



## External Assessment Report 2014

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

The statistics used in this report are prior to the outcome of any Post Results Services requests

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

The number of Centres attempting the revised exam this year increased from six to eight. In total 193 candidates were presented for the exam by three colleges and five schools. This relatively low number of candidates makes it difficult to make reliable generalisations.

### Section A: Objective test

Candidates performed well in this section scoring on average 19 out of 30.

### Section B: Restricted response

Candidate responses showed an improvement in this section, this year. Candidates performed 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; however this is to be expected, as these questions are designed to challenge candidates and allow them to demonstrate 'A' grade knowledge and skills. Intentionally demanding questions included:

- Question 2 (e)(i), e(ii)
- Question 4 (a)(i), (c)
- Question 5 (a)(ii), (b)
- Question 6 (c) – 1 mark
- Question 7 (d)
- Question 8 (b), (c)(iii)
- Question 10 (a)(ii)
- Question 11 (b)(ii), (c) – 1 mark
- Question 12 (a)(ii),
- Question 13 (c), (d)
- Question 14 (c) – 1 mark

### Section C: Extended Responses

Candidate performance in this section also showed an improvement compared to last year. However, this section remains the most challenging part of the exam for candidates

Options 1A and option 1B were equally popular to candidates, with performance in the aerobic respiration option being slightly better than that in the protein synthesis option. Option 2B on cardiovascular disease was chosen by only 16% of candidates with the rest choosing option 2A on treatments for infertility. Candidates scored equally well on each option, scoring on average 5 out of 10.

## **Areas in which candidates performed well**

Candidates showed good knowledge of:

Question 1(a), (b): Mitosis and differentiation

Question 1(d): Therapeutic uses of stem cells

Question 3(a)(ii): Heat treatment of DNA during PCR

Question 3(a)(iii), (iv): Identification of primers and polymerase

Question 6(a): The female reproductive system

Question 9(a)(i): Tissue fluid

Question 9(b): Substance exchange at capillaries

Question 11(a): The effects of recreational drugs on an individual

Question 13(b): Social facilitation

Question 14(a): Describing how histamine affects arteries and capillaries

Candidates performed well in the following problem solving tasks:

Question 2(b): Identifying experimental variables

Question 2(d)(i): Constructing a line graph

Question 3(a)(i): Calculating ratios

Question 3(b): Describing the trends shown in a graph

Question 5(a)(iii): Calculating percentage change

Question 5(c): Calculating the number of males with a condition

Question 8(a)(i): Selecting information from a graph

## **Areas which candidates found demanding**

Candidates found the following questions particularly demanding:

Section A, Question 16: Calculating the mass of glucose present in 5 litres of blood.

Candidates found it difficult to read this graph and then convert the reading to 5 litres using the unit given.

Section A, Question 19: Calculating body mass index for four individuals. This challenging question required candidates to know the BMI formula, apply it to data on four individuals and then realise that those with a BMI over 30 were obese.

Section A, Question 25: Identifying an example of discrimination. This question was designed to indicate that the child had discriminated ginger cats from all other cats.

However, many candidates thought that the child had generalised from a specific ginger cat to all ginger cats.

Question 2(d)(ii): Stating a conclusion from the results of the investigation. Many candidates described the graph instead of relating it back to the aim of the investigation, which was about comparing respiratory substrates.

Question 2(e)(i): Explaining why yeast took longer to decolourise methylene blue with maltose than with glucose. Many candidates thought that because maltose is a bigger molecule it would take longer to respire. They did not realise that maltose had to be broken down into glucose before yeast could use it for respiration.

Question 2(e)(ii): Explaining why yeast did not decolourise methylene blue with lactose. The majority of candidates did not realise that yeast does not have the enzyme required to digest lactose.

Question 3(a)(ii): Explaining why a 10 000 metre runner requires a high percentage of slow twitch muscle fibres. Most candidates did not realise that slow twitch muscle fibres sustain contractions for a longer period making them suitable for distance running.

Question 4(a)(i): Stating a structural difference between the 3' and 5' ends of a DNA strand. It was disappointing that the majority of candidates were unable to do this.

Question 4(b): Stating the term that describes production of multiple copies of DNA during PCR. A large number of candidates did not know the term 'amplification'.

