



External Assessment Report 2013

Subject(s)	Human Biology (Revised)
Level(s)	Higher

The statistics used in this report are pre-appeal.

This report provides information on the performance of candidates which it is hoped will be useful to teachers/lecturers in their preparation of candidates for future examinations. 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 question papers and marking instructions for the examination.

Comments on candidate performance

General comments

This year, the number of presenting centres for the revised course increased from three to six. In total 149 candidates were presented for the exam; this relatively low number of candidates makes it very difficult to make reliable generalisations. In addition, candidates from one of the new presenting centres performed very poorly. This centre had around one third of all the candidates and consequently had a disproportionate effect on the exam statistics. This must be borne in mind when studying the following analysis of exam performance.

Section A: Objective test

The average mark for this section was 18.5 out of 30. This is similar to last year and generally candidates performed well in this section.

Section B: Restricted response

Candidate responses were very variable in this section. As in the unrevised paper, candidates did better when answering 'C' type questions where they had to name biological terms or select information. Candidates were less comfortable answering 'A' type questions which involved applying their knowledge in unfamiliar contexts. This is not surprising as these questions are designed to challenge candidates and allow them to demonstrate A grade knowledge and skills.

Section C: Extended Response

Candidate performance in this section was generally disappointing.

Option 1A on cell differentiation proved more popular (64%) than option 1B on skeletal muscle cells (36%). Candidates choosing the differentiation question scored on average 3.2 out of 10, while candidates choosing the muscle cell question scored on average 4.4 out of 10.

Option 2A on recreational drugs was chosen by only 21% of candidates with 79% choosing option 2B on non-specific body defences. The mean score for the recreational drugs question was 0.9 out of 10, while for the non-specific defences question it was 3.9 out of 10.

Areas in which candidates performed well

Candidates showed good knowledge of:

Question 2(b): Glycolysis

Question 3(b): The function of PCR

Question 3(c): Separation of DNA strands during PCR

Question 4(a)(ii): Genotypes

Question 5(a), (b): The male reproductive system

Question 7(a), (b): Blood vessels and their contents

Question 9(a): Body Mass Index

Question 9(c): Exercise effects on obesity

Question 10(a): Impulse direction along a nerve

Question 10(d): Myelination

Question 11(a): The corpus callosum

Question 13(c)(i): Generalisation

Candidates performed well in the following problem solving tasks:

Question 1(a)(i), 6(b): Selecting information from graphs

Question 3(a): Calculating a change in temperature

Question 4(a)(i): Labelling diagrams

Question 11(b)(ii): Making predictions

Question 12(a): Constructing a line graph

Question 12(b): Calculating a percentage decrease

Question 12(d)(i): Describing a control group

Areas which candidates found demanding

Candidates found the following questions particularly demanding:

Question 17 (Section A): Deciding which individual confirmed that a genetic condition was autosomal. This challenging question where candidates had to apply their knowledge was simply too demanding for the majority of candidates.

Question 1(b): Explaining the role of the active site in enzyme-catalysed reactions. Most candidates only indicated that the substrate binds to the active site. There was usually no mention of induced fit or lowering activation energy.

Question 2(c): Describing what happens to acetyl CoA in the Krebs Cycle. Many candidates did not mention that it combines with oxaloacetate in order to form citric acid.

Question 2(d): Explaining when the body would gain most energy from proteins. The majority of candidates did not realise, from the diagram, that it was when the body had used up all its carbohydrates and fats.

Question 2(e): Stating how and where carbohydrates are stored in the body. Many candidates did not know either glycogen or liver/muscles.

Question 3(d): Describing the role of primers in PCR. Most candidates did not know that they joined to a target/complimentary sequence of DNA.

Question 3(e): Suggesting why temperature is increased during the final stage of PCR. Most candidates did not realise that this was to provide the optimum temperature for heat tolerant DNA polymerase to work.

Question 3(f)(ii): Naming the process that allows individuals to be identified from their DNA. Many candidates could not name DNA profiling.

