investigation.
- Section 2: Most candidates were able to show good knowledge and understanding of the human biology underlying their investigation at a depth appropriate to Higher.
- Section 3: Most candidates were able to select two pieces of data/information that were relevant to their investigation and allowed for a conclusion to be drawn.
- Section 4: Most candidates were able to process and present their raw data.
- Section 8: Most candidates produced a report that was logically structured, had an appropriate title and contained references.

Areas which candidates found demanding

Component 1: Question paper

Section 1 (Objective test)

- ◆ Question 10: many candidates could not apply their knowledge of male reproductive hormones to the diagram. Almost as many candidates chose answers B or C as chose the correct answer (A). This indicates that candidates were unclear about the functions of testosterone.

- ◆ Question 11: this was a challenging skills-based question. Many candidates chose the 3rd or 17th of May and appeared not to use the data in the graph to help them obtain the correct answer (29th of May).
- ◆ Question 12: this question was very poorly done despite it virtually replicating the wording in the Course Assessment Specification. Candidates did not appear to have any knowledge about the stimulation of ovulation by drugs.
- ◆ Question 15: this was a challenging question where candidates had to apply the knowledge that the limbic system is where spatial memories are located.
- ◆ Question 16: many candidates were unable to apply their knowledge of perception to the playing card example.
- ◆ Question 17: this skills-based question, where candidates had to select and process information, proved challenging with many candidates unable to do it.

Section 2

- ◆ Question 1(b): most candidates did not know that the strands are replicated in different ways as nucleotides can only be added to the 3' end of a new strand.
- ◆ Question 1(c): many candidates were unable to describe the functions of DNA polymerase and ligase in DNA replication.
- ◆ Question 2(a)(iv): this was a challenging question. Many candidates struggled to identify the missing bases in the mature mRNA transcript which formed the intron.
- ◆ Question 4(c): many candidates were unable to describe how the reliability of the results was increased by repeating the investigation and calculating averages.
- ◆ Question 4(e): most candidates described the trend in the graph and did not mention respiration rate. The conclusion had to relate to the aim, which was about the effects of physical activity on respiration rate.
- ◆ Question 5(b): many candidates realised that the oxygen concentration of the blood would decrease but were unable to explain that this was due to deoxygenated blood entering the left ventricle.
- ◆ Question 6(a)(ii): many candidates thought that presenting the data as per 100 000 made it reliable. Very few candidates realised that doing this allowed different sizes of populations to be compared.
- ◆ Question 6(c): many candidates realised that the damage must be in the right side of the brain. However, most candidates did not say that this meant the brain was unable to send impulses to the muscles, in order to make them contract.
- ◆ Question 8(d): most candidates did not understand what error bars indicate about data.

- ◆ Question 8(e): most candidates were unaware of the functions of cholesterol in the body and instead described how it builds up in arteries.
- ◆ Question 9(b): many candidates did not apply their knowledge of the term 'localisation of function' to the information shown in the diagram.
- ◆ Question 9(c): most candidates did not realise that if a task is being described to someone then the auditory or visual areas of the cerebrum must be active.
- ◆ Question 9(d): many candidates did not realise that, when folding a piece of paper, the sensory area of the cerebrum would be active due to touching the paper, while the motor area would be active as it controlled the movement of fingers.
- ◆ Question 10(d)(ii): many candidates were unable to apply the knowledge that dopamine induces feelings of pleasure to suggest that nicotine may stimulate the release of dopamine.
- ◆ Question 11(d)(i): many candidates did not seem to realise that herd immunity reduces the chances of unprotected people coming into contact with someone who has the disease.
- ◆ Question 11(f): this was a challenging question where candidates had to spot that if the rate of decrease in the number of cases continued then measles would be eliminated before 2020. A minority of candidates spotted this.
- ◆ Question 12(a)(i): many candidates realised that clonal populations are formed by repeated division of lymphocytes. However, few candidates indicated that this was triggered by the receptors on the lymphocyte combining with antigens on the pathogen.
- ◆ Question 12(a)(ii): most candidates described the role of phagocytes in the non-specific immune response rather than the specific immune response.
- ◆ Question 12(b): most candidates were able to identify the type of lymphocyte involved in either allergy or the autoimmune response. However, many candidates were unable to describe the failure in terms of the lymphocytes attacking either harmless antigens or self-antigens.

Component 2: Assignment

Section 5: The analysis section was poorly done. Many candidates did not fully analyse their data. Instead, there was a tendency to give a fairly superficial analysis that failed to identify key figures that supported all the trends and relationships shown. Even when comparing data from two sources, a partial analysis must contain relevant figures from the tables and/or graphs being compared.

Section 6: Many candidates failed to gain the conclusion mark because they stated a conclusion that either did not answer the aim or was unsupported by the data/information in their report.

Section 7: Many candidates struggled with the evaluation section. There was a tendency to use the terms 'valid', 'reliable' and 'robust' incorrectly, and candidates often muddled these. This meant that they might, for example, give a justification for data being reliable when the justification actually indicated that the data was valid.

