Course Report 2017

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

Summary of the course assessment

Component 1 — question paper

Section 1 (Objective Test) did not perform as well as expected. Some questions proved slightly more demanding than originally intended. This was taken into account when setting the grade boundaries.

Section 2 performed as expected. Candidates were generally good at demonstrating their knowledge, but found applying their knowledge more challenging. There were disappointing responses to some straightforward demonstrating knowledge questions. The majority of candidates demonstrated good numeracy and literacy skills.

Component 2 — assignment

Candidates continue to show an improvement in their assignment performance.

There was a slight improvement in performance in the applying knowledge, selecting information and processing/presenting sections. The analysis, conclusion and evaluation sections continue to be the most challenging for candidates.

Section 2: Comments on candidate performance

Areas in which candidates performed well

Component 1 — question paper

Section 1 (Objective Test)

Questions 1, 10, 15, 20	Most candidates demonstrated that they had knowledge and understanding of these topics.
Questions 4, 14, 17, 18	Most candidates could apply their knowledge and understanding to answer these questions correctly.
Question 3	Most candidates had the skills required to solve this problem.

Section 2

Most candidates demonstrated good knowledge of the following course areas:

Question 1(a);(d)	Naming mitosis and describing tumour development.
Question 2;(d)	Calculating the percentage chance of inheriting PKU.
Question 4;(c)	Describing the effect of pregnancy on the menstrual cycle.

Question 5(a);(b)	Identifying the blood vessel type and naming the endothelium.
Question 6(b)	Measuring blood pressure.
Question 7(c)	Identifying factors that could influence a study.
Question 8(a)	Identifying the mitochondrion.
Question 9(a);(b);(f)	Naming the medulla, explaining antagonistic action and naming effects of the sympathetic system on the body.
Question 10(a);(c);(d)	Naming antigens, naming cytokines and describing the advantage of having memory cells.
Question 11(a)(iii)	Giving reasons for the increase in life expectancy over the last 150 years.
Question 12A	Describing the structure of DNA and the process of DNA replication.

Most candidates performed well in the following skill areas:

Questions 4(a)(ii); 7(e)(i); 9(c)(i); 11(a)(ii) and 11(b)(i)	**Selecting information** — candidates were generally good at selecting data from tables and graphs.
Question 3(c)	**Presenting information** — most candidates were able to draw a line graph correctly.
Questions 4(b)(i) and 9(c)(ii)	**Processing information** — candidates generally were good at calculating ratios and performing calculations on selected information.
Question 3(a)	**Evaluating experimental design** — most candidates could work out why alkali should not be added at the start of the investigation.
Question 7(b)	**Providing supported explanations** — most candidates were able to provide an explanation for this conclusion.
Question 1(e)(ii)	**Making predictions** — most candidates were able to make this prediction.

Component 2 — assignment

Section 1: Aim(s)

Almost all candidates produced an appropriate aim for their investigation.

Section 2: Apply knowledge and understanding of human biology

Most candidates were able to show good knowledge and understanding, at Higher level, of the human biology underlying their investigation.

Section 3: Select information

Almost all candidates were able to select two pieces of data that were relevant to their investigation and allowed for a conclusion to be drawn.

Section 4: Process and present data/information

The majority of candidates were good at processing and presenting their raw data.

Section 8: Presentation

Most candidates produced a logically structured report that had an appropriate title and contained references at its end.

Areas which candidates found demanding

Component 1 — question paper

Section 1 (Objective Test)

