



## Course Report 2015

Subject	Biology
Level	New 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 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 assessment and marking instructions for the examination.

## **Section 1: Comments on the Assessment**

### **Component 1: Question paper**

Candidate performance confirmed that there was a good balance in the paper, including an appropriate proportion of questions which were accessible to most candidates and those which were more challenging to test the more able candidates.

The specification for the new Higher is different to the Higher in that there are now fewer opportunities for candidates to demonstrate knowledge. Candidates are now expected to answer more questions in which they apply their knowledge to new situations. This led to a perception that there was more problem-solving than usual in the paper.

The balance of demonstrating knowledge, applying knowledge and skills questions was appropriate. Due to a lower proportion of demonstrating knowledge and the reduction from 130 to 100 marks, it was inevitable that coverage of the course was less complete than with the previous Higher course.

### **Component 2: Assignment**

Markers reported a wide range in the level of guidance candidates had received in preparation for completing the assignment.

Many candidates found most areas of the assignment accessible and scored well in these. Other areas caused difficulty, as outlined later in this report, and candidates will need more thorough preparation in these areas

## **Section 2: Comments on candidate performance**

### **Component 1: Question paper**

Markers commented that that many candidates seemed well prepared for the new Course content and often used the correct vocabulary in answering questions. Some candidates failed to achieve marks due to lack of detail and the language used in their answers.

Candidates performed well in the shorter extended response question (Section 2 Question 5) with many answering with high level descriptions and detail.

Questions requiring candidates to demonstrate knowledge were usually well answered, indicating that many candidates had revised effectively. However, in some areas of the Course, candidates were less well prepared to answer demonstrating knowledge questions eg Section 1: 4 — main events in evolution; 7 — respiratory substrates; 14 — light dependent stage; Section 2: 2(e) — inactive protein; 8(b) — invasive species; 12(c)(ii) — cell differentiation.

Candidates were less successful in answering questions where application of knowledge was required, eg Section 2: 1(b) — increased surface area for bacterial growth; 2(a) — same restriction endonuclease; 2(c) — obtaining a culture of transformed bacteria; 3(d) — effect of air on ethanol production; 7(c) — controlling schistosomiasis.

## **Component 2: Assignment**

Candidates who clearly structured the assignment under appropriate headings scored well as it was clear to those candidates that they were including all the appropriate information.

Most candidates were successful in giving an appropriate aim, structuring and referencing the assignment and selecting relevant information.

Analysing and evaluating were the areas in which candidates were least successful.

## **Section 3: Areas in which candidates performed well**

### **Component 1 Question paper**

#### **Section 1**

Question 2: Most candidates knew that introns are removed and exons are retained in the mature transcript.

Question 3: Most candidates understood the effect of founder effect, bottleneck effect and inbreeding on genetic diversity.

Question 5: Most candidates could interpret a molecular clock.

Question 8: Most candidates could identify a suitable control.

Question 9: Most candidates understood the advantage of membrane bound compartments in cells.

Question 11: Most candidates could draw a conclusion from line graph data.

Question 12: Most candidates could calculate a percentage.

Question 13: Most candidates could identify an extremophile.

Question 15: Most candidates understood the meaning of economic yield of a crop.

Question 18: Most candidates knew the reason for a long period of parental care in primates.

Question 20: Most candidates could identify a keystone species.

#### **Section 2**

Question 1(a): Most candidates could identify ATP and Pi.

Question 2(b): Most candidates knew the function of ligase.

Question 2(d): Most candidates knew the function of the origin of replication.

Question 3(b): Most candidates could identify a variable to be controlled.

Question 5B: Most candidates could describe competitive and non-competitive inhibition.

Question 6(a)(i): Most candidates could identify RuBisCO and G3P.

Question 9(b)(ii): Most candidates could calculate an average increase.

Question 9(b)(iii) Most candidates could select information from a line graph and table.