Section 3: Advice for the preparation of future candidates

Component 1: Question Paper

Candidates were generally well prepared for the question paper.

Cognisance needs to be taken of the mandatory knowledge that can be assessed in the question paper. The mandatory knowledge is outlined in the Course Assessment Specification.

Although most topics were well taught, there were a number of areas where candidates' knowledge was less than expected. Centres should review their teaching of these areas, which include reproductive hormones and negative feedback, DNA replication, cholesterol function, localisation of brain function, agonists and the specific immune system.

Centres should encourage candidates to carefully read the questions. There were a number of questions where a significant number of candidates did not answer the question that was asked. For example, in question 10(b), candidates often described the breakdown of acetylcholine rather than it attaching to the receptors on the membrane. Similarly, in question 12(b), a large number of candidates described the role of phagocytes in the non-specific immune response rather than the specific immune response. It is also important that candidates are made aware that, when they are trying to explain the meaning of a term, they cannot simply use that term in their explanation. For example, in question 8(c), many candidates said that to ensure a drug trial was randomised, participants should be randomly selected.

Candidate performance in the skills-based questions was generally good. However, there are a number of areas where candidates could improve. Centres should be aware that labels on graphs must replicate exactly the headings in the data table. When only one axis on a graph starts at zero, entering a common zero at the origin will be marked wrong. Centres should ensure that the importance of error bars in determining the significance of results is taught. Conclusions from the results of an investigation must always refer to the aim of the investigation and not simply be a description of the results obtained.

Component 2: Assignment

It was encouraging to see a real improvement in the quality of the assignments produced this year.

Centres are advised to ensure that they are using the Instructions for Candidates and Assignment Marking Instructions to prepare candidates for the assignment.

To gain marks for applying knowledge and understanding of human biology, candidates must provide explanations that are at Higher level. For example, often in assignments on diabetes, much of the information given was at National 5 level and as such could not be awarded marks.

Candidates must include their selected raw data/information in the report. There were still a number of assignments which contained only processed data.

The marking of the processing and presenting data/information section was changed this year, benefitting many candidates. The chosen format must be a graph, table, chart or diagram. If more than one piece of raw data/information had been processed and presented as a graph, table, chart or diagram each piece of processed data was marked separately and candidates were given the best mark obtained.

Candidates should be encouraged to fully analyse data. Candidates should be aware that they must refer to the key points on the X-axis of a graph or the first column of a table while analysing their data.

Candidates should be made aware that any conclusion that is drawn must refer to their aims and be supported by the data/information in the report.

When candidates are evaluating data/information they must use the terms 'valid', 'reliable' and 'robust' correctly.

Full references, for all sources of data used, should be given at the end of the report. There were a significant number of candidates who did not include references at the end of their report.

Grade Boundary and Statistical information:

Statistical information: update on Courses

Number of resulted entries in 2015	1709
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Number of resulted entries in 2016	5991
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Statistical information: Performance of candidates

Distribution of Course awards including grade boundaries

Distribution of Course awards	%	Cum. %	Number of candidates	Lowest mark
Maximum Mark -				
A	20.0%	20.0%	1201	83
B	24.0%	44.0%	1438	70
C	24.6%	68.6%	1472	58
D	11.5%	80.1%	689	52
No award	19.9%	-	1191	0

General commentary on grade boundaries

- ◆ While SQA aims to set examinations and create marking instructions which will allow a competent candidate to score a minimum of 50% of the available marks (the notional C boundary) and a well prepared, very competent candidate to score at least 70% of the available marks (the notional A boundary), it is very challenging to get the standard on target every year, in every subject at every level.
- ◆ Each year, SQA therefore holds a grade boundary meeting for each subject at each level where it brings together all the information available (statistical and judgemental). The Principal Assessor and SQA Qualifications Manager meet with the relevant SQA Head of Service and Statistician to discuss the evidence and make decisions. The meetings are chaired by members of the management team at SQA.
- ◆ The grade boundaries can be adjusted downwards if there is evidence that the exam is more challenging than usual, allowing the pass rate to be unaffected by this circumstance.
- ◆ The grade boundaries can be adjusted upwards if there is evidence that the exam is less challenging than usual, allowing the pass rate to be unaffected by this circumstance.
- ◆ Where standards are comparable to previous years, similar grade boundaries are maintained.
- ◆ An exam paper at a particular level in a subject in one year tends to have a marginally different set of grade boundaries from exam papers in that subject at that level in other years. This is because the particular questions, and the mix of questions, are different. This is also the case for exams set in centres. If SQA has already altered a boundary in a particular year in, say, Higher Human Biology, this does not mean that centres should necessarily alter boundaries in their prelim exam in Higher Human Biology. The two are not that closely related, as they do not contain identical questions.
- ◆ SQA's main aim is to be fair to candidates across all subjects and all levels and maintain comparable standards across the years, even as arrangements evolve and change.