



External Assessment Report 2014

Subject(s)	Biotechnology
Level(s)	Intermediate 2

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 instructions for the examination.

Comments on candidate performance

General comments

Overall, the level and quality of the candidates' responses in all areas was very pleasing. The question paper functioned in the expected manner.

There was the expected decrease in the number of candidates this year, and there were no new centres. As in recent years, it is apparent that the teachers and lecturers delivering Intermediate 2 Biotechnology have a clear understanding of the course arrangements and the application of examination standards.

Areas in which candidates performed well

Section A

Candidate performance was very much as expected in this area, even though Intermediate 2 Biotechnology multiple choice questions are **not** pre-tested.

KU questions:

- Q5: Most candidates knew about how saprophytes obtain food.
Q7: Most candidates knew about nitrogen-fixing bacteria in root nodules.
Q9: Most candidates knew about steps involved in good practice in setting up a biotechnology laboratory.
Q13: Most candidates knew about mycorrhizal associations.

PS/PA skills questions:

- Q16: Most candidates could make a correct prediction from experimental data.
Q19: Most candidates could select the correct experimental set ups to draw a conclusion.
Q23: Most candidates could draw a correct conclusion from experimental data.
Q24: Most candidates could select the appropriate variables to control in an experiment.
Q25: Most candidates could identify variables were being controlled in an experiment.

Section B

KU questions:

- Q1(a)(i): Most candidates recognised the structure of a protozoan.
Q2(d) and (e): Most candidates understood the steps involved in sub-culturing micro-organisms.
Q3(a)(i) and (ii): Most candidates knew the role of algae in energy fixation.
Q5(b): Most candidates understood the steps in preparing a fermenter for use.

- Q6(d)(i): Most candidates understood the steps involved in the sub-culture of fungi.
- Q7(e): Most candidates knew a use of citric acid in the food industry.
- Q8(a)(iii): Most candidates knew the reason for staining bacteria before microscopy.
- Q8(b)(i) and (ii): Most candidates could identify different bacteria by their shape.

PS/PA skills questions:

- Q3(c): Most candidates could accurately plot a bar graph.
- Q6(b): Most candidates could draw a correct conclusion from experimental data.
- Q6(c): Most candidates could make a correct prediction from experimental data.
- Q7(a)(i): Most candidates could select and describe information from a graph of experimental data.
- Q7(a)(ii): Most candidates could process information from a graph of experimental data.

Section C

Most candidates attempted one of the choices in questions 1 and 2; less than 10% of candidates did not attempt to answer either question. Candidates performed very well in questions 1A and 1B in this section, with many candidates scoring close to or full marks. Questions 1A and 1B were not chosen equally, with the majority of the candidates choosing questions 1A; the mean marks for question 1A and 1B were very similar. Question 2A was more a popular choice, and had a higher mean mark, than question 2B. A number of candidates scored full marks for question 2A.

Areas which candidates found demanding

Section A

KU questions:

- Q8: Stages in an enzyme-controlled reaction.
- Q18: Controlling the commercial production of penicillin.
- Q20: Production of vinegar by continuous processing.

PS/PA skills questions:

- Q22: Making a correct prediction from experimental data.

Section B

KU questions:

- Q2(a): Suggesting reasons for the production of agar plates with different appearances.
- Q3(a)(iii): Product made by algae during energy fixation.
- Q4(b)(ii): Explaining the reason why fungi release enzymes into soil.
- Q7(d): Raw material involved in production of citric acid.
- Q8(a)(ii): Requirement to fix bacteria prior to staining.

PS/PA skills questions:

- Q1(b): Calculating the length of a micro-organism in micrometres.

- Q4(a)(iii): Describing the correct contents of a control in an experiment.
Q4(a)(iv): Giving a correct conclusion from experimental data
Q6(a)(ii): Name of the bacterium involved in the production of human insulin.

Section C

Most candidates attempted one of the choices in questions 1 and 2. Less than 10% of candidates did not attempt to answer either question. Candidates performed very well in questions 1A and 1B in this section, with many candidates scoring close to or full marks.

Questions 1A and 1B were not chosen equally, with the majority of the candidates choosing questions 1A; 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. A number of candidates scored full marks for question 2A.

Advice to centres for preparation of future candidates

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

There is evidence from candidate responses that centres are undertaking relevant practical work on the culture of different types of micro-organisms. It is clear that this work has included a variety of different transfer methods and, importantly, centres have stressed the understanding of the various steps in the processes.

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. Questions based on practical techniques that arise from Unit 2 tend to be well answered, whereas experimental questions based on applications that arise from Unit 3 tend to be less well answered.

Centres should give candidates practice problems in processing data at a suitable level that involve calculating averages, ratios and percentage changes, through experimental work and problem solving questions.

It is important that centres expose candidates to dealing with data from unfamiliar and complex experiments or investigations. There is a tendency for candidates to memorise and repeat answers to experimental questions, for example, describing control setups or drawing conclusions, without considering the context and details of the experiment. This was apparent in candidates' responses to Question 4, 6 and 7 in Section B.

Centres should continue to give candidates practice in writing extended-response answers with an emphasis on Section C question 2. 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 refer to the updated Intermediate 2 Biotechnology arrangements document (Fourth edition, June 2002) for clarification to depth of treatment to content, especially in areas of KU.

Statistical information: update on Courses

Number of resulted entries in 2013	88
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Number of resulted entries in 2014	56
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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				
A	33.9%	33.9%	19	70
B	16.1%	50.0%	9	60
C	28.6%	78.6%	16	50
D	3.6%	82.1%	2	45
No award	17.9%	-	10	-

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.