



General Certificate of Education (A-level)
June 2013

Human Biology

HBI3T/Q13

(Specification 2405)

Unit 3T: Investigative and Practical Skills

Final

Marking Guidelines

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

General principles

In general, you are looking for evidence that the student knows and understands the fact, principle or concept required by the Marking Guidelines.

It is important to mark what the student 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
Eg anaphase, the term must appear
Egand....., both items must be present for a mark
Eg 'active site and substrate have complementary shape', the concept must be clearly stated.
- Brackets are used to indicate contexts for which a marking point is valid. This context may be implied by a student's answer
- 'Accept' and 'reject' show answers which should be allowed or not allowed.
- '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 fact, term, principle or concept.

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 higher in the cell' is an acceptable converse of 'the water potential is lower in the solution'.

Occasionally, a student will give a biologically correct answer that is not present 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 student has written.

For each mark awarded, put a tick close to the key fact, term, principle or concept. In all cases, a tick should equal one mark and the total number of ticks should match the mark totals in the margins.

Put a cross against incorrect points. It is helpful to indicate omissions of key words or incomplete answers with a **Λ** 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 student'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 again makes moderation much easier. It also helps the teacher to avoid awarding the same point twice.

Disqualifiers A correct point should be disqualified when the student 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 student 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 students from gaining full marks from a list of right and wrong answers. For example, if in answer to 'Name **two** products of photosynthesis' a student gives: 'Oxygen, carbon dioxide, glucose', 1 mark would be awarded. 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 between 'mitosis' and 'meiosis', should result in the relevant marking point being withheld. Spellings like this will be underlined in the Marking Guidelines to show that misspellings must not be credited.

HBI3T Q14 The effect of sodium chloride concentration on the rate of the reaction catalysed by amylase.

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, i.e., 'concentration of sodium chloride solution' and 'time taken for starch to be digested';	1	This may be recorded either by a full title for the table or by complete headings at the top of each column in the table. Do not reward a column title 'Time' alone unless it is qualified in the title. Candidates should not be penalised if they refer to 'sodium chloride' as 'salt' at any stage in the table.
Independent variable (concentration of sodium chloride) in first column;	1	Candidates may list the letters of each tube in the first column. This can be ignored provided the independent variable is in the second.
Appropriate units clearly stated, i.e., mol dm^{-3} and seconds or minutes only in the headings to the appropriate columns;	1	Units may be separated from the variable by a solidus or brackets. For the independent variable accept M or molarity. Dependent variable must be in seconds or minutes. Reject mixtures of units. Students may calculate actual concentrations of sodium chloride solutions after dilution with starch solution, buffer and distilled water. These are acceptable.
Stage 1 Total	3	

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 data processing and the graph

The following criteria should be used to assess the processing of the data.

Marking Guidelines	Mark	Comments
Mean times taken for starch to be digested calculated correctly;	1	Credit should be given if the candidate calculated the rate, and then the mean.
Graph with independent variable, i.e., sodium chloride concentration on x axis and dependent variable, i.e., time (taken for starch to be digested) on y axis;	1	Candidates should not be penalised if they refer to 'sodium chloride' as 'salt'. Allow 1/t if rate plotted.
Appropriate scales selected for both the x and y axes;	1	Scales should be linear and of a size that allows for both accurate plotting and reading of the graph
Both axes labelled and with appropriate units;	1	If graph has 1/t plotted accept a unit of s ⁻¹
All points plotted accurately;	1	If ICT has been used to plot the graph it should be possible to read the points with appropriate precision.
Data presented as a line graph and not extrapolated beyond the range of the data;	1	Points joined with ruled lines unless the candidate's data are such that it is felt intermediate points could be predicted reliably, in which case a line of best fit may be drawn.
Stage 2 Total	6	

