



General Certificate of Education

Human Biology

Unit 6T A2 Investigative Skills Assignment

HBI6T/Q11/MG

Final

Marking Guidelines

2011 examination – June series

These 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 Human Biology ISAs

Final marking guidelines should 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 answer, 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.

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, ie 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 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.

The effect of use on features of the arm

Stage 1

Assessment of the presentation of raw data table

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.

Marking Guidelines	Mark	Comments
Data presented clearly with full descriptions of both the independent and dependent variables 'Dominant/other arm' and 'Circumference of forearm', 'Diameter of wrist' and 'number of times circumference of forearm is bigger than diameter of wrist';	1	This may be recorded either by a full title for the table or by complete headings at the top of each of the columns in the table (eg if 'Arm' only is recorded in the table, the title should / must give more detail by reference to the feature measured)
(Independent variable) 'Arm' in first column;	1	
Units mm	1	Appropriate units clearly stated and only in the heading to the appropriate columns separated from the variable by a solidus (/); Accept brackets instead of solidus Circumference and diameter must be measured in millimetres. The use of centimetres is inappropriate No units are required for the column showing how much bigger the forearm is than the wrist
Total 3		

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

Stage 2

Assessment of statistical analysis of data collected by the candidate

Marking Guidelines	Mark	Comments
Clear statement of null hypothesis, i.e., There is no difference in the ratio of forearm circumference to wrist diameter in the dominant and other arms;	1	
Choice of statistical test appropriate to the data collected, i.e., Standard error or Student <i>t</i> test or correlation coefficient;	1	
Justification of test with a clear explanation of why specific test was chosen, i.e. Data are continuous/used to compare means/samples;	1	
Test statistic calculated correctly;	1	Accept candidate's correct calculation even if the test is not appropriate
Correct interpretation of statistical test, in terms of acceptance or rejection of null hypothesis; Interpretation involves appropriate reference to probability of difference being due to chance;	2	Use candidate's value of chosen test even if it is incorrect
Total 6		

The statistical analysis must be attached to the ISA test.

Section A (16 marks)

Q	Part	Marking Guidelines	Mark	Comments
1		Contract muscles both sides of forearm / so muscles all maximum contraction (or 'size') when measurements taken / not possible to relax both equally / to remove a variable;	1	Accept 'To make forearm as big as possible'
2	a	Tension of tape/string; Just touching the skin / no indent into the skin; OR Level of clenching of fist/contraction of muscle; Measure (promptly) as soon as muscle contracted/fist clenched;	2	Both comments should relate to the same idea
2	b	Angle at which wrist measured; Kept ruler parallel to bench; OR Ensured maximum width measured; By twisting hand / wrist in slot;	2	Ignore references to keeping ruler straight
3		Wrist (no mark) (Wrist) smaller dimension; 1 mm is bigger proportion of this;	2	Accept converse re size and proportion if related to forearm in correct context

Q	Part	Marking Guidelines	Mark	Comments
4	a	Use dominant arm more, so muscles increase (with use); Little / no muscle in wrist, so no real difference;	2 max	Do not credit answers which only offer a partial explanation
4	b	Repeat the test until concordant results are achieved;	1	Accept descriptions of the term 'concordant'. Do not credit any answers which refer to leaving out the results
5	a	Forearm reduces more than the wrist (with age);	1	Reject 'ratio decreases'
5	b	Loss of muscle tissue; Due to aging/degenerative disease/less activity;	2	Do not credit 'muscle weaker' without qualification
6	a	The variability / spread (of the data) <u>about the mean</u> ;	1	Credit only answers which refer to the variability or spread about / from the mean
6	b	Larger surface area (of pads versus jaws); So pressure becomes a smaller source of error/(jaws) do not press into skin; Results more likely to be the same / similar / more accurate when repeated;	2 max	

Section B (19 marks)

Q	Part	Marking Guidelines	Mark	Comments
7	a	The non-cricketers / Group L (no mark) Largest standard deviation;	1	
7	b	Standard error / (Student) <i>t</i> test	1	Accept either
8		(Lactate) end product / result of anaerobic respiration; As circulation not fast enough / not enough blood flow; To supply enough oxygen; To accept hydrogen from NADH / reduced NAD; (Lactate) moved away in circulation / blood; Broken down in liver; Used to make glucose / oxidised / broken down using oxygen;	5 max	Allow one mark for oxygen debt repaid instead of points 2 and 3
9		Probably not / no (no mark) (All groups quite large) so anomalous results will not affect the mean very much / significantly; OR Probably / yes (no mark) (All groups quite small) so should carry out investigations on thousands / much larger groups; Anomalies will have bigger effects on smaller groups; Bigger groups more reliable;	1 max	
10	a	Strength decreases from 49/50 (years);	1	
10	b	No (no mark) Shows a correlation; Does not prove causal link;	1 max	

Q	Part	Marking Guidelines	Mark	Comments
11		Get up and go faster / shorter time needed (on both supplements); People taking calcium improve slightly, but people taking calcium and vitamin D improve more; Calcium needed to improve muscle contraction; (And) synaptic transmission; (And) bone strength; (And) ATPase activity / myosin head movement; Faster muscle contraction; Vitamin D increases uptake of calcium; (but) no statistical test (carried out);	4 max	(2 for description, and 2 for suggestions) OR (1 for description and 3 for suggestions) Second marking point needs reference to those taking calcium, <i>and</i> those taking both
12		Check methods used; So results are reliable; Check conclusions drawn from data; To see if they are valid; Check the analysis/stats; To see if they are valid; To increase the credibility (of the investigation); To eliminate ideas of bias/poor methods/analysis/stats;	2 max	One reason; with explanation;
13		Loss of muscle strength; Loss of muscle; Loss of bone strength; Loss of joint mobility; Reduced nerve conduction velocity / slower nerve impulses; Loss of nerve cells in brain / spinal cord; Degenerative diseases / named example; Deteriorating eyesight / balance;	3 max	