



**General Certificate of Education**

**Biology**

**Unit 3T AS Investigative Skills Assignment**

**BIO3T/P11/MG**

**Final**

**Marking Guidelines v2**

*2011 examination – June series*

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

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## Guidance for teachers marking Biology ISAs

**Final Marking Guidelines** must be used to mark candidates' work

### General principles

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

It is important to mark what the candidate 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 candidate's answer
- 'Accept' and 'reject' show answers which should be allowed or not allowed.
- Additional instructions are shown in the final 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 candidate 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 candidate 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  $\Delta$  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 candidate's response in the order 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 candidate 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 candidate 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 candidates from gaining full marks from a list of right and wrong answers.

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 final column in the Marking Guidelines to show that misspellings must not be credited.

Provisional Marking Guidelines

**Stage 1**

Candidates should be assessed on their ability to present raw data in an appropriate way.

<b>Marking Guidance</b>	<b>Mark</b>	<b>Comments</b>
Data presented clearly with full descriptions of both variables; e.g. 'Time from the start of filtering' / 'Time for juice to come through' / 'Volume of juice produced with pectinase / cellulase'.	1	This may be recorded either by a full title or by complete headings at the top of the table (e.g. if 'Volume' and 'Time' only recorded in the table, the title should give more detail by reference to apple juice. The name of the enzyme must appear either in the column heading or in the title to gain this mark.
Time in first column;	1	If table in horizontal format, time in first row.
Units stated clearly and only in the heading to the appropriate columns;	1	Although AQA uses the IOB convention of separating units by a solidus(/), credit should not be awarded or withheld for the way in which they are presented, provided they are clear. Time must be measured in appropriate units e.g. minutes or seconds, not a combination of both.
<b>Total</b>	<b>3</b>	

## Stage 2

Marking Guidance	Mark	Comments
Graph has time on x-axis and volume on y-axis;	1	
Appropriate scales selected for both the x and y axis;	1	These scales should allow for both accurate plotting and reading the graph.
Both axes correctly labelled with appropriate units;	1	Credit should not be awarded or withheld for the way in which units are presented, provided they are clear.
All points plotted accurately. If ICT has been used, it should be possible to read the points with appropriate precision;	1	Do not award if candidate has only plotted data for 30 minutes.
Data presented as two labelled curves on a line graph;	1	Do not award this mark if the curves have been extrapolated beyond the range of data collection. Ignore extrapolations to the origin (0,0). Depending on the data obtained by the student, <ul style="list-style-type: none"> <li>• points may be joined by a curve of best fit if it felt immediate values are likely to fall on such a curve.</li> <li>• alternatively, all points should be joined with straight lines if it felt that the position of intermediate points cannot be predicted reliably.</li> </ul> Do not award if candidate has only plotted data for 30 minutes.
<b>Total</b>	<b>5</b>	

**Section A**

Question	Marking Guidance	Mark	Comments
<b>1</b>	<ul style="list-style-type: none"> <li>1 Volume of enzyme;</li> <li>2 Mass of apple pulp;</li> <li>3 Concentration of enzyme;</li> <li>4 Variety of apple;</li> <li>5 Time of mixing;</li> <li>6 Time before filtering;</li> <li>7 Time between readings;</li> </ul>	2 max	
<b>2</b>	Temperature of room recorded regularly throughout investigation / at beginning and end of investigation / temperature of apple pulp recorded regularly throughout the investigation / at beginning and end of investigation;	1	Must be reference to temperature and time span.
<b>3</b>	<ul style="list-style-type: none"> <li>1 Use buffers;</li> <li>2 Use different buffers for each enzyme / pH 5 for cellulase and pH 6 for pectinase;</li> </ul>	2	<ul style="list-style-type: none"> <li>Award one mark for basic answer referring to buffer.</li> <li>Award two marks for more detailed answer referring to use of different buffers for each enzyme.</li> </ul>
<b>4</b>	<p>Either</p> <ul style="list-style-type: none"> <li>1 (Yes) – shows that juice produced as a result of enzyme activity / yes – shows if juice is produced without enzyme;</li> </ul> <p>Or</p> <ul style="list-style-type: none"> <li>2 (No) – investigation is to determine if there is a difference in juice production with the enzymes used / no – comparing (two) enzymes;</li> </ul>	1	
<b>5</b>	<ul style="list-style-type: none"> <li>1 Able to check that results are similar / concordant;</li> <li>2 Able to reduce / identify effect of anomalies / extreme values;</li> <li>3 Gives <u>reliable mean</u></li> <li>4 Allows statistics test to be carried out;</li> </ul>	2 max	Do not credit able to calculate mean
<b>6(a)</b>	<ul style="list-style-type: none"> <li>1 Pectinase produces a greater volume of juice than cellulase;</li> <li>2 With pectinase volume of juice produced increases then levels out at 20/25 minutes / 17.5/19.5 cm<sup>3</sup>;</li> <li>3 With cellulase volume of juice increases at same rate / is directly proportional to time;</li> </ul>	2 max	Accept figures within range of extremes given.