Question 10(a): Most candidates were able to identify horizontal transfer and relate this to rate of evolutionary change.

Question 11(e)(i): Most candidates could write a complementary base sequence.

Question 12(a): Most candidates were able to draw conclusions.

## **Component 2: Assignment**

Section 1: Most candidates gave a suitable aim but some candidates provided multiple aims. This impacted negatively on their attainment later in the assignment as they were rarely able to select sufficient data and draw a conclusion that addressed all parts of their aim.

Section 2: Many candidates provided a good account of the background knowledge relevant to their aim and gave descriptions and explanations at a level appropriate to Higher Biology. Candidates who chose a topic related to the Higher Biology Course often scored better in this section as they were more successful in applying knowledge and understanding at the appropriate level.

Section 3: Most candidates selected relevant data but some did not select sufficient data from which to draw a conclusion which met their aim.

Section 4: Some candidates could process and present information, particularly those who accurately processed and presented two sources of data and not multiple sources.

Section 7: Some candidates could provide several correct evaluation statements, particularly those who used results from their own experiment as one of their sources of information. These candidates scored well in this section as they could evaluate their experimental procedure.

Section 8(a): Most candidates provided an appropriate title, although some gave Biology Assignment as a title which was not sufficient to gain the mark.

Section 8(b): Most candidates correctly gave a detailed list of references at the end of the report.

## **Section 4: Areas in which candidates found demanding**

### **Component 1: Question paper**

#### **Section 1**

Question 4: Some candidates found difficulty in arranging in order the main events in evolution.

Question 7: Some candidates found difficulty in identifying where protein and fat breakdown products are used in respiration.

Question 14: Some candidates found difficulty in relating pigments absorbing light energy to transfer of electrons down electron transport chains.

## Section 2

Question 1(b): Some candidates found difficulty in explaining the effect of shredding cabbage.

Question 2(b): Some candidates found difficulty in explaining the importance of using the same restriction endonuclease to remove the gene and open the plasmid.

Question 2(c): Some candidates found difficulty in describing how to obtain a culture containing only transformed bacteria.

Question 2(e)(i): Some candidates found difficulty in stating why bacteria produce an inactive protein.

Question 2(e)(ii): Some candidates found difficulty in stating that yeast can be used to produce an active protein.

Question 3(b): Some candidates found difficulty in describing a relationship in data in a table.

Question 3(d): Some candidates found difficulty in explaining the effect of air on ethanol production.

Question 4A: Some candidates found difficulty in relating heart structure to efficiency of oxygen delivery and metabolic rate.

Question 6(b): Some candidates found difficulty in stating and explaining the importance of selection of treatments, randomisation of treatments and number of replicates in field trials.

Question 7(b): Some candidates found difficulty in describing the benefit of a secondary host to a parasite.

Question 7(c): Some candidates found difficulty in describing a method to control a parasite.

Question 8(b): Many candidates found difficulty in defining an invasive species.

Question 9(a)(iii): Some candidates found difficulty in calculating the total mass of protein produced.

Question 9(b)(i): Some candidates found difficulty in identifying the feature of the trial which ensured reliability.

Question 10(b): Some candidates found difficulty in describing how natural selection has led to increased bacterial resistance to antibiotics.

Question 10(c)(ii): Many candidates found difficulty in naming a complex compound used in growth media.

Question 11(d): Some candidates found difficulty in drawing a conclusion.

Question 12(c)(ii): Many candidates found difficulty in describing cell differentiation.

Question 12(d): Some candidates found difficulty in giving a reason for stem cell research.

Question 13A: Some candidates found difficulty in describing the role of RNA polymerase and the structure of tRNA.

Question 13B: Some candidates found difficulty in defining a single gene mutation and in stating how a chromosome mutation can change the number or structure of a chromosome.

## Component 2: Assignment

Section 3: Some candidates did not select sufficient data from which to draw a conclusion which met their aim, particularly if a multiple aim was used.

