General Certificate of Education

Human Biology

Unit 3T AS Investigative Skills Assignment

HBI3T/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.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX.

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 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
  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'.

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 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 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 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.

Investigation into whether length of the lower arm can be used to predict height of a person

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 variable ('length of lower arm') and the dependent variable ('height');	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 (ie length of lower arm) in first column;	1	
Appropriate units clearly stated, ie cm or mm and only in the heading to the appropriate columns;	1	Units may be separated from the variable by a solidus or brackets. Units must be 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
Graph with independent variable, *Length of lower arm*, on x axis and dependent variable, *Height*, 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 a scattergraph;	1	Ignore any curve drawn
	Total 5	

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

Section A (17 marks)

Q	Part	Marking Guidelines	Mark	Comments
1		Height as investigation was to see if it could be predicted from lower arm length / height as it depends on the first variable measured;	1	The mark is for the reason, not the choice of 'height'
2	a	Upper arm / elbow not against wall / thickness of sleeve / some upper arms bare, some in sleeves; (May be) bending at wrist / of fingers; Parallax error / difficulty of reading position of fingertips against scale / metre rule;	2 max	Ignore references to mm being too small / too difficult to read scale
2	b	Thickness of socks; Whether standing up straight; Thickness / 'depth' of hair;	2 max	
3		Age; Sex; Race / ethnicity; Genes / heredity / dwarfism; Physical abnormality / deformity / curvature of spine; Posture; Nutrition;	2 max	Accept any named physical abnormality or deformity affecting height
4		So bottom of book / line between top of head and wall / height gauge horizontal / at right angles to wall / so height measured accurately;	1	
5		Removes effect of gravity / compression / slouching / stooping; Easier <u>to measure tall person/people</u>;	1 max	Ignore references to 'easier' if unqualified

Q	Part	Marking Guidelines	Mark	Comments
6		Yes because, (Can be used reliably as) height proportional to lower arm length / can plot line graph / can draw trend line; OR No because, (Cannot be used reliably as) results scattered / not proportional / cannot plot straight line / smooth curve through points / cannot draw trend line / data clumped / size range (of persons measured) too small; Example(s) quoted from data to support statements;	2 max	Candidates' statements should be checked against their data / graph No mark for 'yes' or 'no'
7	a	Scattergraph / scattergram / scatter diagram;	1	
7	b	Positive correlation;	1	Accept description of positive correlation, ie, as height increases, so does arm span Ignore proportional / directly proportional
7	c	Yes, (no mark) Large number of points increases reliability / reduces effect of anomalies / makes anomalies easier to spot; Allows trend to be seen; No, (no mark) Sample not large compared to whole population; So trend not clear / not reliable;	2	If candidate quotes number of points as > 30 accept as equivalent to 'large number of points'
7	d	(Some subjects') arms may not be held horizontal / fully extended / straight / fingers not extended; Includes width of shoulders (which may vary independently); No table or bench to hold arms out straight / horizontal;	2 max	

Section B (19 marks)

Q	Part	Marking Guidelines	Mark	Comments
8		1: 4 ;;	2	Ignore any units given If answer is incorrect but working shows $\frac{41.83}{167.32}$ give 1 mark Award 1 mark for answer 4:1
9	a	*Australopithecus* shorter than *Homo*; *Australopithecus* height increased (over time); *Homo* did not (significantly) increase in height;	2 max	Accept converse answer, ie, *Homo* taller than *Australopithecus*
9	b	Multiplied 35.8 / mean femur length (of *Australopithecus* 1.5 – 1.9 million years ago) by 4 / by ratio of femur length to height (from **Figure 2** / from Question 8);	1	
9	c	Ratio of femur length to height might be different in *Australopithecus* (from ratio in modern humans) / *Australopithecus* may have different body proportions (from modern humans); *Australopithecus* may not have been (fully) upright; Small sample size / gaps in fossil record; Fossils may not have been representative (of *Australopithecus* population) / different species of *Australopithecus*;	2 max	Ignore any reference to candidate finding difficulty with / suspecting error in calculation

Q	Part	Marking Guidelines	Mark	Comments
10		Range only records highest and lowest values / range greatly affected by outliers; Range gives no information about distribution of (rest of) data; Standard deviation gives information on spread of data about mean / uses all data / reduces effect of anomalous data;	2 max	
11	a	(Heavier have) smaller surface area to volume ratio; (Heavier) lose less / conserve more heat; **OR** (Heavier have) more fat; (Heavier) better insulated / more energy reserves; **OR** (Heavier have) more muscle; And heat generated / released / produced;	2 max	Each pair of marking points is linked. A candidate can be awarded marks from one pair only Accept SA / vol ratio or SA / V ratio
11	b	(Do not support theory because) heavier mean body size at lowest altitude / in warmer conditions; Standard deviations of 100 m and 3500 m do not overlap (so difference significant); Standard deviations of 100 m altitude and 2500 m altitude populations overlap / standard deviations of 2500 m and 3500 m altitude populations overlap; Greater difference between (means of) 2500 m and 3500 m altitude populations than between 2500 m and 100 m altitude populations;	2 max	
11	c	Diet / nutrition; Genes / heredity / race; (Level of) physical activity; Oxygen availability (less O_2, less respiration, less growth); Disease;	1 max	

Q	Part	Marking Guidelines	Mark	Comments
12	a	Percentage (with diabetes) greater with increased mass / weight and age; At younger age percentage slightly / one-third higher in overweight group than normal group and / but percentage much higher in obese group; At older age normal and overweight have same percentage and / but obese higher; Normal weight: percentage with diabetes double in older group (*cf* younger group); Obese: percentage with diabetes (only) slightly higher in older group (*cf* younger group); Obese (may be) more likely to become diabetic at earlier age;	3 max	Where 'and' and 'but' are underlined, both elements of the answer are required
12	b	No (no mark) Correlation does not prove cause / causation; There may be some other (risk) factor involved (which causes / increases risk of both obesity and diabetes); It may be diabetes that causes / increases risk of obesity;	2 max	