

A-level **BIOLOGY**

Investigative and Practical Skills in AS Biology – BI03T/P14
Final Marking Guidelines

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Marking Guidelines are prepared by the Principal Moderator and considered, together with the relevant questions, by a panel of subject teachers.

Guidance for teachers marking Biology ISAs

These are the final **Marking Guidelines**, which provide guidance on the marking of the ISA.

General principles

In general, you are looking for evidence that the student knows and understands the point required by the Marking Guidelines.

It is important to mark what the student has written, not to assume what may have been intended. It is also important to make sure that a valid point is in the correct context. Individual words or phrases where the overall answer does not apply to the question asked should not be credited.

Conventions

The following conventions are used in the Marking Guidelines.

- A semicolon (;) separates each marking point
- An oblique stroke (/) separates alternatives within a marking point
- Underlining of a word or phrase means that the term must be used
For example anaphase, the term must appear
For example and, both items must be present for a mark
- Brackets are used to indicate contexts for which a marking point is valid. This context may be implied by a student's answer
- 'Accept' and 'reject' show answers which should be allowed or not allowed
- Additional instructions are shown in the comments column
- 'Max' refers to the maximum mark that can be awarded for a particular question or part question.

The Marking Guidelines show the minimum acceptable answer(s) for each marking point. A better, more detailed, or more advanced answer should always be accepted, provided that it covers the same key point.

Marking Guidelines cannot give every possible alternative wording - equivalent phrasing of answers should be accepted. For example, 'the water potential is higher in the cells' is equivalent to 'the water potential is less negative in the cells'. It is, however, important to be sure that the minimum requirement of the Marking Guidelines is met and that the point is made unambiguously.

Converse answers are normally acceptable, unless the wording of the question rules this out. For example, 'the water potential is lower in the solution' is an acceptable converse of 'the water potential is higher in the cell'.

Very occasionally, a student will give a biologically correct answer that is not covered in the Marking Guidelines. If it is equivalent in standard to the Marking Guideline answers, it should be credited. In this case, write the word 'valid'.

All marking points are awarded independently, unless a link between points is specified in the Marking Guidelines.

The mechanics of marking

Always mark in red ink. Make sure that some red ink appears on every page on which the student has written.

For each mark awarded, put a tick close to the marking point. In all cases, a tick should equal one mark and the total number of ticks should match the mark totals in the margins. The total mark for each part answer should be written in the right hand margin.

Put a cross against incorrect points. It is helpful to indicate omissions of key words or incomplete answers with a Λ symbol, and to highlight irrelevancies or contradictions by underlining. It is also helpful to write brief comments to explain the reason for awarding or withholding a mark when the answer does not obviously match the Marking Guidelines.

When marking answers with many marking points, the points will be numbered. The points do not have to appear in the student's response in the order in which they appear in the Marking Guidelines. The appropriate number must be placed alongside the tick. This helps to clarify where a specific point has been awarded and makes moderation much easier. It also helps to avoid awarding the same point twice.

Disqualifiers A correct point should be disqualified when the student contradicts it in the same answer. Indicate this on the script by 'dq'. If a tick has already been placed against a valid point, ensure that it is clearly deleted. Note that there is no penalty for incorrect points which are not contradictory, or for surplus or neutral information.

The list rule When a question asks for a specific number of points, and the student gives more, the general rule is that any wrong answer cancels a correct answer. For example, if a question asks for two points and three answers are given, two correct and one clearly wrong, the mark awarded is one, whatever the order of the answers. This prevents students from gaining full marks from a list of right and wrong answers.

Example:

Name two substances that are produced in photosynthesis.

(2 marks)

Answer	Marks	Comment
Oxygen, glucose	2	Both correct
Oxygen, carbon dioxide	1	One correct, one incorrect
Carbon dioxide, oxygen, glucose	1	Carbon dioxide is clearly incorrect and cancels one of the marks
Oxygen, glucose, water	2	Regard water as a neutral point. It is not worth a mark but it is not incorrect

Two or more correct points on the same answer line should be credited.

'Neutral' points, i.e. ones which are not creditworthy but not actually incorrect, should not negate a correct answer.

Spelling Reasonably close phonetic spellings should be credited. However, any misspelling of technical terms which can easily be confused, such as intermediate between ‘mitosis’ and ‘meiosis’, should result in the relevant marking point being withheld. Terms like this will be indicated in the comments column in the Marking Guidelines to show that misspellings must not be credited.

