



2014 Biotechnology

Intermediate 2

Finalised Marking Instructions

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Part One: General Marking Principles for: Biotechnology Intermediate 2

This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this Paper. These principles must be read in conjunction with the specific Marking Instructions for each question.

- (a) Marks for each candidate response must always be assigned in line with these general marking principles and the specific Marking Instructions for the relevant question. If a specific candidate response does not seem to be covered by either the principles or detailed Marking Instructions, and you are uncertain how to assess it, you must seek guidance from your Team Leader/Principal Assessor.
- (b) Marking should always be positive ie, marks should be awarded for what is correct and not deducted for errors or omissions.

GENERAL MARKING ADVICE: Biotechnology Intermediate 2

The marking schemes are written to assist in determining the “minimal acceptable answer” rather than listing every possible correct and incorrect answer. The following notes are offered to support Markers in making judgements on candidates’ evidence, and apply to marking both end of unit assessments and course assessments.

1. There are no **half marks**. Where three answers are needed for two marks, normally one or two correct answers gain one mark.
2. In the mark scheme, if a word is **underlined** then it is essential; if a word is (**bracketed**) then it is not essential.
3. In the mark scheme, words separated by / are **alternatives**.
4. There are occasions where the second answer negates the first and no marks are given. There is no hard and fast rule here, and professional judgement must be applied. Good marking schemes should cover these eventualities.
5. Where questions on data are in two parts, if the second part of the question is correct in relation to an incorrect answer given in the first part, then the mark can often be given. The general rule is that candidates should not be penalised repeatedly.
6. If a numerical answer is required and units are not given in the stem of the question or in the answer space, candidates must supply the units to gain the mark. If units are required on more than one occasion, candidates should not be penalised repeatedly.

7. Clear indication of understanding is required, so:

- if a description or explanation is asked for, a one word answer is not acceptable
- if the question asks for **letters** and the candidate gives words and they are correct, then give the mark
- if the question asks for a word to be **underlined** and the candidate circles the word, then give the mark
- if the result of a calculation is in the space provided and not entered into a table and is clearly the answer, then give the mark
- **chemical formulae** are acceptable, eg CO₂, H₂O
- contractions used in the Arrangements document, eg DNA, ATP are acceptable
- words not required in the syllabus can still be given credit if used appropriately, eg metaphase of meiosis.

8. Incorrect **spelling** is given. Sound out the words(s):

- if the correct item is recognisable then give the mark
- if the word can easily be confused with another biological term then **do not** give the mark, eg ureter and urethra
- if the word is a mixture of other biological words then **do not** give the mark, eg mellum, melebrum, amniosynthesis.

Part Two: Marking Instructions for each Question

Section A

Question			Expected Answer(s)	Max Mark	Additional Guidance
1			C		
2			C		
3			B		
4			D		
5			C		
6			D		
7			A		
8			A		
9			C		
10			A		
11			D		
12			B		
13			B		
14			A		
15			C		
16			D		
17			D		

Question			Expected Answer(s)	Max Mark	Additional Guidance
18			A		
19			C		
20			B		
21			B		
22			D		
23			A		
24			B		
25			D		

Section B

Question			Expected Answer(s)	Max Mark	Additional Guidance																
1	(a)	(i)	Protozoan/protozoa/Paramecium	1																	
1	(a)	(ii)	W cytoplasm X nucleus Y cell membrane	3																	
1	(a)	(iii)	To break down/digest the food.	1																	
1	(a)	(iv)	Remove/expels/excretes (excess) water	1																	
1	(b)		75	1																	
2	(a)		W – Poor aseptic technique or example eg lid kept off plate too long, agar touched, etc. X – Incorrect pouring temperature.	1 1																	
2	(b)		Contaminants not visible on surface of agar OR condensation on lid or agar surface.	1																	
2	(c)		Easier to sterilise/remove contaminants.	1																	
2	(d)		Produce an updraught or explanation of advantage of updraught.	1																	
2	(e)			3																	
			<table border="1"> <thead> <tr> <th>Statement</th> <th>True</th> <th>False</th> <th>Correction</th> </tr> </thead> <tbody> <tr> <td>A sterile <u>scalpel</u> can be used to transfer micro-organisms from liquid to solid medium.</td> <td></td> <td>✓</td> <td>pipette/ dropper/ loop</td> </tr> <tr> <td>Streak plating can be used to obtain <u>isolated</u> colonies.</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>Visible differences in a mixed culture can be seen only <u>in liquid</u> medium.</td> <td></td> <td>✓</td> <td>on solid</td> </tr> </tbody> </table>	Statement	True	False	Correction	A sterile <u>scalpel</u> can be used to transfer micro-organisms from liquid to solid medium.		✓	pipette/ dropper/ loop	Streak plating can be used to obtain <u>isolated</u> colonies.	✓			Visible differences in a mixed culture can be seen only <u>in liquid</u> medium.		✓	on solid		
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Question			Expected Answer(s)	Max Mark	Additional Guidance
3	(a)	(i)	Photosynthesis	1	
3	(a)	(ii)	Carbon dioxide	1	
3	(a)	(iii)	Oxygen	1	
3	(b)		Removes/upgrades waste OR carbon neutral OR less pollution OR renewable	1	
3	(c)		x-axis – names of organisms y-axis – label and scales plot – block plotted accurately	3	
4	(a)	(i)	Volume of culture medium/type of culture medium/temperature/well diameter or size or volume.	1	
4	(a)	(ii)	Measure diameter/area of clear area with square paper/ruler.	1	
4	(a)	(iii)	(Same volume of) culture medium as used in cultures P, Q and R.	1	
4	(a)	(iv)	Culture P contained most active/highest concentration of enzyme OR Culture Q did not produce enzyme / made least active enzyme OR Culture R produced some/less active enzyme.	1	
4	(a)	(v)	Specific	1	
4	(b)	(i)	Extracellular (enzymes)	1	
4	(b)	(ii)	To <u>break down</u> (large) food molecules (into smaller molecules). Allows fungi to obtain food by <u>absorbing</u> small food molecules.	2	