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

HBI3T Q14 Written Test: Section A

Question	Marking Guidance	Mark	Comments
1	(So) more accurate/closer to true value;	1	Accept 'more precise' Do not accept 'more reliable' or 'more valid'.
2 (a)	To control pH / to keep pH constant;	1	Do not accept answers which refer to optimum pH for enzymes (in general).
2 (b)	Optimum pH for amylase;	1	Accept answers which describe 'optimum'
3 (a)	To allow them to reach the same temperature as the enzymes / correct temperature / 50°C / to equilibrate;	1	Do not accept to 'remove or control a variable' / 'to keep this factor constant' / 'to give a fair test'. Do not credit 'amount of heat stays the same'.
3 (b)	<ol style="list-style-type: none"> (Amount of) kinetic energy available stays the same / molecules would move at same rate; Same number of collisions / enzyme-substrate complexes formed; Same rate of reaction; Removes/controls a variable; Temperature affects the rate of an enzyme controlled reaction / the rate at which enzymes work; 	2 max	Award one mark if there is no reference to the idea of 'same'
4	Personal judgement of colour change/end point subjective / not quantitative;	1	Accept 'no actual measurement of end point'
5	<ol style="list-style-type: none"> <u>Active site</u> (of amylase) is specific/ complementary; To starch; 	2	Accept as a converse: <ol style="list-style-type: none"> Starch is the only substrate; That fits into the <u>active site</u> (on amylase): Reject any references to the 'same shape'. Reject active site of starch.

6 (a)	<ol style="list-style-type: none"> 1. As the sodium chloride concentration increases the time taken for the reaction decreases, and then increases; 2. Increase starts/minimum at $0.1(\text{mol dm}^{-3})$; 	2	2. Accept change occurring at 30s, i.e., reference to y-axis rather than x-axis.
6 (b)	$0.1 (\text{mol dm}^{-3})$;	1	Units not required for the mark
6 (c)	<ol style="list-style-type: none"> 1. Carry out repeats; 2. At smaller intervals; 3. Either side of optimum / $0.1 (\text{mol dm}^{-3})$; 	2	<p>Credit answers in which the idea of repeat trials is clearly implied in point 1.</p> <p>Credit marking point 3 in terms of actual figures, eg 0.05 to $0.15 (\text{mol dm}^{-3})$.</p>
Section A Total		14	

HBI3T Q14 Written Test: Section B

Question	Marking Guidance	Mark	Comments
7	Weight / mass / portion size;	1	Accept 'amount'
8	Scattergraph / scattergram;	1	
9 (a)	No (no mark) Points appear to be scattered at random / high and low results in urinary calcium with high and low results in calcium intake;	1	The mark is for the reason. It may be expressed in a number of ways. Allow correct ideas however expressed. Accept 'no pattern/no trend'.
9 (b)	Calcium used / retained (by the body); Not all calcium in diet absorbed;	1 max	Accept a valid use for calcium.
10	As the (amount of) sodium in the urine goes up so the (amount of) calcium in the urine goes up / <u>directly</u> proportional;	1	Give credit if variables are the wrong way round, if calcium in the urine goes up so calcium in the diet goes up. Accept 'positive correlation'
11	1. Less salt in diet linked to less salt in urine (probably); 2. Less salt in urine linked to less calcium (lost) in urine; 3. More calcium in the body for stronger/more dense bones; 4. Eat more calcium;	3	Accept converse argument.
12 (a)	Calculate the gradients (of the curve) / find where the curve is steepest;	1	Accept references to 'the line' (of the graph) rather than 'the curve'.
12 (b)	30 to 60 seconds;	1	
12 (c)	Without/no lactose (no mark) Biggest standard deviation;	1	The mark is for the reason. Do not give credit if the incorrect line is chosen.

13	1. Diarrhoea / watery faeces; 2. Excess wind / gas in intestine; 3. Failure/slow to put on weight;	2 max	1. Accept all reasonable spellings for diarrhoea. Accept 'excessive crying' Do not accept 'crying a lot'.
14	(For) 1. (Baby) may not absorb enough calcium on lactose-free milk; (Against) 2. Some babies really are lactose-intolerant; 3. Results in rats may not be the same in humans;	3	2. Credit the idea that some babies really do need lactose-free milk. Do not credit 'other factors may play a part'. Accept no statistical test carried out
15 (a)	Because (lactose-intolerant) rats do (absorb calcium ions more slowly); No lactose in their diet;	1 max	
15 (b)	1. (Lactose-intolerant people are) less likely to volunteer; 2. Symptoms are unpleasant/painful / would cause stomach cramps/diarrhoea/other relevant symptom / would make them ill;	2	
15 (c)	1. No (no mark) can find mean; 2. Yes (no mark) mean values have different levels of reliability;	1 max	
15 (d)	1. To compare (the effect of two diets); 2. To use each person as a control;	1 max	Do not credit to compare the amounts of calcium in their urine.
Section B Total		21	