



External Assessment Report 2014

Subject(s)	Human Biology
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

Comments on candidate performance

General comments

Candidates are generally well prepared for this exam. The standard of response was similar to previous years.

Section A: Objective test

This section was well done with candidates scoring on average 20 out of 30.

Section B: Restricted Responses C

Candidate responses in this section were slightly poorer for knowledge and understanding than last year; however there was an improvement in the application of problem solving skills, with calculations in particular being well done.

Candidates continue to be comfortable answering 'C' type questions where they have to name biological terms or select information. They are less comfortable answering 'A' type questions, which involve 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. Questions which were designed to be intentionally demanding included:

- Question 1 (c)
- Question 2 (e) (i), (ii)
- Question 3 (a) (ii), (b) – 1 mark
- Question 4 (a) (ii), (b)
- Question 5 (d)
- Question 6 (d)
- Question 7 (b), (c) (iii)
- Question 8 (c)
- Question 9 (b)
- Question 10 (c) (i) – 1 mark
- Question 11 (c), (d)
- Question 12 (a) (ii)
- Question 13 (a) – 1 mark, (b) (ii), (iii)

Section C: Extended Responses

This section remains the most demanding part of the exam. Candidate performance in this section was variable this year. Question 1 was well done however Question 2 was done relatively poorly with the majority of candidates failing to gain the five marks necessary to trigger the relevance and coherence marks.

The options were equally popular, in each question, with approximately 50% of candidates choosing one or the other.

Areas in which candidates performed well

Candidates showed good knowledge of:

Question 1(a), (b)(ii): Muscle proteins and contraction

Question 3(a)(i): Macrophages

Question 3(a)(iii): Exocytosis

Question 5(a): The female reproductive system

Question 5(c): Cleavage

Question 8(a)(i): Tissue fluid

Question 8(b): Substance exchange at capillaries

Question 8(a)(i): Identification of blood vessels

Question 10(b): Myelination

Question 10(c)(ii): Breakdown of acetylcholine at the synapse

Question 11(b): Social facilitation

Question 12(b): The limbic system / hippocampus

Question 13(c): Gaining passive immunity

Section C, Question 1A: Protein synthesis

Section C, Question 1B: Aerobic respiration

Candidates performed well in the following problem solving tasks:

Question 2(b): Identifying experimental variables

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

Question 4(a)(iii): Calculating percentage change

Question 4(c): Calculating the number of males with a

Question 6(a): Calculating heart rate from an ECG trace

Question 7(a)(i), 14(a)(i): Selecting information from graphs

Question 7(c)(ii): Calculating ratios

Question 11(a): Calculating average improvement

Question 14(a)(ii): Making predictions

Areas which candidates found demanding

Candidates found the following questions particularly demanding:

Section A, Question 3: Deciding which substance contains nitrogen.

This was a challenging question – candidates had to recognise that glucagon was a hormone and that some hormones are proteins which contain nitrogen.

Section A, Question 8: Replication of DNA. Many candidates failed to realise that the original DNA molecule had two strands so only two of the resulting DNA molecules could contain these strands.

Question 1(c): Explaining why only small amounts of ATP are produced during anaerobic respiration. Most candidates understood that only glycolysis could occur but did not go on to explain that there was no oxygen to act as the final hydrogen acceptor in the cytochrome system.

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): Describing the function of the lysosome during stages B and C. Many candidates described the lysosome attaching to the bacteria as opposed to it attaching to the vacuole and then releasing its digestive enzymes into it, as shown in the diagrams.

Question 3(b): Describing the humoral response. It was disappointing that many candidates were unaware that B-lymphocytes are stimulated to produce antibodies that attach to bacterial antigens.

Question 4(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 5(d): Describing how the development of the zygote shown resulted in monozygotic twins. Many candidates described one sperm fertilising one egg instead of describing the zygote shown dividing to form two balls of cells.

Question 6(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 7(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 7(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 8(a)(ii): Indicating how tissue fluid differs from plasma (Q 8a(ii)) – A large number of candidates did not know that tissue fluid contains no proteins.

Question 8(c): Explaining how lymph is transported in lymphatic vessels. Many candidates did not know that contraction of skeletal muscles moves lymph in the vessels.

Question 9(b): Describing what happens to the products of haemoglobin breakdown. Too many candidates were unaware of the fate of iron and bilirubin.

Question 10(c)(i): Describing how impulses pass across the synapse. A large number of candidates gave general answers that were not specific enough to gain two marks.

Question 11(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 11(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.

Question 12(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 13(a): Explaining why poor living conditions increase the spread of disease. Many candidates could give examples of poor living conditions but could not explain the role of microbes in the transmission of the disease.

Question 2(b)(ii): Explaining how vaccination prevents a child showing the symptoms of mumps. Too many candidates were unable to say that antibodies against it are quickly produced.

Section C, Question 2A: Discussing factors that influence the development of human behaviour. Many candidates focussed on social influences that affect behaviour as opposed to discussing maturation, inheritance and the environment which are the factors which influence the development of behaviour.

Advice to centres for preparation of future candidates

General

The majority of candidates continue to be well prepared for the Human Biology exam.

It was particularly encouraging to observe an improvement in problem solving this year with candidates performing better in both numeracy and data handling skills. Candidates should be reminded to link conclusions to experimental aims. They 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'.

Despite being highlighted in previous reports, an area of concern continues to be 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. This point has been highlighted in recent assessment reports.

Centres should encourage candidates to carefully read the question. There were a number of questions e.g. Questions 3(a)(ii), 5(d) and 6(d) where 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 information in the diagram and instead gave an answer that simply demonstrated their general knowledge of the topic.

Candidates should also be encouraged to write 'full' answers to two mark questions in Section B of the question paper. Many candidates wrote short, general answers to questions, e.g. Questions 3(b) and 10(c)(i), which were simply not detailed enough to gain both marks.

Statistical information: update on Courses

Number of resulted entries in 2013	4124
------------------------------------	------

Number of resulted entries in 2014	3943
------------------------------------	------

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	20.8%	20.8%	820	87
B	25.1%	45.9%	990	71
C	25.7%	71.6%	1014	56
D	10.8%	82.4%	427	48
No award	17.6%	-	692	-

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.