



# **General Certificate of Education**

## **Biology**

**Unit 3T AS Investigative Skills Assignment**

**BIO3T/P10/MG**

## **Marking Guidelines**

*2010 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

### 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.

| 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.

**Stage 1****Assessment of presentation of raw data**

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

The following criteria should be used to mark this skill.

| <b>Marking Guidance</b>  | <b>Mark</b> | <b>Comments</b>  |
|--|-------------|--|
| Data presented clearly with full descriptions of both the independent and dependent variable i.e. tube number and time taken for pink colour to disappear; | 1           | This may be recorded either by a full title or by complete headings at the top of the table.   |
| Independent variable (tube number) in the first column;  | 1           |  |
| Units clearly stated and only in the head of the appropriate column;   | 1           | Although AQA uses the IOB convention of separating the units by a solidus (/), credit should not be recorded or withheld for the way in which they are presented, provided they are clear.<br>(Time must be measured in appropriate units e.g. minutes or seconds not a combination of both) |
| <b>Total</b>   | <b>3</b>    |  |

The table of raw data collected during implementation is required for moderation and must be attached to the ISA written test.

## Stage 2

## Assessment of processing

| Marking Guidance  | Mark     | Comments  |
|---|----------|---|
| Rate of reaction calculated correctly (1/time taken for pink colour to disappear);                              | 1        |   |
| Data presented as a bar chart;  | 1        | Accept bars touching  |
| Graph has independent variable (tube number / tube contents) on x axis and dependent variable (rate) on y axis; | 1        |   |
| Both axes correctly labelled with appropriate units;  | 1        | For independent variable, tube number or tube. For dependent variable, rate as $\text{minutes}^{-1}$ or $\text{seconds}^{-1}$                 |
| Appropriate scales selected for the x and y axes:   | 1        | These scales should allow for both accurate plotting and reading of the graph<br>The bars should not be touching and should be of equal width |
| All bars plotted accurately;  | 1        | If ICT has been used to plot the graph, it should be possible to read the height of the bars with appropriate precision                       |
| <b>Total</b>  | <b>6</b> |   |

The graph produced is required for moderation and must be attached to the ISA written test.

## Section A

| Question | Marking Guidance  | Mark | Comments  |
|----------|---|------|---|
| 1        | This is a temperature very similar to (mammal) body temperature/ because enzymes work fast enough at this temperature to get results/ optimum temperature/temperature easy to control;  | 1    | No mark for temperature<br>1 mark for reason<br><br>Mark the reason first and then check this matches with the temperature chosen. If it does not, withhold the mark. |
| 2        | (a) To equilibrate / (for the solution) to reach the temperature of the water bath;   | 1    |   |
| 2        | (b) If room temperature higher than incubated temperature rate of reaction increased/ if room temperature lower than incubated temperature rate of reaction lowered/ if room temperature same as incubated temperature rate of reaction will be the same; | 1    |   |
| 3        | To produce a pink solution;   | 1    |   |
| 4        | (b) To see if lipase on its own could break down / hydrolyse triglycerides / to compare with tube containing bile salts and enzyme;   | 1    | Ignore references to 'control'  |

## Section A—continued

| Question                         | Marking Guidance   | Mark      | Comments                          |
|----------------------------------|--|-----------|-----------------------------------|
| 5                                | <p>Tryglycerides are broken down into fatty acids (and glycerol);<br/>           By hydrolysis;<br/>           Fatty acids decrease pH;<br/>           Phenolphthalein changes colour when solution becomes more acidic /<br/>           pH decreases;</p> | 3 max     | Accept lipids broken down         |
| 6                                | <p>A buffer keeps the pH the same;<br/>           This investigation uses change in pH to measure the progress of the<br/>           reaction;</p>   | 2         |                                   |
| 7                                | <p>(a)<br/>           Lipase / enzyme denatured by boiling;<br/>           Active site changes shape;<br/>           Substrate no longer fits / binds / no or fewer enzyme-substrate<br/>           complexes formed;</p>                                  | 3         |                                   |
| 7                                | <p>(b)<br/>           From tube 2, bile salts do not digest triglyceride;<br/>           From tubes 3 and 1, bile salts speed up action of lipase;<br/>           From tube 5, bile salts not an enzyme / protein / is not denatured;</p>                  | 2 max     | Assume 'they' refer to bile salts |
| <b>Total marks for Section A</b> |  | <b>15</b> |                                   |



## Section B

| Question | Marking Guidance   | Mark  | Comments  |
|----------|--|-------|---|
| 8        | pH goes down and levels out;<br>after 30 min / pH 6.5;   | 2     |   |
|          | Enzyme not used up in reaction;  | 1     |   |
| 10       | Curve will be less steep:  | 1     | Only accept answers relating to curve <b>not</b> rate of reaction |
| 11       | Measure with eyepiece graticule/scale;<br>Calibrate with stage micrometer / scale on slide/object of known size;<br>Repeats and calculate the mean;<br>OR<br>Use a ruler to estimate the field diameter under microscope;<br>How many droplets go across the field;<br>Repeats and calculate mean;                                       | 3     | Accept references to radius                                       |
| 12       | (a)<br>Two mark for correct answer of 4 : 1;;<br>One mark for incorrect answer but working shows that candidate has clearly attempted to compare values of $r^2 / 6^2$ and $3^2 / 36$ and 9;   | 2     | Idea of comparing ratios<br>A ratio of 1 : 4 should gain 1 mark   |
| 12       | (b)<br>Small droplets have a larger surface area to volume ratio;<br>More surface for lipase (to act);<br>Faster digestion of triglycerides;<br>Fatty acids are produced more quickly so pH will drop more quickly in curve <b>Y</b> / with bile salts / less fatty acids in curve <b>Z</b> / without bile salts so pH drop more slowly; | 3 max |   |

## Section B—continued

| Question                         | Marking Guidance  | Mark      | Comments |
|----------------------------------|---|-----------|----------|
| 13                               | Diet including saturated fats leads to higher plasma cholesterol concentrations;<br>Higher in all age groups;<br>But sample size is very small;<br>Standard deviations overlap / suggest wide variation;  | 3 max     |          |
| 14                               | The sex of individual is a risk factor for high cholesterol;<br>To remove a / one variable / to establish a fair test;  | 2         |          |
| 15                               | Monkeys and humans closely related therefore similar conclusions might be drawn;<br>High concentrations of plasma cholesterol lead to an increased risk of cardiovascular disease in humans;<br>Don't know if diet has the same effect in monkeys (as in humans) / could have different effects because not the same species; | 3         |          |
| <b>Total marks for Section B</b> |   | <b>20</b> |          |