Question 2	Half of candidates were unable to draw the correct conclusion from this graph containing two vertical axes.
Question 5	This proved to be a challenging application of knowledge question. Most candidates could not work out that glycolysis was the only process that could occur in a cell with no nucleus or mitochondrion.
Question 6	Approximately only half of candidates knew that most ATP is produced when hydrogen ions pass through ATP synthase.
Question 7	This question was poorly done. Most candidates appeared to have little knowledge of lactic acid production.
Question 8	Approximately only half of candidates were able to apply their knowledge of autosomal dominance to the family tree given.
Question 9	Less than half of candidates were able to correctly apply their knowledge of sex-linked inheritance to determine the expected phenotypes.
Question 11	This was a very challenging question. Candidates had to interpret the graph, take readings from it and then put these readings into a formula in order to calculate the cardiac output.
Question 12	It was disappointing that only half of candidates knew about the role of thrombin in clot formation. This was intended to be a very straightforward question.
Question 13	It was very disappointing that fewer than half of candidates realised that glucagon, produced by the pancreas, stimulates the conversion of glycogen to glucose. This was another straightforward demonstrating knowledge question that proved to be surprisingly difficult for candidates.
Question 16	This was a fairly novel question which involved candidates applying their knowledge of perception. It was encouraging that almost half of candidates were able to answer it correctly.
Question 19	This was designed to be a challenging applying knowledge question. Less than half of candidates were able to correctly determine the condition each patient had.

Section 2

Question 1(b)	Most candidates did not know that blood cells are an example of connective tissue.
Question 1(c)	A large number of candidates answered in terms of red blood cells needing haemoglobin to transport oxygen; instead of realising that after differentiation the gene to produce haemoglobin is switched on in red blood cells but switched off in white blood cells.
Question 1(d)(i)	Many candidates could not take the correct reading from this graph containing two vertical axes. The correct answer was 15. Many candidates thought it was 17·5.
Question 2(a)	Many candidates did not know that it is a nucleotide that is replaced when a substitution mutation occurs within a gene. They also did not realise that the effect of this is to change an amino acid in the resultant enzyme.
Question 2(b)(ii)	Most candidates did not realise that the metabolic pathway indicated that tyrosine can be obtained from dietary protein and so people with PKU can still make melanin.
Question 3(b)	This question was poorly done this year as many candidates did not notice that they could not list variables already shown in the investigation description. Consequently, they gave answers relating to volume or time which were wrong.
Question 3(e)	Many candidates gave a general description of how non-competitive inhibitors affect enzymes instead of relating their answer to the results of the investigation, and stating that the absorbance levels will remain low.
Question 4(a)	Many candidates did not realise that oestrogen build-up stimulates the release of LH which triggers ovulation.
Question 4(d)	Many candidates did not know how fertility drugs stimulate ovulation.
Question 5(a)(ii)	A large number of candidates did not realise that arteries can undergo vasoconstriction to reduce blood flow to capillary networks.
Question 5(b)(ii)	Many candidates stated that substances move from plasma to tissue fluid by diffusion instead of indicating pressure filtration.
Question 5(c)	Many candidates were unaware of the role of lymph vessels in the return of tissue fluid to the bloodstream.
Question 6(a)	Many candidates could not explain what systolic and diastolic measurements are.
Question 6(c)(i)	Most candidates were able to state that atherosclerosis was caused by a build-up of fatty material / cholesterol in an artery. However, many did not then link this to how it raised blood pressure by reducing the diameter of the lumen.
Question 6(c)(ii)	Many candidates could not describe how a low HDL to LDL ratio results in more cholesterol being deposited in the arteries.
Question 7(d)	It was disappointing that many candidates were unable to examine the research design, and describe that the large number of women used made the results reliable.

Question 7(e)(ii)	A large number of candidates found it difficult to work out how to determine the number of years when the average bone mass was at least 80% of the maximum.
Question 8(b)	Despite some candidates gaining all three marks, it was disappointing that many scored zero for this question. These candidates were unable to describe what the diagram was showing using the terms vesicle, neurotransmitter and receptor.
Question 8(c)	Many candidates were unaware that sensitisation involves increasing the number or sensitivity of receptors in the synapse and that it can lead to addiction.
Question 9(d)	Most candidates did not realise that this question was simply looking for the fact that the heart has a SAN which controls the heartbeat.
Question 9(e)	This was a challenging question and many candidates were unable to interpret the data in the graph in order to justify the statement.
Question 10(e)	Most candidates were unaware that TB bacteria can survive within phagocytes.
Question 11(a)(i)	A large number of candidates were unable to calculate this percentage increase.
Question 11(b)(ii)	This was a very challenging question that very few candidates answered correctly. Candidates needed to identify that in 1861 there was a high rate of infant mortality. Many candidates misinterpreted the question and answered in terms of the immune system of children getting stronger.