Question 4(b): Naming the plasma protein involved in blood clotting and describing how it is converted into threads. A large number of candidates could not name fibrinogen and thrombin.

Question 6(c)(i): Explaining why the concentration of IgA decreased despite the mass being constant. The majority of candidates ignored the constant mass and talked about her producing less antibodies after two days, rather than spotting the milk volume increase in Figure 1.

Question 7(c): Explaining the increase in lactic acid in the athlete's blood. Many candidates mentioned anaerobic respiration but did not indicate this was happening in muscle cells.

Question 8(b)(ii): Calculating the volume of blood leaving the left ventricle each minute. Many candidates found reading the graph correctly and then making the calculation too difficult.

Question 8(c): Describing how the nervous system and hormones can increase the blood volume leaving the heart. A large number of candidates did not realise heart rate increases and so the sympathetic nervous system and adrenaline will be involved.

Question 9(b): Explaining why the dietary intake of free sugars should be limited. The majority of candidates were unaware that no energy is required to digest free sugars.

Question 9(d): Stating two ways that exercise reduces the risk factors for CVD. Many candidates mentioned lowering pulse rate which does not reduce the risk of developing CVD.

Question 10(b): Suggesting a possible role for the nucleus in transferring information across the synapse. This challenging question required candidates to understand that neurotransmitters transfer information and that the nucleus may code for their production or the production of an enzyme to break them down in the synaptic cleft.

Question 11(b)(i): Explaining why the split brain patient picked up the key and not the spoon. This challenging problem solving question required candidates to provide an explanation for picking up the key and one for not picking up the spoon. Most candidates only explained why he picked up the key.

Question 12(d)(ii): Suggesting how the control group's recall pattern would differ from the results shown. Most candidates did not realise that the control group would show the serial position effect and so recall more words towards the end of the list.

Question 12(e): Explaining the role of the distraction task. The majority of candidates did not realise that this would displace words from short-term memory.

Question 13(b): Suggesting how shaping could be used by a teacher to improve a student's guitar playing. Most candidates discussed the rewarding of good playing but failed to go on and explain that over time only improvements in playing would be rewarded.

Question 13(c)(ii): Explaining how a teenager's opinion on a band's music could be altered by internalisation. A large number of candidates failed to indicate the role of persuasion in the process.

Question 14(b): Suggesting why different vaccines are required to combat different strains of influenza virus. Many candidates were unaware that different strains carried different antigens.

Question 14(c): Describing two ways in which T-lymphocytes combat infection. Most candidates did not mention either destroying infected cells by apoptosis or secreting cytokines to activate B lymphocytes.

Advice to centres for preparation of future candidates

General

The majority of centres who presented candidates for this exam had made a good effort to prepare them. Some candidates scored excellent marks. It was unfortunate that one centre had a large number of candidates who did very poorly. The results from this centre significantly lowered the candidate scores for each question and made a general analysis of responses very difficult.

Centres should look at the specific areas outlined above where the majority of candidates appeared to experience difficulties. These indicate a range of topics that centres should focus on when preparing candidates.

It is interesting to note that candidate performance in the problem solving questions was generally much better than their performance in the knowledge and understanding questions.

Candidate performance in the extended response questions in section C was particularly disappointing. There was a general lack of detailed knowledge with the majority of candidates struggling to gain half marks in these questions. This was particularly evident in the question on recreational drugs where most candidates wrote very general accounts on drugs but did not mention terms like agonist, antagonist, sensitisation and desensitisation. Centres should devote more time to practicing writing extended response answers.

Statistical information: update on Courses

Number of resulted entries in 2012	54
------------------------------------	----

Number of resulted entries in 2013	149
------------------------------------	-----

Statistical information: Performance of candidates

Distribution of Course awards including grade boundaries

Distribution of Course awards	%	Cum. %	Number of candidates	Lowest mark
Maximum Mark 130				
A	15.4%	15.4%	23	86
B	12.8%	28.2%	19	70
C	22.8%	51.0%	34	55
D	16.8%	67.8%	25	47
No award	32.2%	100.0%	48	-

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.