BIO3T/P14 TASK

Before you mark any work, please make sure that you have read **Guidance for teachers marking Biology ISAs** on pages 3 to 5 of these Marking Guidelines.

Stage 1 – Marking of table showing raw data

Marking Guidance	Mark	Comments
<p>Marking points 1 to 4 can be awarded whatever the 'quality' of data shown. Where data are shown in rows instead of columns, the same principles apply. 'Percentage' can be written or shown as '%' throughout.</p>		
1. Data presented clearly and with full description of independent variable, i.e. concentration/percentage/dilution of blackcurrant/squash in first column ;	1	There must be a reference to 'blackcurrant' or 'squash' Ignore additional information that is neutral, eg 'tube number' even if this is given as the first column
2. Columns showing initial mass/weight and final mass/weight and percentage change in mass/weight;	1	Ignore additional information that is neutral, eg 'difference in mass/weight'
3. Unit for mass/weight shown as gram(s)/g and only shown in the column heading. 'Percentage' or '%' should only appear in column headings and not anywhere in the body of the table;	1	Allow the use of '%' as a unit
4. Correct calculations of percentage change in mass;	1	Do not award unless calculations for all concentrations are correct
Total	4	

The Candidate Results Sheet: Stage 1 is required for moderation and must be attached to the ISA test.

Stage 2 – Marking of graph

Marking Guidance	Mark	Comments
1. Graph has (concentration/ percentage/dilution of) blackcurrant/squash on x -axis and percentage change in mass/weight on y -axis;	1	Reject plotting of final mass/weight or just change in mass/weight for this marking point only
2. Both axes labelled correctly including appropriate units for labels given;	1	Do not further penalise students who have plotted final mass/weight or change in mass/weight for marking points 2 to 5 Do not reward if 'water' is shown to be a concentration (rather than 0)
3. Appropriate scales selected for x and y axes;	1	To enable points to be plotted accurately
4. All points plotted correctly;	1	Reject if less than the 6 concentrations shown or if any one plot is inaccurate
5. Points joined correctly or line of best fit as appropriate;	1	Reject extrapolation of the line beyond the plotted points. A line of best fit must reflect the plotted data
Total	5	

The Candidate Results Sheet: Stage 2 is required for moderation and must be attached to the ISA test.

BIO3T/P14 Section A

Question	Marking Guidance	Mark	Comments
1	1. (Cells/tissues) have same/similar water potential/sugar content; 2. (So) no genetic differences/all genetically the same;	1 max	Accept either approach for 1 mark Accept converse, eg different varieties have different sugar contents. Accept 'removes sugar content/genetic difference as a confounding variable'. Do not credit 'confounding variable' without qualification
2	1. 4 and 16; 2. 60 and 8;	2	1 mark per row. Both figures must be correct, and in the right box, to gain each mark
3	1. (Skin is) impermeable to water; 2. (Skin is) a different tissue; 3. <u>Cells</u> of skin have different water potential (to rest of tissue);	1 max	Allow any of 3 different approaches but only 1 mark Accept 'it' as referring to skin unless another tissue is identified Ignore references to surface area 3. Reference to cells required
4	1. Same/similar surface area; 2. (Otherwise) affects rate of water uptake/water loss/osmosis/diffusion;	2	2. A reference to rate or speed of process is required. Ignore reference to 'rate of reaction'
5	1. (Find) change/difference in mass; 2. Divide by time/30 minutes;	2	1. Accept final mass minus initial mass $\frac{\text{Final mass} - \text{initial mass}}{\text{Time}} = 2 \text{ marks}$ Accept correct use of student results to show 'how'

6(a)	<ol style="list-style-type: none"> 1. (Mass increases) between 0 – 0.3 (mol dm⁻³) water potential outside higher than inside so water taken up; 2. In 0.3 (mol dm⁻³) no change in mass because solutions have same water potential so no net movement of water (in or out); 3. (Mass decreases) between 0.3 – 0.8 (mol dm⁻³) water potential outside lower than inside so water lost; 	3	<p>Each marking point requires both the identification of correct values and an explanation</p> <p>Accept 'water potential' represented by the symbol 'Ψ'</p> <ol style="list-style-type: none"> 2. Accept description of 'net' movement. Reject suggestion of no movement 2. Accept 'isotonic' for 'same water potential' 3. Accept 'above 0.3'
6(b)	No further loss of water / maximum loss of water;	1	<p>Accept 'all cell water has moved out'</p> <p>Accept 'cells (fully) plasmolysed'</p>
6(c)	<ol style="list-style-type: none"> 1. (Water potential is) -800 (kPa); 2. (Using Figure 1) read off 0.3/concentration (of sucrose) where no (percentage) change in mass/crosses <i>x</i>-axis; 3. (Using Figure 2) read off water potential corresponding to this concentration (of sucrose); 	3	Marking points 2 and 3 still available for incorrect water potential
Total marks for Section A		15	

