Course Report 2017

Subject	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

The question paper proved to be well balanced and provided good coverage of the course; there was an appropriate balance of knowledge and understanding questions and skills questions. Overall the question paper was deemed to be fair. However, some questions proved to be more demanding than expected. This was taken into account when setting grade boundaries.

Some candidates did not provide responses at a level appropriate to Higher.

Component 2 — assignment

Candidate performance in the assignment improved again this year. This reflects good support and guidance from teachers and lecturers in ensuring that candidates were well prepared for this component. However, some candidates attained low marks in this component as they were less well prepared; this is less evident than last year, which is encouraging. The analysis section continues to be the most challenging.

It was good to see some assignments with handling and processing of data gathered as a result of candidates' experimental work. This is encouraging as experimental work/fieldwork will be a mandatory feature of the Higher Biology assignment from session 2018–19 onwards.

Section 2: Comments on candidate performance

Areas in which candidates performed well

Component 1 — question paper

Candidates generally performed well in questions requiring straight recall of knowledge, and most candidates were successful in answering skills questions involving calculations.

Section 1 (Objective Test)

Most candidates performed well in this section of the question paper, which suggests that they were well prepared in terms of practice of multiple choice style questions.

Question 1	Most candidates could identify the correct structure of DNA.
Question 4	Most candidates could list what molecules are required for DNA replication.
Question 6	Most candidates could describe when new species had evolved.
Question 9	Most candidates could describe anabolism and catabolism.
Question 11	Most candidates could list mammal responses to a decrease in body temperature.
Question 12	Most candidates could describe the effect of a restriction endonuclease.
Question 13	Most candidates could describe inbreeding depression.
Question 14	Most candidates could explain why livestock production generates less food per unit area than crop production.
Question 17	Most candidates could identify examples of parasitic relationships.
Question 19	Most candidates could describe the effects of the bottleneck effect and habitat corridors on genetic diversity.

Section 2 (Paper 2)

Question 1(a)	Most candidates could name exons.
Question 1(b)	Most candidates could state the result of alternative RNA splicing.
Question 2(c)	Most candidates could state the importance of using heat tolerant DNA polymerase in PCR.
Question 9(a)(i)	Most candidates could name the independent variable.
Question 9(a)(iii)	Most candidates could state why a water bath is used.
Question 11(a)(i)	Most candidates could state a fate of light.
Question 11(b)	Most candidates could state the source of hydrogen in photosynthesis.
Question 12(b)(i)	Most candidates could calculate a percentage.
Question 13(a)	Most candidates could do a times greater calculation.
Question 14(a)(ii)	Most candidates could select information from a bar graph.

Component 2 — assignment

Section 1: Aim(s)

Some candidates provided a clear aim with an independent and dependent variable from which a conclusion could be drawn.

Section 2: Apply knowledge and understanding of biology

Many candidates provided a good account of the underlying biology with expanded descriptions and explanations at Higher level.

Section 3: Select information

Many candidates selected two sources of relevant high-quality data which allowed them to draw a conclusion related to the aim.

Section 4: Process and present data/information

Many candidates presented their data in an appropriate format which was correctly labelled. The data was accurately transferred from their raw data and correctly referenced.

Section 5: Analyse data/information

Some candidates clearly described a complex relationship in the data, or did appropriate calculations and used them to describe relationships in the data.

Section 6: Conclusion(s)

Some candidates stated a clear, concise conclusion supported by the selected data.

Section 7: Evaluation

Some candidates attained full marks in this section by correctly evaluating data from their selected sources, one of which was an experiment.

Section 8: Presentation

Most candidates attained full marks in this section.

Areas which candidates found demanding

Component 1 — question paper

Many candidates had difficulty in answering questions that demonstrated knowledge and understanding of some areas of the course; this suggests that these areas are less familiar. These areas included: nonsense mutations, horizontal gene transfer, non-therapeutic uses of stem cells, and preventing survival of genetically modified microorganisms in the external environment.

Many candidates found difficulty with skills questions in an experimental situation where they had to describe a control experiment and identify an aspect which reduced reliability. Most candidates continue to have difficulty in drawing a conclusion relating to the aim with many simply restating the results.

Section 1 (Objective Test)

Question 3	Most candidates found difficulty describing how DNA is organised in plant cells.
Question 5	Most candidates found difficulty labelling a tRNA molecule.
Question 10	Most candidates found difficulty selecting data from a graph with two vertical axes and calculating a ratio.

Section 2 (Paper 2)

Question 1(c)(i)	Most candidates had difficulty with describing and explaining the effect of a nonsense mutation. Some candidates had difficulty in distinguishing between describing and explaining an effect.
Question 1(c)(ii)	Most candidates had difficulty explaining the effect of a deletion mutation.
Question 3(c)	Most candidates had difficulty explaining why bacteria evolve more rapidly than plants.
Question 4(b)	Most candidates had difficulty giving an example of how stem cells are used in research.
Question 5(a)(iii)	Most candidates had difficulty explaining evolutionary relatedness from a phylogenetic tree.
Question 6(a)(i)	Most candidates had difficulty identifying the process for which cells need amino acids in the context of cell culture in a fermenter.
Question 6(a)(iii)	Most candidates had difficulty explaining the importance of preventing contamination of a cell culture in a fermenter.
Question 6(c)	Most candidates had difficulty describing how to prevent survival of genetically modified microorganisms in the external environment.

