



## External Assessment Report 2012

Subject(s)	<b>Biotechnology</b>
Level(s)	<b>Intermediate 2</b>

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

Overall, the level and quality of the candidates' responses was satisfactory. Nearly all questions in the paper functioned as expected. There was a small decrease in the number of candidates this year and there were no new centres. As in previous years, it is evident that centre staff delivering Intermediate 2 Biotechnology have a clear vision about both the Course Arrangements and the application of standards.

## Areas in which candidates performed well

### Section A

Candidate performance was very much as expected in this area.

Candidates answered well in many areas of KU including:

Question 1: The structure of protozoal cells

Question 6: Features of parasitic nutrition

Question 9: Streak plating

Question 14: Parts of the microscope

PS/PA skills continue to show progress with many candidates performing well in areas such as:

Question 11: Calculations involved in the production of plates and slope

Question 15: Calculation of average number of colonies

Question 21: Drawing conclusions from experiments set in unfamiliar contexts

Question 24: Selecting information from a line graph

### Section B

Candidate performance in this section was strong in a number of areas including:

Question 1 (a): Replication of viruses

Question 1 (b): Comparing the structure of bacteria and viruses

Question 1 (d): Asexual reproduction in bacteria

Question 3 (b) (i): Steps in pouring an agar plate

Question 5 (b) & (d): Silage production

Question 7 (d): Genetic modification of micro-organisms

Question 8 (b): Role of Lactobacillus in the food industry

In PS/PA, candidates were strong in:

Question 2 (a) (i): Making predictions in familiar contexts

Question 2 (d): Commenting on improving the reliability of results

Question 4 (c): Calculation of magnifications and presenting this information in a table

Question 6 (c): Identifying control variables in an experiment  
Question 9 (a): Drawing a line graph

### **Section C**

Most candidates attempted one of the choices in Questions 1 and 2. Candidates performed well in Questions 1A and 1B in this section, although very few candidates scored full marks. Questions 1A and 1B were chosen equally and the average marks for question 1A and 1B were very similar. Question 2A was more a popular choice, and had a higher average mark, than Question 2B. Several candidates scored full marks for Question 2A.

## **Areas which candidates found demanding**

### **Section A**

Candidates found the following areas of KU challenging in this section:

Question 4: Reproduction in Mucor  
Question 10: Use of vital stains  
Question 17: Landfill sites and pollution  
Question 19: Citric acid production by micro-organisms

In the PS/PA area candidates were challenged by questions in the following areas:

Question 20: Identifying a control in an experiment in an unfamiliar context

### **Section B**

Performance was weakest in KU areas that asked candidates to give an explanation or a reason as part of their response. Candidates found the following areas of KU challenging in this section:

Question 4 (d): Advantages/disadvantages of fixing micro-organisms  
Question 6 (a): Fungus involvement in antibiotic production  
Question 6 (e): Soil fungi and antibiotic production in natural environments  
Question 7 (a) (i): Breakdown of complex carbohydrates (unfamiliar context)  
Question 8 (a) (iii): Effect of temperature on bread making  
Question 9(c): Nitrates and synthesis by micro-organisms

In the PS/PA area candidates were challenged by questions in the following areas:

Question 1 (c): Calculating a simple whole number ratio  
Question 4 (a): Calculating the length of an algal cell  
Question 5 (a) (i): Calculating a percentage decrease  
Question 5 (a) (iii): Controlling variables in silage production  
Question 9 (c): Limiting factors in photosynthesis

## **Section C**

Although some candidates performed impressively in Questions 1 A/B, a significant number of candidates did not answer all parts of the questions and so could not access all of the marks.

In Question 2B, some candidates did not answer both aspects of the question. Often candidates did not describe the second area (giving the advantages of the process to the saprophyte and the environment) in enough detail. As a result, only a few candidates were awarded full marks in this question.

## Advice to centres for preparation of future candidates

Intended A-type questions that operated in Section B of paper:

Q1 (c)	1 mark	KU
Q4 (a)	1 mark	PS/PA
Q4 (d)	1 mark (of 2)	KU
Q5 (a) (i)	1 mark	PS/PA
Q5 (a) (iii)	1 mark (of 2)	PS/PA
Q6 (e)	1 mark	KU
Q7 (c) (i)	1 mark	KU
Q7 (c) (ii)	1 mark	KU
Q8 (a) (iii)	1 mark	KU
Q9 (b)	1 mark	PS/PA
Q9 (c) (i)	1 mark	KU
Q9 (c) (ii)	1 mark	KU

Centres should continue to stress to candidates the importance of learning, retaining, recalling and, especially, understanding the knowledge content of all Units.

Centres should make sure that the practical work undertaken on culturing micro-organisms includes a variety of different transfer methods, utilises different types of micro-organisms and emphasises that the reasons for the various stages should be understood.

Centres should give candidates practice problems at a suitable level which involve calculating averages, ratios and percentage changes through experimental work, unfamiliar problem solving situations, and homework.

Centres should continue to give candidates practise 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 responses.

It is important that centres 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 up-dated Intermediate 2 Biotechnology Arrangements document (Fourth edition — June 02) for clarification of depth of treatment to content, especially in areas of KU.

## Statistical information: update on Courses

### Intermediate 2

Number of resulted entries in 2011	100
------------------------------------	-----

Number of resulted entries in 2012	87
------------------------------------	----

## 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	21.8%	21.8%	19	70
B	20.7%	42.5%	18	59
C	23.0%	65.5%	20	48
D	12.6%	78.2%	11	42
No award	21.8%	100.0%	19	-

## **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.