BIO3T/P14 Section B

Question	Marking Guidance	Mark	Comments
7	<ol style="list-style-type: none"> 1. Protein synthesis and cell wall synthesis and cell expansion stop at -0.7/at a <i>higher</i> water potential than other two; 2. Photosynthesis and stomatal opening stop at -1.5/at a <i>lower</i> water potential than other three; 	2	<p>If all 3 are correctly identified in marking point 1, accept 'the others/the other two' in marking point 2, and <i>vice versa</i></p> <p>Correct processes must be named in at least one of marking point 1 or marking point 2</p> <p>Where reference to water potential differences are made, they must be comparative, eg '<i>higher</i>'</p>
8	<ol style="list-style-type: none"> 1. Stomata allow uptake of carbon dioxide; 2. Carbon dioxide used in/required for photosynthesis; 	2	
9	<ol style="list-style-type: none"> 1. Growth involves cell division/cell expansion/increase in mass; 2. Protein synthesis stops so no enzymes/no membrane proteins/no <u>named</u> protein (for growth/division); 3. Cell wall synthesis stops so no new cells can be made; 4. No cell expansion/increase in mass because (cells) stop taking up water; 	3 max	<p>Marking point 1 is for the principle</p> <p>Marking points 2, 3 and 4 require appreciation of 'why' before credit can be awarded</p> <p>2. 'named' protein must relate to proteins involved in growth or cell division</p> <p>Full credit is possible without a statement of the principle (marking point 1)</p>
10	<ol style="list-style-type: none"> 1. (Presence of) root hairs; 2. (This area) has a large surface area; 3. This area is permeable to water; 	2 max	<ol style="list-style-type: none"> 3. Accept 'root tip is not permeable'

11	<ol style="list-style-type: none"> 1. Suberin/waterproof material in <u>cell walls</u> (of endodermis); 2. Blocks apoplast (pathway) / only syplast (pathway); 3. Water moves across membranes; 4. Ions moved by active transport into xylem; 5. (This) lowers the water potential (in the xylem) and water enters by osmosis (into xylem); 	4 max	<ol style="list-style-type: none"> 1. You can award marking point 1 for reference to Casparian strip without further qualification 4. Need idea of what is moved and how they are moved 5. Both aspects needed for credit. Context of xylem is required
12	<ol style="list-style-type: none"> 1. (Curve for) dog falls rapidly at the start but (curve for) sheep falls slowly at first; 2. Sheep doesn't fall rapidly until 0.5 (but dog falls rapidly from 0); 3. (Trend shows that) for any concentration of sodium chloride haemolysis is lower in the dog; 	2 max	<p>Do not allow curve for dog falls more steeply (since from 0.5% NaCl fall in sheep is just as steep as fall in dog)</p> <ol style="list-style-type: none"> 3. The idea of a trend is required. Statement of individual values alone is insufficient, eg 'at 0.2, 34% in dog and 98% in sheep' is insufficient 3. Accept dog reaches 0 at lower concentration of sodium chloride than for sheep / dog reaches 0 at 0.38% compared to 0.84 % in sheep;
13	74 to 76;	1	Accept a value within this range
14	<ol style="list-style-type: none"> 1. (Red) colour is due to haemoglobin; 2. The more haemoglobin released the more red the solution; 	2	<p>Note: a correct response to marking point 2 also scores marking point 1</p> <ol style="list-style-type: none"> 2. Need idea of haemoglobin release before giving credit

<p>15</p>	<p>1. (Use of 0.9%) will not cause haemolysis in any (of the mammals);</p> <p>2. (So) will not kill any of the animals;</p> <p>or</p> <p>Only need to use/store/buy one concentration of sodium chloride solution/cheaper to have one concentration of sodium chloride solution/can buy in bulk;</p> <p>or</p> <p>Anyone can give it/no need to find out what concentration any animal requires;</p>	<p>2 max</p>	<p>Full credit requires statement of marking point 1 and any approach from marking point 2</p> <p>2. Different approaches available for this marking point</p>
<p>Total marks for Section B</p>		<p>20</p>	