Question 7(b)	Most candidates had difficulty explaining why animals regulate body temperature.
Question 8(b)	Most candidates had difficulty giving an adaptation; an animal from high altitude has to increase efficiency of oxygen delivery to cells.
Question 8(c)	Some candidates had difficulty distinguishing between describe and explain.
Question 9(a)(ii)	Most candidates had difficulty describing a control experiment.
Question 9(a)(iv)	Most candidates had difficulty identifying an aspect of an experiment which made it unreliable.
Question 9(c)	Most candidates had difficulty drawing a conclusion.
Question 10A	Many candidates had difficulty describing a social hierarchy in primates and why they use ritualistic displays.
Question 10B	Many candidates had difficulty describing naturalised species and why invasive species spread rapidly after becoming naturalised.
Question 11(c)	Most candidates had difficulty describing the role of NADPH in the Calvin Cycle.
Question 13(c)	Most candidates had difficulty explaining why inbreeding depression is not a problem in naturally self-pollinating plants.
Question 14(c)	Most candidates had difficulty explaining why social animals care for relatives.
Question 15A	Most candidates had difficulty stating that the Citric Acid Cycle is enzyme controlled and describing the role of dehydrogenase enzymes, NAD and FAD.
Question 15B	Some candidates had difficulty distinguishing between surviving and avoiding adverse conditions. Some candidates had difficulty stating that animals survived adverse conditions using dormancy which involved a reduction in metabolic rate.

Component 2 — assignment

Section 1: Aim(s)

Some candidates stated an aim which did not clearly have an independent and dependent variable and as a result could not draw a conclusion.

Section 2: Apply knowledge and understanding of biology

Some candidates had difficulty gaining marks where the topic was not directly related to the Higher Biology Course. Some candidates provided knowledge at National 5 level.

Section 3: Select information

Some candidates had difficulty attaining both marks where one source did not include data but was an account of underlying knowledge.

Section 4: Process and present data/information

- Some candidates did not attain full marks as they included a complete outcome 1 report rather than the title, aim and results.
- Some candidates attained less than full marks by not transferring complete table headings, including units, to graph labels.
- Some candidates attained less than full marks by not selecting an appropriate scale so that their graph occupied at least half of the grid.
- Some candidates included calculations, which is not necessary to attain full marks in this section.

Section 5: Analyse data/information

- Many candidates had difficulty in describing the relationship shown by the selected or processed data.
- Many candidates had difficulty in fully analysing the selected, or processed and presented data by doing calculations but failing to describe what the calculations showed.

Section 6: Conclusion(s)

Many candidates did not attain the mark because they gave an account of the entire investigation rather than a concise conclusion which related to the aim. Some candidates incorrectly drew a conclusion from just one source where the results in the selected information were conflicting.

Section 7: Evaluation

Some candidates had difficulty using the terms robust, reliable and valid correctly. Few candidates attained full marks in this section where neither of the selected sources of data was an experiment. Some candidates attained less than full marks where they gave the same comment for more than one source.

Section 8: Presentation

Some candidates had difficulty in giving the full reference for a textbook. Some candidates had difficulty in giving the title and aim for a class experiment.

Section 3: Advice for the preparation of future candidates

Component 1 — question paper

It was clear that candidates were well prepared to answer questions in Section 1 (Objective Test). Most candidates performed well in questions involving calculations and in questions where they were required to demonstrate knowledge in areas such as DNA structure, transcription, post-translational modification, PCR, temperature regulation and food security. This reflects the support of teachers and lecturers in preparing candidates in these areas.

Cognisance needs to be taken of the mandatory knowledge that can be assessed in the question paper. The mandatory knowledge is outlined in the Course Assessment Specification.

There were a number of areas where candidates' knowledge was less than expected. Many candidates had difficulty with questions requiring knowledge of biotechnology, nonsense mutations, horizontal gene transfer, non-therapeutic uses of stem cells and preventing survival of genetically modified microorganisms in the external environment. Some centres should review their teaching of these areas.

As in previous years, some candidates had difficulty answering questions involving a description or explanation, often confusing these command words. Examples of valid responses to command words are provided in the general marking principles within the marking instructions.

Many candidates continue to have difficulty answering experimental questions. They failed to answer the question on reliability at the appropriate level and simply described results rather than drawing a conclusion.

Component 2 — assignment

Attainment in the assignment component improved again this year, suggesting that candidates are well prepared. Teachers and lecturers are reminded that there are exemplar materials available to help them develop their understanding of the standards required for assessment. These materials are published on the Understanding Standards website.

Although there was improvement in the conclusion section, some candidates provided a vague aim from which a conclusion cannot be drawn. Candidates should be advised to provide a concise aim with a clear independent and dependent variable.

Assignments with underlying knowledge from the Higher Biology Course scored more marks in this section. Candidates must provide descriptions and explanations that are at higher level.

Candidates should be advised to select two sources of data which allows them to draw a conclusion related to the aim. They should provide the results only and not the whole scientific paper or experimental write up.

When processing and presenting the information, candidates should ensure that they present the data in an appropriate format. They should accurately transfer the labels/headings and reference the sources properly. Calculations are not essential in this section.

In the analysis section candidates should be advised to clearly describe any complex relationships. For simple trends and relationships, appropriate calculations should be used and described in context.

In the evaluation section, assignments involving an experiment scored well because this allowed opportunities to comment on validity and reliability of experimental design. Marks were also attained for comments on experimental error or improvements. Candidates should be advised to avoid giving the same evaluation comment for different sources. Sources should be specified in the evaluation comments rather than a generic comment referring to their selected data.

Whilst it was pleasing to see that the conditions of assessment for coursework were adhered to in the majority of centres, there were still a number of cases where this was not the case. SQA's criteria on assessment conditions 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:
(Completed by SQA)

Statistical information: update on Courses

Number of resulted entries in 2016	7493

Number of resulted entries in 2017	7574

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	27.0%	27.0%	2045	80
B	21.4%	48.4%	1618	68
C	23.8%	72.2%	1803	56
D	9.6%	81.8%	726	50
No award	18.2%	-	1382	-

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.