Component 2 — assignment

Section 5: Analyse data/information

The analysis section continues to be poorly done, with more than half of candidates failing to gain any marks. This is usually because candidates do not fully analyse their data. They often fail to describe the key trends and relationships shown and do not quote relevant figures in support of their analyses. Many candidates try to compare the data from each of their sources, but fail to state the relevant figures from the tables and/or graphs they are comparing.

Section 6: Conclusion(s)

More than half of candidates failed to gain the conclusion mark because their conclusion either did not answer their aim, or was unsupported by the data in their report.

Section 7: Evaluation

The majority of candidates gained either one or two marks for the evaluation section. Many candidates did not use the terms ‘valid’, ‘reliable’ and ‘robust’ correctly, often providing an inappropriate justification.

Section 3: Advice for the preparation of future candidates

Component 1 — question paper

Candidates generally appeared to be well prepared for the question paper, and there were fewer 'no responses' to questions this year compared to last year. This is encouraging and indicates that centres are generally doing a good job of preparing candidates for the exam.

While preparing candidates, centres should be aware that only the mandatory knowledge outlined in the Course Assessment Specification can be assessed in the question paper.

There were a number of areas where candidate understanding of basic mandatory knowledge was disappointing. These included: clot formation, control of blood glucose concentration, tissue types, use of fertility drugs, pressure filtration and sensitisation. Some centres should consider reviewing their teaching of these topics.

It is encouraging that candidate performance in the skills-based questions is generally good. However, there are a number of areas where candidates could improve, such as in questions which involve taking readings from a graph containing two vertical axes. Centres should focus on practising this skill with candidates. Centres should also emphasise to candidates that, to obtain reliable results in studies, researchers use large numbers of individuals.

Examiners commented that there were more candidates this year whose writing was difficult to read — or illegible in some cases. Candidates should be reminded that markers need to be able to read their work, and centres should provide appropriate support if they identify candidates who struggle to write legibly.

Component 2 — assignment

In general, centres are providing good support to candidates for the assignment. Centres are reminded that they should be using the Instructions for Candidates and the assignment marking instructions to help prepare candidates.

Candidates can process both pieces of information in the same way eg from a table into a graph. They should not be encouraged to process information in an illogical manner — for example, from a graph of results back into a table.

Candidates should fully analyse each piece of data, describing all the key trends using relevant figures. They should not feel that they have to make a calculation as this can lead them to make inappropriate calculations — for example, calculating a percentage decrease from a series of percentages.

Any conclusion that candidates make must refer to the aim of their assignment and be supported by the data provided.

When candidates use the terms valid, reliable and robust in their evaluation, they must produce an appropriate justification that supports the comment.

Whilst it was pleasing to see that the conditions of assessment for coursework were adhered to in the majority of centres, there were a small number of examples where this may not have been the case. Following feedback from teachers, we have strengthened the conditions of assessment criteria for National 5 subjects and will do so for Higher and Advanced Higher. The criteria are published clearly on our website and in course materials

and must be adhered to. SQA takes very seriously its obligation to ensure fairness and equity for all candidates in all qualifications through consistent application of assessment conditions and investigates all cases alerted to us where conditions may not have been met.

Grade Boundary and Statistical information:

Statistical information: update on Courses

Number of resulted entries in 2016	5991

Number of resulted entries in 2017	5927

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	23.4%	23.4%	1388	83
B	22.6%	46.0%	1337	70
C	24.9%	70.8%	1473	57
D	11.6%	82.4%	688	50
No award	17.6%	-	1041	-

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 Business Manager 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 Chemistry, this does not mean that centres should necessarily alter boundaries in their prelim exam in Higher Chemistry. 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.