Section 4: Some candidates attempted to process and present several pieces of data which increased the chances of making an error. Candidates who used graphs or charts without major and minor gridlines could not process and present this data accurately.

Section 5: Many candidates failed to score in this section as there was no evidence of analysis, eg percentage changes, average increases.

Section 6: Some candidates found difficulty in stating a valid conclusion that was supported by their data and addressed their aim, particularly where a multiple aim was used. Some candidates selected data which gave an indirect measure of their aim, eg changes in red blood cell count where the aim was to investigate the effect of altitude training on athletic performance. In such cases a statement linking red blood cell count to athletic performance was required.

Section 7: Some candidates found difficulty in evaluating the assignment. Some did not understand the meanings of the terms robust, reliable and valid which are clearly explained in the assignment marking instructions. Others did not evaluate individual sources but grouped them together eg 'my information was reliable because ...'. Some candidates stated why sources were relevant, for which there is no credit at Higher.

## **Section 5: Advice to centres for preparation of future candidates**

### **Component 1: Question paper**

Candidates should ensure that they understand the meaning of 'describe' and 'explain'. Underlining these and other words in the question may help candidates to focus on what is important. This is particularly relevant in applying knowledge questions, which may have a longer stem to describe an unfamiliar setting.

When presenting information in graphs, candidates should ensure that each axis has a number at the start, although a common zero in the origin is acceptable if it is clearly in the origin. Points should be plotted accurately and a ruler used to draw a clear line through the centre of each point. Full axes labels should be copied exactly from table headings.

Candidates should be given opportunities to answer questions requiring them to apply their knowledge to unfamiliar situations.

Candidates should practise the skills that are externally assessed in the question paper — particularly drawing conclusions, ensuring reliable results and more complex calculations.

In answering extended response questions, credit is often given for an introductory general definition, eg of a single gene or chromosome mutation.

### **Component 2: Assignment**

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

Candidates should be advised to structure their assignment under headings which apply to each section of the marking instructions and to give the assignment a relevant title.

Topics should be chosen which relate to the Higher Biology course so that candidates can apply knowledge and understanding at the appropriate level. Application of knowledge and understanding should include descriptions and explanations at Higher Biology level.

Candidates should avoid providing a multiple aim for which it will be difficult to select sufficient information and draw a valid conclusion.

When selecting information, candidates should include the relevant table of results, graph etc, and not the whole scientific paper. Candidates should avoid using graphs and charts without major and minor gridlines as this will prevent them accessing accuracy marks. It is useful for candidates to state which sources they are processing and to reference raw data, even if only as Source 1, Source 2 which they subsequently reference properly at the end of the assignment.

Centres are reminded that data from a candidate's experiment can be used in the report ie from Outcome 1.

In analysis of information, description of a simple trend is not enough. Quantification using eg average increase or percentage change should be included. If describing a trend in which a change of direction occurs, the value of the independent variable at which the change occurs should be given.

In evaluation of sources it may be easier to access marks if one of the sources is an experiment of which the procedure can be evaluated. Candidates should be encouraged to use the terms 'reliable', 'valid' and 'robust' accurately, and to evaluate sources individually.

## Statistical information: update on Courses

Number of resulted entries in 2014	0
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Number of resulted entries in 2015	2572
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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 - 120				
A	26.3%	26.3%	677	82
B	21.2%	47.6%	546	70
C	24.5%	72.0%	629	58
D	9.8%	81.8%	253	52
No award	18.2%	-	467	-

For this Course, the intention was to set an assessment with grade boundaries at the notional values of 50% for a Grade C and 70% for a Grade A. Question 4 in Section 1 was intended to be accessible to all candidates; however it proved more difficult than intended. Section 2 was more demanding than intended due to a cumulative effect. The grade boundaries were decreased by 2 marks for Upper A, Grade A and Grade C to reflect this.



## 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.