



General Certificate of Education

Biology

Unit 6T A2 Investigative Skills Assignment

BIO6T/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 Δ 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 2 (NB no marks are awarded for the table, Stage 1 at A2)

| Question | Marking Guidance | Mark | Comments |
|--------------|---|----------|--|
| 1 | Correct calculations of the reciprocal distance squared; | 1 | |
| 2 | Clear statement of null hypothesis e.g. there is no relationship / correlation between light intensity and rate of photosynthesis; | 1 | |
| 3 (a) | Spearman Rank; | 1 | |
| 3 (b) | Rate of photosynthesis measured at a number of light intensities and this test determines if there is an association/correlation between them; | 1 | |
| 4 | Test statistic calculated correctly; | 1 | Accept candidate's correct calculation even if test is not appropriate |
| 5 | Compares the test statistic with the critical value at $P = 0.05/5\%$ level of probability; Correct statement concerning acceptance or rejection of null hypothesis; | 2 | Use candidate's value of test statistic even if it is incorrect |
| Total | | 7 | |

Section A

| Question | Part | Marking Guidance | Mark | Comments |
|----------|------|---|-------|--|
| 6 | | Bubbles contain oxygen from photosynthesis/oxygen is a product of photosynthesis/oxygen is a product of photolysis; Higher rate of photosynthesis results in more bubbles being released; | 2 | |
| 7 | a | More bubbles released; Because increase in rate of photosynthesis/lower solubility of oxygen/thermal expansion of gas/(photosynthetic) enzymes work faster; | 2 | |
| 7 | b | Use of water-filled transparent container/sheet of glass/(clear) plastic/heat shield between plant and lamp; Use of LED/low voltage bulb/halogen bulb/bulb which does not give off heat; Use of larger test tube/volume of water; | 1 max | |
| 8 | | Provides carbon dioxide/source of carbon for photosynthesis; So carbon dioxide not limiting; | 1 max | Accept 'to act as a buffer/maintain pH' |
| 9 | | Time needed for rate to adjust to new light intensity / oxygen released from previous light intensity still present; | 1 | |
| 10 | a | Rate limited by light intensity; Because rate of photosynthesis increases as light intensity increases; Increase in light intensity results in greater activation of chlorophyll / more electrons released; So more photolysis / greater dissociation of water producing oxygen; | 2 max | |
| 10 | b | Light intensity not limiting; Another factor is limiting; Carbon dioxide concentration/temperature/chlorophyll concentration limiting; | 2 max | If described in terms of 'not enough' rather than 'limiting' max 1 |

Section A – continued

| Question | Part | Marking Guidance | Mark | Comments |
|----------------------------------|------|---|-----------|----------|
| 11 | | Bubbles are the same size; Bubbles are oxygen/constant proportion of oxygen; A constant proportion of oxygen produced is released /oxygen produced does not dissolve/oxygen produced is not used in respiration/rate of respiration constant; Bubbles do not stick to glass/apparatus; | 2 max | |
| Total marks for Section A | | | 13 | |

Section B

| Question | Part | Marking Guidance | Mark | Comments |
|----------|------|---|-------|---|
| 12 | | To see if a difference in hours of sunshine was present/because it is necessary to monitor factors which cannot be controlled; So that they could eliminate this factor from affecting the yield (with/without extra carbon dioxide); Duration of light influences length of time for photosynthesis/temperature in glasshouse; Higher photosynthesis results in higher yield/more carbohydrates/sugars/proteins produced; | 2 max | |
| 13 | | Named factor; Explanation of why the factor is important; E.g. Density of planting; Competition for named resource; or Same variety of tomato; Yield will vary with different varieties/with different genotypes; or Water (application); Water needed for expansion of fruit/maintain leaf turgidity/maintain stomatal opening/replace water lost in transpiration/water used in photosynthesis; | 2 | For named resource accept 'nutrient' but not 'food' |
| 14 | a | Yield increases by 0.6 kg m^{-2} (when extra carbon dioxide present); | 1 | |
| 14 | b | Temperature/light intensity so could be lower in these weeks (as temperature / light intensity not fully controlled / monitored) (over period 1998 – 2000); | 1 | |

Section B – continued

| Question | Part | Marking Guidance | Mark | Comments |
|----------|------|---|-------|--|
| 15 | | Two marks for correct answer of 50.6 %;; One mark for incorrect answer in which candidate has shown clearly that calculation based on an increase / 0.42 and original mass / 0.83 | 2 | |
| 16 | | Cost of supplying carbon dioxide; Price of (very early) tomatoes; | 2 | |
| 17 | | Lowest price paid for tomatoes; Some carbon dioxide lost as windows open in summer; Little/no mean increase in yield in summer; | 2 max | |
| 18 | | Grow with extra carbon dioxide in one glasshouse and without carbon dioxide in other glasshouse at same time; So all environmental conditions/light and temperature same for experiment and control; | 2 | |
| 19 | a | Biological control; | 1 | |
| 19 | b | When/whether to start release of the parasitic wasps; How many parasitic wasps to release; To monitor effectiveness of method; Threshold population size beyond which they cause severe crop loss; | 2 max | |
| 19 | c | Only catch flying whitefly / whitefly may not be evenly distributedj / don't know what proportion of whitefly are caught; | 1 | Accept converse e.g. will not catch crawling young |
| 19 | d | Control not immediate; Always some pest present/pest not eliminated; | 1 max | |

Section B – continued

| Question | Part | Marking Guidance | Mark | Comments |
|---------------------------|------|---|-------|--|
| 20 | | <p>Traps with same surface area/stickiness/height above ground; Same climatic conditions e.g. same wind speed, same temperature, same day; Left for same length of time/stated length of time given; Large number of traps; Count number of whitefly trapped on both colours; Determine if there is a significant difference using a statistical test;</p> | 5 max | <p>Any two relevant factors for two marks Do not allow 'weather' If number stated this must be at least 10 Allow 'many', do not allow 'several'</p> |
| Total marks for Section B | | | 24 | |