



General Certificate of Education

Biology

Unit 6T A2 Investigative Skills Assignment

BIO6T/Q10/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 (N.B. No marks are awarded for the table, Stage 1 at A2)

Question	Marking Guidance	Mark	Comments
1	Clear statement of null hypothesis;	1	e.g. there is no difference in the mean rate of movement (of maggots / woodlice) at the two temperatures
2 (a)	Standard error and 95 % confidence limits;	1	
2 (b)	Rate of movement determined at two different temperatures and this test determines if there is a difference between the means of the two samples;	1	
3	Test statistic calculated correctly	1	Accept candidate's correct calculation even if the test is not appropriate
4	Overlap of confidence limits used to determine if significant difference exists at $P = 0.05 / 5\%$; Correct statement concerning acceptance or rejection of null hypothesis;	2	Use candidate's value of chosen test even if it is incorrect
Total		6	

Section A

Question	Marking Guidance	Mark	Comments
5 (a)	To ensure body temperature of animal reaches that of the environment/equilibrate;	1	
5(b)	Cause death/harm to animal; Higher temperatures would denature enzymes/cause dehydration;	2	Do not allow 'cruel'
6	Room temperature – as temperature not constant/to see if temperature changed; Temperature inside boiling tube – to find temperature of air surrounding animals; Water bath temperature – to ensure same temperature for all animals/to see if it changed as no thermostatic control/to make sure it did not go above 32 °C;	2 max	
7	This question should be answered using the following principles: Identification of relevant factor; Explanation of why the factor was monitored or controlled;	2	E.g. Position of animals in Petri dish at start of timing; To ensure same distance to line on bottom of dish or Light intensity; As animals respond to light / light affects (rate of) movement of animals; or Size / age of woodlouse / of maggot; Smaller woodlice have a larger surface area to volume ratio or behaviour may differ in adults and juveniles/different age maggots; or How long after putting the animals in the Petri dish the counts were started; Behaviour changes with time;

Question	Part	Marking Guidance	Mark	Comments
8		No (no mark) Different animals behave in different ways; Data collected by repeats with one animal not comparable with other data; Investigation is measuring response of woodlice/maggots/one species of animals in general to temperature not response of one animal; Internal environment of animal changes with time e.g. dehydration/energy available; Or Yes (no mark) Different animals behave in different ways; So using one animal reduces the amount of variation; More likely to see a difference in response;	2 max	No mark for yes or no
9	a	If animal reverses just after crossing a line this would give an overestimate of the rate of movement; If animal reverses just before crossing a line this would give an underestimate of the rate of movement; If many reverses take place the over- and under-measurements would cancel each other out / no effect on rate;	2 max	
9	b	Use comparable data in the two samples / identify data as anomalous;	1	
10	a	Reversing has smaller effect / greater discrimination possible;	1	
10	b	Animals may leave chemical/scents which influence behaviour of other animals;	1	
Total Section A			14	

Section B

Question	Part	Marking Guidance	Mark	Comments
11		Shows trend of mean temperature rise; Higher temperatures more frequent since 1984 (in January and February); Considerable variation in temperature from year to year; Which may be due to chance;	2 max	No mark for yes or no Do not penalise candidates who state there is no trend
12		Construct null hypothesis; Use Spearman rank (and calculate test statistic); Look up in table (to find critical value of $P = 0.05 / 5\%$); Use figure (in table) to accept or reject null hypothesis;	3 max	
13	a	(Particular daylength) always occurs at same time of year/valid example; Birds do not start laying eggs when period of warm weather occurs early in year; Synchronises breeding behaviour; Sufficient foraging time for food collection for young;	2 max	
13	b	Birds able to respond to changing climate; Food availability (mainly) determined by temperature; As insect/invertebrate development temperature-dependent;	2 max	
14		A correlation does not indicate a causal relationship; As may be due to another factor / named factor;	2	
15		Visits could be up to 5 days apart; Date of egg-laying may be inaccurate by 5+ days;	2	

Question	Part	Marking Guidance	Mark	Comments
16	a	To obtain a representative sample of the population / minimise effect of anomalies;	1	
16	b	To avoid bias / so the results can be analysed statistically;	1	
17		Earlier / more young produced as adults survive the winter; Temperatures higher earlier in year so more time for production of young;	2	
18	a	Temp. difference between 1979 and 2000 = 5°C (0° and 5°C) and difference in date of flying = 80 days (April 30 and July 19); $\frac{80}{5} = 16$ days; or Temp. difference between 1979 and 2000 = 5°C (0°C and 5°C) 5 x 16 = 80 days; April 30+80 days = July 19;	2	
18	b(i)	Combines all available methods of control/use of chemicals and natural predators or parasites; Chemical control only used when necessary / only used when pest numbers exceed economic threshold / used so that it causes little disruption to biological control;	2	
18	b(ii)	Able to predict years when pest damage is likely to be high; As able to predict when high numbers of aphids will be present; Able to predict when control measures first required; Able to predict whether chemical control required because of predicted high numbers; Therefore can be used as a preventative measure;	3 max	
Total Section B			24	