Question 4(c): Stating the feature of DNA which allows profiling to identify different individuals. Very few candidates were able to indicate that DNA has repetitive sequences of nucleotides.

Question 5(a)(ii): Explaining why an affected male could not pass the sex-linked condition to his sons. Candidates needed to indicate the condition is carried on the X chromosome which he does not pass to his sons.

Question 4(b): Explaining the effect of a mutation on the structure of an enzyme. A large number of candidates discussed frameshift mutations and changes in the order of nucleotides instead of relating it to enzyme structure and changes in the order of amino acids.

Question 6(c): Explaining how further development of follicles is prevented when pregnant. Many candidates were unable to describe the inhibitory effect of oestrogen and progesterone on the pituitary gland production of FSH.

Question 7(d): Predicting how the trace on the ECG would change under the influence of the parasympathetic nervous system. Too many candidates described the heart rate slowing instead of describing a change in the ECG trace.

Question 8(b): Explaining why it is important that insulin production is inhibited during cycling. Many candidates still refer to insulin converting glucose to glycogen instead of it stimulating the conversion of glucose to glycogen.

Question 8(c)(iii): Describing how changes in the volume and distribution of blood to muscles occurs. Many candidates misinterpreted this question, describing the increase in blood flow shown in the diagram as opposed to how the increase occurs due to increased heart rate and vasodilation.

Question 9(a)(ii): Indicating how tissue fluid differs from plasma. A large number of candidates did not know that tissue fluid contains no proteins.

Question 9(c): Describing the function of lymphatic vessels. Many candidates did not know that the lymphatic vessels absorb excess tissue fluid or return lymph to the blood system.

Question 10(a)(ii): Explaining how a contextual cue aids recall. This intentionally challenging question indicated that many candidates could not explain how contextual cues work.

Question 11(b)(ii): Describing two ways that recreational drugs affect the synapse. Candidates were expected to answer in terms of the effect on neurotransmitter action.

Question 11(c): Explaining what sensitisation is and what causes it. The majority of candidates were unable to explain the increase in the number of receptors caused by antagonists.

Question 12(b)(ii): Explaining how vaccination prevents a child showing the symptoms of mumps. Too many candidates were unable to say that antibodies against mumps are quickly produced.

Question 13(c): Improving the design of the investigation to eliminate the effect of practice. Most candidates found it difficult to suggest doing the investigation again with different individuals but doing it with an audience first.

Question 13(d): Redesigning the investigation to investigate the effects of practice. Many candidates did not realise that the investigation had to be repeated a number of times in one condition - either with or without an audience.

## **Advice to centres for preparation of future candidates**

### **General**

Most of the centres made a good effort to prepare their candidates for the question paper.

Centres should look at the specific areas outlined in this report that highlights where the majority of candidates experience difficulties. 'New' topics worth focussing on include the details of PCR and the effects of recreational drugs on the synapse

In terms of evaluating experimental procedures, candidates should be reminded to link conclusions to experimental aims. Candidates also should be aware that terms like 'temperature' and 'pH' must be qualified when identifying experimental variables. The term 'amount' remains too imprecise to describe an experimental variable, instead examiners will continue to look for use of the terms 'concentration', 'volume' or 'mass'.

Centres need to examine how they teach the role of hormones. A high number of candidates still talk about insulin converting glucose to glycogen instead of it stimulating this conversion.

An area of concern is in regard to the role of hormones. A high number of candidates still talk about insulin converting glucose to glycogen instead of it stimulating this conversion.

Centres should encourage candidates to carefully read the question. For example, in Question 7(d) candidates had to refer back to the diagram and answer with reference to it. A large percentage of candidates did not apply their knowledge to the ECG trace and instead gave an answer that simply demonstrated their general knowledge of the parasympathetic system.

Candidates should also be encouraged to write 'full' answers to two mark questions in Section B of the exam. Many candidates wrote short, general answers to questions, e.g. Questions 6(c) and 14(c), which were simply not detailed enough to gain both marks.

## Statistical information: update on Courses

Number of resulted entries in 2013	149
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Number of resulted entries in 2014	213
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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 130				
A	16.0%	16.0%	34	85
B	19.7%	35.7%	42	71
C	21.1%	56.8%	45	58
D	8.9%	65.7%	19	51
No award	34.3%	-	73	-

## 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.