



# General Certificate of Education

## Biology

Unit 6T A2 Investigative Skills Assignment

**BIO6T/Q11/MG**

# Final

# Marking Guidelines

*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 be ignored.

Spelling Reasonably close phonetic spellings should be credited. However, any misspelling of technical terms which can easily be confused, such as intermediates 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.

**Stage 2 (NB No marks are awarded for Stage 1 at A2)**

Question	Marking Guidance	Mark	Comments
1	Clear statement of null hypothesis;	1	e.g. the volume of the conical flask has no effect on the size of the yeast population / the amount of oxygen has no effect on the density of yeast colonies
2 (a)	Standard error (and 95 % confidence limits) / $\chi^2$ ;	1	
2 (b)	1 If SE and 95% confidence limits chosen; 2 Compared two means; 3 If $\chi^2$ chosen; 4 Number of yeast colonies is categoric;	1	
3	Test statistic calculated correctly	1	Accept candidate's correct calculation even if the test is not appropriate. If working not shown, calculation must be checked against raw data.
4	1 Correct interpretation of statistical test in terms of acceptance or rejection of null hypothesis; 2 Interpretation involves appropriate reference to the probability of the results being due to chance;	2	Use candidate's value of chosen test even if it is incorrect:
<b>Total</b>		<b>6</b>	

The table of raw data and the Stage 2 sheet is required for moderation and must be attached to the ISA test.

## Section A

Question	Marking Guidance	Mark	Comments
<b>5</b>	Allow yeast to reproduce / allow yeast to multiply / allow (time to show) effect of oxygen;	1	Accept cells as alternative for yeast Reject equilibrate
<b>6 (a)</b>	<p>1 Prevent contamination by bacteria;</p> <p>2 Bacteria would compete with the yeast for oxygen / nutrients;</p> <p>3 Toxins / substances produced by bacteria might inhibit yeast growth;</p>	2 max	Accept microorganisms / microbes as alternatives for bacteria
<b>6 (b)</b>	Allows oxygen through / is permeable to gases / carbon dioxide;	1	
<b>7</b>	<p>1 Reduces concentration of yeast / dilutes yeast;</p> <p>2 So colonies would be spread out enough to count / colonies would grow from individual cells / colonies would be separate / colonies easier to count;</p>	2	Accept cells as alternative for yeast Accept reference to all questions to bacteria as equivalent to yeast.
<b>8</b>	Mix yeast and water / distribute yeast evenly / stop yeast settling;	1	Accept cells as alternative for yeast
<b>9</b>	<p>1 Method used to generate a random square;</p> <p>2 Method used to locate the square;</p>	2	E.g. take numbers from a box / use random button on calculator / use computer  Do not credit random number generator E.g. number each square
<b>10</b>	<p>1 Larger surface area (in 250 cm<sup>3</sup> flask);</p> <p>2 For diffusion (of oxygen into the culture);</p>	2	

Question	Marking Guidance	Mark	Comments
11	<p>1 (More oxygen) allows more respiration / allows aerobic respiration / stops anaerobic respiration / reduces anaerobic respiration;</p> <p>2 Produces more ATP / releases more energy;</p> <p>3 Energy / ATP used for growth / producing new substances / active transport of nutrients / cell division;</p> <p><b>OR</b></p> <p>4 Less anaerobic respiration;</p> <p>5 Less ethanol produced;</p> <p>6 Ethanol kills/inhibits/slows;</p>	3	Ignore references to making or producing energy
12	<p>1 Up to 500 cm<sup>3</sup>, volume of flask / oxygen is limiting;</p> <p>2 As size of flask increases, number of colonies increases / size of flask and number of colonies show positive correlation / size of flask and number of colonies are directly proportional;</p> <p>3 Above 500 cm<sup>3</sup>, volume of flask / oxygen not limiting / something else limiting / named factor limiting;</p>	3	<p>Do not penalise candidates if volumes slightly different from values quoted. All that is necessary is to identify the relevant part of the curve.</p> <p>Named factors might be, for example, carbon dioxide, lack of nutrients</p>
Total marks for <b>Section A</b>		<b>17</b>	

## Section B

Question	Marking Guidance	Mark	Comments
<b>13</b>	<p>1 Shows mass of wheat seedlings when grown on their own;</p> <p>2 Allows percentage to be calculated / allows comparison / allows effect of competition to be seen;</p>	2	
<b>14</b>	<p>1. Interspecific competition / ryegrass reduces growth of wheat;</p> <p>2. Justification by using values;</p> <p>3. Competition between shoots had a greater effect than competition between roots;</p> <p>4. Justification by use of values;</p>	4	<p>When marking please number marking points E.g. 4 means a mark awarded for point 4.</p> <p>2. 100% with wheat but less when grown with ryegrass</p> <p>4. 46% when shoots complete / in <b>Y</b> / 76% when roots compete / <b>X</b></p>
<b>15</b>	<p>1 Growth involves enzymes / enzyme-controlled reactions</p> <p>2 Lower temperature means less kinetic energy / fewer collisions / fewer E-S complexes formed;</p> <p>3 Wheat and ryegrass affected to a different extent;</p>	2 max	Accept other valid physiological processes such as growth involves diffusion / lower temperature means less kinetic energy molecules move slower.
<b>16</b>	Same number of ryegrass seedlings in distilled water;	1	
<b>17 (a)</b>	<p>1 Produce null hypothesis;</p> <p>2 Carry out Spearman Rank correlation test / find correlation coefficient;</p> <p>3 Use values to show <math>P &lt; \text{critical value}</math> / find probability of results being due to chance;</p>	2 max	Accept valid example E.g. There is no correlation between inhibition of germination and the concentration of the extract.
<b>17 (b)</b>	May be another factor / named factor (that also inhibits germination);	1	e.g. amount of water in extract



Question	Part	Marking Guidance	Mark	Comments
18	(a)	<p>1 Extract inhibits ryegrass germination / extract stops ryegrass starting to grow;</p> <p>2 Inhibition of root length / causes ryegrass to have shorter roots;</p>	2	
18	(b)	<p>1 Scientists crushed plants to get extract;</p> <p>2 Plants might not secrete substances in the extract into the soil;</p> <p>3 These substances might get broken down in the soil;</p> <p>4 Wheat and ryegrass might not grow at the same time / wheat plants might not produce substance when ryegrass is growing;</p> <p>5 Concentration of extract in the soil might be different from that in solution;</p>	3 max	
19	(a)	<p>1 Use no / less herbicide / weed killer;</p> <p>2 Specific example of how less herbicide / weed killer would benefit the environment;</p>	2	E.g. would produce greater diversity of plants.
19	(b)	Reduces genetic diversity / gene pool / number of different alleles; Wheat unable to adapt to new conditions / new disease;	2	
Total marks for Section B			<b>21</b>	