Question			Expected Answer(s)	Max Mark	Additional Guidance
5	(a)	(i)	Plasmid	1	
5	(a)	(ii)	E.coli	1	
5	(b)		(Stop the growth of) other micro-organisms/contaminants.	1	
5	(c)		Binary fission	1	
5	(d)	(i)	Diabetes	1	
5	(d)	(ii)	No animal products involved / no side-effects on reaction to insulin	1	
5	(e)		4200 kg	1	
6	(a)	(i)	Type of agar/time left for	1	
6	(a)	(ii)	Number/many/three plates were used (at each humidity and temperature).	1	
6	(a)	(iii)	Growth may be irregular/height is not taken into account.	1	
6	(b)		As fungal growth increases, the damage to tomatoes increases. The results' tables above suggest that the minimum damage of tomatoes will occur at relative humidity of 30% and temperature of 10°C.	2	
6	(c)		0 -11 mm	1	
6	(d)	(i)	Scalpel or forceps	1	
6	(d)	(ii)	Dipped in alcohol <u>and</u> flamed/alcohol burned off.	1	

Question			Expected Answer(s)	Max Mark	Additional Guidance
7	(a)	(i)	Increases between 0–6 days/up to day 6, then decreases between 6–10 days.	2	
7	(a)	(ii)	4 day to 6 day	1	
7	(b)		Batch (processing)	1	
7	(c)		Fungus	1	
7	(d)		Molasses/sugar	1	
7	(e)		Flavour enhancer/antioxidant/acidity regulator/preservative.	1	
8	(a)	(i)	Pass slide/sample/bacteria through a (yellow) Bunsen (flame).	1	
8	(a)	(ii)	To attach cells to slide/glass.	1	
8	(a)	(iii)	Improves contrast/makes cells stand out.	1	
8	(b)	(i)	Spirilla/spiral	1	
8	(b)	(ii)	Any round shaped bacteria.	1	
8	(c)		Reason 1 – Sample contains range/different species of bacteria. Reason 2 – Broad spectrum antibiotics kill wide range of bacteria OR narrow spectrum only kill one/few species of bacteria.	1 1	
8	(d)		Most antibiotics are taken orally/by mouth and pass through the <u>stomach</u> . <u>Stomach is acidic</u> (environment).	2	

Question			Expected Answer(s)	Max Mark	Additional Guidance
9	(a)	(i)	<u>genetic modification</u>	1	
9	(a)	(ii)	<p>Many plants can be grown from small sample</p> <p>OR</p> <p>can grow plants that are difficult to reproduce by other methods</p> <p>OR</p> <p>all plants produced are identical/ clones to GM plant.</p>	2	
9	(b)		150%	1	

Section C

Question		Expected Answer(s)	Max Mark	Additional Guidance
1	A	<p>(a)</p> <ol style="list-style-type: none"> 1. X – sporangium/sporangia 2. Y – zygospore <p>(b)</p> <ol style="list-style-type: none"> 3. Asexual reproduction requires only one parent 4. In asexual reproduction, spores are produced 5. Spores are produced by structures which develop from hyphae/mycelium 6. Sexual reproduction requires two parents or two mating types (+ and -) 7. In sexual reproduction, (two) gametes/nuclei fuse together 8. Sexual reproduction produces variation/asexual reproduction doesn't produce variation <p>Maximum 2 marks for (a) Maximum 3 marks for (b)</p>	5	
1	B	<p>(a)</p> <ol style="list-style-type: none"> 1. Micro-organism – virus/bacteriophage 2. Q – <u>protein coat</u> <p>(b)</p> <ol style="list-style-type: none"> 3. Attachment of micro-organism to cell 4. Micro-organism DNA/RNA injected OR labelled diagram 5. Micro-organism DNA/RNA takes control of bacteria/cell OR labelled diagram 6. Protein coat production/DNA/RNA production OR labelled diagram 7. New micro-organisms assembled OR labelled diagram 8. (Host) cells burst/new viruses released OR labelled diagram <p>Maximum 2 marks for (a) Maximum 3 marks for (b)</p>	5	

Question		Expected Answer(s)	Max Mark	Additional Guidance
2	A	<p>Answer either A or B</p> <ol style="list-style-type: none"> 1. Lactobacillus or other suitable species 2. Grass OR green crops used 3.compressed to exclude air/produces anaerobic conditions 4. Bacteria convert lactose/sugar 5. Results in temperature increase 6.lactose/sugar converted into (lactic) acid 7.reduces the pH 8. Prevents other bacteria breaking down grass/prevents putrefaction/preserves grass <p>Point 1 1 mark Points 2–8 Maximum 4 marks</p> <p style="text-align: center;">OR</p>	5	
	B	<ol style="list-style-type: none"> 1. Fungus or other suitable micro-organism 2. Raw material is waste/whey/molasses/other suitable examples 3. Removal of pollutant 4. Raw materials are cheap 5. High(er) protein content of product 6. Food (for humans) 7. Animal/livestock feed 8. Meat substitute <p>Point 1 1 mark Points 2 – 8 Maximum 4 marks</p>		

[END OF MARKING INSTRUCTIONS]