



General Certificate of Education

Human Biology

Unit 3T AS Investigative Skills Assignment

HBI3T/P11/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
Eg anaphase, the term must appear
Eg 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 again 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 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.

The effect of amylase concentration on the rate of digestion of starch

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 amylase solution' and 'diameter of clear area';	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
(Independent variable) concentration of amylase in first column;	1	If candidate has a first column of well numbers, ignore it and give credit for independent variable in second column
Appropriate units clearly stated, i.e. g dm^{-3} and cm or mm and only in the headings to the appropriate columns;	1	Units may be separated from the variable by a solidus or brackets. Dependent variable must be in either cm or mm. Reject mixtures of units.
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 diameters of clear areas calculated correctly;	1	
Graph with independent variable (<i>amylase concentration</i>) on x axis and dependent variable (<i>diameter of clear area</i>) on y axis;	1	
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 correctly labelled and with appropriate units;	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 line graph and not extrapolated beyond the range of 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
Total 6		

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

SECTION A (18 marks)

Q	Part	Marking Guidelines	Mark	Comments
1		Control; Shows unstained/clear area not due to water (in amylase solution); Shows unstained/clear area is due to amylase;	2 max	Ignore references to "fair test"
2		Reduces chance of random error/anomaly affecting results; Allows identification of anomalies; Provides mean/average;	2 max	
3		So that volume is not a variable/to ensure that only one variable is changed;	1	Ignore references to "fair test"
4		Prevents evaporation/drying out; Prevents contamination/entry of bacteria/microorganisms / microbes/spores/fungi/maintains aseptic conditions;	2	Ignore reference to viruses/germs/bugs
5		Clear areas (may) not (be) circular/diameter may not be same in all directions;	1	
6	a	Starch present/iodine gives blue-black colour with starch;	1	Reject iodine 'colours' starch/starch agar / agar because iodine gives a brown colour
6	b	Starch not present; Amylase diffused into agar; Amylase digests/hydrolyses/breaks down starch; Starch converted to maltose; Maltose does not react with iodine;	3 max	

Q	Part	Marking Guidelines	Mark	Comments
7		Higher concentration difference / gradient (between well and agar); (Faster) diffusion (of amylase into agar); (So) amylase gets further into starch agar / away from well (in the same time); Greater / faster breakdown of starch; More enzyme substrate collisions / more ES complexes / more active sites;	3 max	Note 'higher diffusion gradient' scores both first and second marking points Allow converse argument for lowest concentration of amylase resulting in smallest clear area Ignore references to getting a larger clear area
8	a	Use graph paper / squared paper; Count number of squares; Don't include area of well; OR Measure diameter (of clear area) and calculate area; Use πr^2 (to find area); Subtract / take away area of well;	2 max	
8	b	Area is more accurate / more valid measure (than diameter) of amount of digestion / starch breakdown;	1	Ignore references to being easier

SECTION B (17 marks)

Q	Part	Marking Guidelines	Mark	Comments
9		Starch from potato <u>and</u> glycogen digested faster by amylase from saliva; Starch from maize digested faster by amylase from pancreatic juice; Glycogen digested faster by amylase from saliva;	2 max	Accept converse statements Accept correct comparisons quoting figures from table
10	a	More KE / kinetic energy / molecules move faster; More frequent collisions between active site and substrate / more ES complexes formed; Rate of enzyme activity greater / enzymes work faster; Enzymes denatured at <u>high</u> temperature;	2 max	Accept description of denatured (as a permanent change in shape)
10	b	Use (thermostatically controlled) water bath / incubator;	1	
10	c	Substrate concentration / volume of substrate (solution); Enzyme concentration / volume of enzyme (solution); Source / variety / type of polysaccharide / substrate;	2 max	Ignore unqualified references to 'amounts'
11	a	Different optimum pHs / amylase from saliva lower optimum pH / amylase from pancreas / pancreatic juice higher optimum pH; Maximum rate of reaction of amylase from saliva greater than maximum rate of reaction of amylase from pancreas / pancreatic juice;	2	Numerical values are not required but accept answers giving values from graph that correctly illustrate different optimum pHs or rates of reaction Accept converse statement for second marking point
11	b	Different (lengths / pieces / sections of) DNA / different base sequences; Code for different RNA; Different amino acid sequences / different <u>primary</u> structures / different <u>tertiary</u> structures;	2 max	Accept mRNA, but reject other named RNA

Q	Part	Marking Guidelines	Mark	Comments
12		147 ;; OR 59.5 / 60 ;;	2	The first answer is the difference as a percentage of healthy group value, the second as a percentage of the cystic fibrosis group value. Either is acceptable for 2 marks. If answer incorrect but working shows $84 - 34 = 50$, $\frac{50}{84} \times 100 = 59.5$ or $\frac{34}{84} \times 100 = 40.5$ allow 1 mark
13	a	(Yes) standard deviations do not overlap;	1	Accept (error) bars do not overlap
13	b	So only one variable / so only variable / difference is cystic fibrosis;	1	Ignore references to any other named variables
14		More starch digested (in mouth); (Compensates for) less amylase in pancreatic juice / in small intestine (in cystic fibrosis); Pancreatic duct blocked in cystic fibrosis; Less digestion of starch in small intestine (in cystic fibrosis);	2 max	