



External Assessment Report 2011

Subject	Biotechnology
Level	Intermediate 2

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

In general, the quality of the candidates' responses was very pleasing. The paper performed as expected with all questions functioning. The number of candidates presented remained similar to last year's entries. As in previous years, it is evident that the teachers and lecturers delivering Intermediate 2 Biotechnology are clear about both the Course Arrangements and the application of standards.

Areas in which candidates performed well

Section A

The performance of candidates was very much in line with expectations in the multiple-choice questions. Candidates answered well in many areas of Knowledge and Understanding (KU) including structure of micro-organisms, pouring agar plates, antibiotic activity, and plant tissue culture techniques.

Problem Solving (PS) and Practical Abilities (PA) skills continue to show positive developments with many candidates performing well in magnification calculations and drawing conclusions from complex experimental data.

Section B

Candidates performed well in a number of KU areas in Section B, including the structure and function of bacteria, parts and function of the light microscope, enzyme action, genetic engineering, anaerobic digesters, and the use of micro-organisms in the food industry. In the PS/PA area, candidates coped well with the following: plotting a line graph to present data, calculating a simple whole number ratio, presenting information in a pie chart, describing relationships between variables from graphical information, and selecting information from tables and graphs.

Section C

Candidates performed equally well in Questions 1A and 1B in this section with some candidates producing sophisticated pieces of extended writing and achieving most of the available points in the marking instructions. The majority of candidates attempted Question 1A or 1B and, as in previous years, the average marks for Question 1A/B were higher than those for Question 2A/B. Question 2A was more popular and had a higher average mark than Question 2B.

Areas which candidates found demanding

Section A

Candidates found a number of areas of KU demanding in this section. These included: transfer of fungal mycelium, associating named micro-organisms with their commercial products, micro-organisms and the carbon cycle, and production of single cell protein. In the PS/PA area, candidates were challenged in calculating the average growth rates of a fungal culture, analysing a photosynthesis limiting factors graph, and interpreting the control of variables in an unfamiliar context.

Section B

Candidates were challenged in KU areas that asked for an explanation or a reason as part of their response; these included both familiar and unfamiliar contexts. For example, candidates were uncertain about the reason for carrying out some of the steps involved in the preparation of person and work space before starting a microbiological procedure. Many candidates had a poor grasp of the role of algae in photosynthesis and the potential environmental benefit of producing fuel in this manner. Candidates were challenged by the question on the production of single cell protein (SCP) by fungi and found the integration of content areas from Units 1 and 3 complicated. Another question which integrated knowledge from Units 1 and 2, on anaerobic digesters, also challenged many candidates. As in previous years, candidates struggled to calculate a percentage change.

Section C

Many candidates performed impressively in Questions 1A and 1B, although a small number of candidates only answered either part (a) or part (b) in these questions and therefore restricted their possible mark allocation. Question 2B proved particularly challenging and many candidates had a poor understanding of genome mapping, often confusing the technique with genetic engineering. As a result, very few candidates collected full marks in this question.

Intended 'A' type questions that operated in Section B of the paper were:

- ◆ Question 2 (a)(ii) — 1 mark, KU
- ◆ Question 2 (b)(iii) — 1 mark (of 2), KU
- ◆ Question 3 (a) — 1 mark, KU
- ◆ Question 3 (d)(ii) — 1 mark (of 2), KU
- ◆ Question 4 (a)(i) — 1 mark, KU
- ◆ Question 4 (a)(ii) — 1 mark, KU
- ◆ Question 4 (b) — 1 mark, KU
- ◆ Question 5 (a)(i) — 2 marks, KU
- ◆ Question 5 (a)(iii) — 2 marks, KU
- ◆ Question 6 (a)(iv) — 1 mark, PS/PA
- ◆ Question 8 (a) — 2 mark, KU
- ◆ Question 9 (b) — 1 mark (of 2), PS/PA

Advice to centres for preparation of future candidates

General

Centres should continue to stress to candidates the importance of learning, retaining, recalling and, especially, understanding the knowledge content of all Units. It is important that candidates experience, as class work, homework or assessment, questions which integrate knowledge over two or more Units of work.

Centres should also make sure that candidates fully understand the reasons behind the various steps and procedures involved in the microbiological practical work they carry out, including the preparation of themselves and their work space for this work. Centres should give candidates practice in calculating averages and percentage changes through experimental work, homework and other problem solving situations. Centres should continue to give candidates rehearsal in writing extended response answers with an emphasis on Section C Question 2 Extended Response in the context of Units 1 and 3. The bank of questions and marking instructions from past papers could be used in a formative way to help candidates improve the quality and relevance of their response. It is important that centres continue to provide opportunities for candidates to carry out practical work in as many different areas of the Intermediate 2 Biotechnology Course as possible.

It is important that centres refer to the updated Intermediate 2 Biotechnology Arrangements document (Fifth edition, March 2004) for clarification of depth of treatment to content, especially in areas of KU. The Arrangements document is published on SQA's website (www.sqa.org.uk).

Statistical information: update on Courses

Number of resulted entries in 2010	110
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Number of resulted entries in 2011	100
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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 100				
A	19.0%	19.0%	19	70
B	29.0%	48.0%	29	60
C	18.0%	66.0%	18	50
D	8.0%	74.0%	8	45
No award	26.0%	100.0%	26	-

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, therefore, SQA 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 Head of Service 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.