



General Certificate of Education

Human Biology

Investigative Skills Assignment

HBI3T/Q09/MG

Marking Guidelines

2009 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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The Marking Guidelines should be read in conjunction with "Guidance for teachers marking Human Biology ISAs"

Guidance for teachers marking Human Biology ISAs

General principles

In general, you are looking for evidence that the candidate knows and understands the fact, principle or concept 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
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 candidate's answer
- 'Accept' and 'reject' show answers which should be allowed or not allowed.
- Additional instructions are shown in *italics*
- '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 candidate will give a biologically correct answer that is not present 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 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 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 the teacher 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.

For example, if in answer to 'Name **two** products of photosynthesis' a candidate 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.

Stage 1**Assessment of 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.

Data presented clearly with full descriptions of both the independent and dependent variable (e.g. 'temperature' and 'time taken for all starch to be digested'); <i>This may be recorded either by a full title or by complete headings at the top of the table. (e.g. If 'time' only is recorded in the table, the title should/must give more detail by reference to the colour change/digestion of the starch).</i>	1
Independent variable (e.g. temperature) in first column;	1
Units clearly stated and only in the heading to the appropriate columns; <i>(Time must be measured in appropriate units e.g. minutes or seconds, not a combination of both.)</i>	1
	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 processing**

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

Mean values calculated correctly;	1
Additional calculations carried out correctly (e.g. rate of digestion of starch);	1
Graph has independent variable (e.g. Temperature) on x axis and dependent variable (e.g. rate of starch digestion or time taken for colour change to occur) on y axis;	1
Appropriate scales selected for the x and y axes; <i>These scales should allow for both accurate plotting and reading of the graph.</i>	1
Both axes correctly labelled with appropriate units;	1
All points plotted accurately; <i>If ICT has been used to plot the graph, it should be possible to read the points with appropriate precision.</i>	
Data presented as a line graph; <i>For line graphs, depending on the data obtained by the student,</i> <ul style="list-style-type: none"> • <i>points should be joined with a curve of best fit if it is felt that intermediate values are likely to fall on such a curve</i> • <i>alternatively, all points should be joined with straight lines if it is felt that the position of intermediate points cannot be predicted reliably.</i> 	1
	Total 7

SECTION A**Question 1**

To maintain constant pH; 1

Question 2

To maintain constant temperatures of all solutions; 1

Question 3

To allow them to equilibrate / to have time to reach reaction temperature; 1

Question 4

Yes (no mark)

To avoid any fluctuations in room temperature;

OR

No (no mark)

I monitored room temperature and found it remained more or less constant; 1

Question 5

The black colour disappeared/red-brown colour appeared;
Compare it with a solution of iodine and amylase; 2

Question 6

Plot a graph of time against temperature;
Draw a line of best fit;
Extrapolate graph to 5 °C and read off time; 3

Question 7

9 cm³ (water) and 1 cm³ (amylase solution); 1

Question 8

Yes (no mark)

Would act as a control / could check that effect was only due to amylase; 1

Question 9

Time is continuous variable / not a categoric variable; 1

Question 10

Variability about the mean / how spread out the results are; 1

Question 11

High temperature denatures enzyme / amylase;

Changes shape of active site;

No enzyme-substrate complexes made starch or substrate no longer fits in the active site;

3

Question 12

Carry out at lower temperature;

Increase concentration or volume of starch solution;

Reduce concentration or volume of amylase solution;

Take samples at shorter time intervals;

max 2

SECTION B**Question 13**

Any combination of mass and volume / units of enzyme activity per given volume; 1

Question 14

Amylase / enzyme concentrations in blood higher in people with pancreatitis / lower in healthy people;
Tissues of pancreas broken down;
Allowing enzymes to be secreted into blood instead of into gut; 3

Question 15

To avoid bias / so that the researcher did not influence the results; 1

Question 16

Bigger spread about the mean and more amylase in blood; 1

Question 17

So no (net) gain / loss of water from tissues;
By osmosis;
Would damage tissues of volunteers; max 2

Question 18

38%;;
 $790 - 490 = 300$ OR $\frac{300}{790} \times 100$; 2

Question 19

Not important – possible to compare means with samples of different sizes;
OR
Important – difference in reliability of mean if some samples small and others large; 1

Question 20

No idea of number of people involved;
No idea of level of disease;
No idea of duration of improvement;
No idea about side effects;
Results very similar, error bars overlap;
Was more effective in this trial, mean lower;

max 3

Question 21

Damaged pancreas producing less enzyme/obstruction of pancreatic duct / more of the enzyme going into the blood;

1

Question 22

Increase amount of chymotrypsin in faeces of pancreatitis sufferers compared with those untreated;
Have similar effects on levels of chymotrypsin in sufferers;
Drug **Y** slightly more effective than drug **X**;

max 1