**Section A**—continued

Question	Marking Guidance	Mark	Comments
<b>6(b)</b>	<ol style="list-style-type: none"> <li>1 Overall <u>volume</u> is the same;</li> <li>2 (If 1 cm<sup>3</sup>) less enzyme present / (should have used 2 cm<sup>3</sup>) so same amount of enzyme present;</li> <li>3 (If 1 cm<sup>3</sup>) valid comparison cannot be made / rate of reaction lower for each enzyme;</li> <li>4 (With 2 cm<sup>3</sup>) same amount of enzyme (as in original experiment);</li> </ol>	2 max	
<b>7</b>	<ol style="list-style-type: none"> <li>1 Pectinase breaks cells apart;</li> <li>2 More surface / cells for cellulase to act on;</li> <li>3 Cellulase breaks down cell walls / cellulase releases juice;</li> </ol>	2 max	
<b>Total</b>		<b>14</b>	

**Section B**

Question	Marking Guidance	Mark	Comments
<b>8</b>	<ol style="list-style-type: none"> <li>1 Cholesterol not removed / accumulates;</li> <li>2 In artery walls</li> <li>3 Atheroma forms;</li> <li>4 Oxygen supply / blood flow to heart muscle reduced;</li> <li>5 (Increased risk of) myocardial infarction / thrombosis;</li> </ol>	3 max	5 Do not accept 'heart attack' or 'clot'. Technical term required. Reject aneurysm.
<b>9</b>	<ol style="list-style-type: none"> <li>1 Maintain constant intake of energy / carbohydrate / vitamins;</li> <li>2 (Otherwise) result might have been due to different amounts of sugars / minerals / vitamins;</li> <li>3 So that participants did not know the concentration of juice being used;</li> </ol>	2 max	



Section B—continued

Question	Marking Guidance	Mark	Comments
10	<ol style="list-style-type: none"> <li>Increase in high density lipoprotein may be due to other factor / named factor;</li> <li>High standard deviations / standard deviations overlapping;</li> <li>So may not be a difference in HDL concentrations;</li> <li>HDL only one of the risk factors in CHD;</li> <li>No control;</li> <li>Sample size small / only 31;</li> <li>Change both time and concentration;</li> </ol>	4 max	<ol style="list-style-type: none"> <li>Eg diet not controlled</li> </ol> <p>When marking, please number the marking points e.g. <math>\checkmark</math> means a mark awarded for point 4.</p> <ol style="list-style-type: none"> <li>Idea of two independent variables</li> </ol>
11	<ol style="list-style-type: none"> <li>Natural product used / cranberry juice safe / has no harmful effects;</li> <li>No change in normal lifestyle of participants;</li> <li>Participants were volunteers;</li> <li>Participants were healthy;</li> </ol>	2 max	
12	Straight lines point to point as not possible to predict intermediate values/values between points;	1	
13	<ol style="list-style-type: none"> <li>Increases then levels/falls;</li> <li>Maximum antibody production 180 units/ at dose of 0.25 g per kg;</li> </ol>	2	
14	<p>Two marks for correct answer of 57.14 / 57.1;;</p> <p>One mark for incorrect answer in which candidate clearly divides difference in antibody production / 60 by 105;</p>	2	
15	Takes into account different masses of mice / allows comparison;	1	Accept different weights of mice. Do not accept different size.
16	<ol style="list-style-type: none"> <li>Sheep red blood cells have antigens (on their surface);</li> <li>Antigens are proteins;</li> <li>Foreign to mice / are non-self;</li> <li>Stimulate B cells to produce antibodies;</li> </ol>	3 max	
17	<ol style="list-style-type: none"> <li>Response only observed in mice;</li> <li>Disease organisms not investigated;</li> <li>Not all disease caused by pathogens / cured by antibodies</li> </ol>	2 max	i.e. not tested on humans
<b>Total</b>		<b>22</b>	