



General Certificate of Education

Human Biology

Unit 3T AS Investigative Skills Assignment

HBI3T/P10/MG

Marking Guidelines

2010 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

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.

The effect of different concentrations of sodium chloride solution on the percentage change in mass of carrot tissue

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

Data presented clearly with full descriptions of both the independent variable (<u>concentration</u> of sodium chloride (solution)) and dependant variable (mass/weight of carrot (discs)); <i>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</i>	1
Independent variable (sodium chloride) in first column;	1
Appropriate units clearly stated and only in the heading to the appropriate columns; <i>Accept solidus or brackets to separate units from headings</i>	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.

Percentage changes in mass calculated accurately;	1
Graph with independent variable (NaCl conc) on x axis and dependent variable on y axis;	1
Appropriate scales selected for both x and y axes; <i>Scales should be linear and of a size that allows for both accurate plotting and reading of the graph</i>	1
Both axes correctly labelled and 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>	1
Data presented as a line graph and not extrapolated beyond the range of the data; <i>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</i>	1
Total 6	

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

SECTION A (17 marks)

Q	Part	Sub Part	Marking Guidelines	Mark	Comments
1			So all the cylinders had the same/similar water potential/same water content/same salt content/same concentration of dissolved substances; OR Different tissues/areas might have different water potentials/different water/salt content/concentration of dissolved substances;	1 max	Accept concentration of dissolved substances

Q	Part	Sub Part	Marking Guidelines	Mark	Comments
2			Size of carrot/cortex/number of cylinders that could be cut (from the carrot); Time taken to cut cylinders; Large enough mass to give measurable/significant change; Leave enough space for solution/size of tube; Prevent stacking/sticking together;	2 max	

Q	Part	Sub Part	Marking Guidelines	Mark	Comments
3			Allows comparison/shows proportional change; Not all cylinders have same mass/weight initially;	2	

Q	Part	Sub Part	Marking Guidelines	Mark	Comments
4			Different places different temperatures/so all tubes/samples at same temperature; Rate of osmosis/diffusion affected by temperature; Named physiological process that would affect water potential or mass (e.g. production of sugars from starch/ion transport/respiration) affected by temperature;	2 max	Ignore unqualified reference to enzymes

Q	Part	Sub Part	Marking Guidelines	Mark	Comments
5	a	i	Straight line of best fit; OR Smooth curve of best fit/ruled lines point to point;;	2 max	Award 1 mark for straight line of best fit
5	a	ii	Accurate reading of value where line/curve crosses x axis given as a value between 0.235 and 0.27;	1	Accept value from candidates own curve
5	b		(Water potential of plant tissue) same as external solution/ value given in (a);	1	
5	c		Same rate/amount of movement into and out of cells/tissues; No (net) gain/loss of water;	2	
5	d		Changes in mass are due to loss of water; By osmosis; Cells/tissues lose water when in solution of lower/more negative water potential;	3	
5	e		Student data/graph does not use percentage change;	1	

SECTION B (18 marks)

Q	Part	Sub Part	Marking Guidelines	Mark	Comments
6	a		Haemoglobin;	1	
6	b		Water potential of (red blood) cells lower/more negative than distilled water/surrounding liquid; Water enters (red blood cells) by osmosis; (Red blood) cells burst/haemolysis; Haemoglobin/substance/pigment released;	3 max	
6	c	i	Difference in water potential/water potential gradient between (red blood) cells and surroundings becomes less; Less water enters (red blood cells); Fewer cells burst/release haemoglobin/substance/pigment/less haemolysis;	3 max	
6	c	ii	All cells have burst/total haemolysis/all haemoglobin has been released;	1	
6	d		0.9%; No haemolysis/no haemoglobin/substance/pigment released/ no cells burst (at this concentration);	2	Accept values between 0.9 and 1.0

Q	Part	Sub Part	Marking Guidelines	Mark	Comments
7	a		6;;	2	If answer incorrect but calculation shows amount of sodium chloride in 100 g % of GDA allow 1 mark
7	b		Yeast extract; $(9.6 \times 4 = 0.384)$ 100	1	

Q	Part	Sub Part	Marking Guidelines	Mark	Comments
8	a		Smoking/BMI/body weight/(blood) cholesterol/race/family history/level of activity/occupation; (Factor) might influence death rate/(CHD/vascular) disease rate/susceptibility to/probability of (CHD/vascular) disease;	2	Ignore references to 'fair test' or 'confounding variable'
8	b		Lower salt intake group has lower death rate; Greatest reduction/effect in CHD; Supported by suitable calculation (e.g. CHD death rate in low salt group = $1.00 \times \frac{1.55}{1.55}$)	2 max	Accept converse for higher salt intake group

Q	Part	Sub Part	Marking Guidelines	Mark	Comments
9			Salt lost in sweat/sweat is salty/(isotonic drink) will not lower water potential of blood/replace salt lost in sweat;	1	