AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Education

Human Biology
Investigative Skills Assignment

HBI3T/P09/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.

Set and published by the Assessment and Qualifications Alliance.

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
- <u>Underlining</u> of a word or phrase means that the term <u>must</u> be used
  Eg <u>anaphase</u>, the term must appear
  Eg ...... <u>and</u> ...., both items must be present for a mark
  Eg '<u>active site and substrate have complementary shape</u>', 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 Λ symbol, and to highlight irrelevancies or contradictions by underlining. It is also helpful to write <u>brief</u> 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.

<u>Disqualifiers</u> 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.

<u>The list rule</u> 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.

<u>Spelling</u> 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. 'exercise' and 'pulse rate'); *This may be recorded either by a full title or by complete headings at the top of the table. (e.g. If 'exercise' only is recorded in the table, the title must give more detail by reference to the duration of the exercise.)*	1
Independent variable (e.g. exercise) in first column;	1
Units clearly stated and only in the heading to the appropriate columns; *(Time must be measured in appropriate units e.g. minutes or seconds, not a combination of both.)*	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 recovery);	1
Graph has independent variable (e.g. exercise) on x axis and dependent variable (e.g. rate of recovery or heart rate after x seconds) on y axis;	1
Appropriate scales selected for the x and y axes; *These scales should allow for both accurate plotting and reading of the graph*	1
Both axes correctly labelled with appropriate units;	1
All points plotted accurately; *If ICT has been used to plot the graph, it should be possible to read the points with appropriate precision.*	1
Data presented as a line graph; *For line graphs, depending on the data obtained by the student,* • *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* • *alternatively, all points should be joined with straight lines if it is felt that the position of intermediate points cannot be predicted reliably.*	1
	Total 7

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

SECTION A

Question 1

Wait until pulse rate returns to resting rate;
2 consecutive readings the same / within 5 beats of the resting pulse
rate / continuously monitored until it did;   2

Question 2

Yes, all results clumped around the same figure / the mean;   2
Quote relevant figures;
OR
No, figures fairly widely spread out;
Quote relevant figures;
(Ignore refs to repeats e.g. insufficient time for repeats)

Question 3

(To monitor means) to check the levels;
(To control means) to keep constant;   2

Question 4

Hard to count accurately for 30 seconds / pulse rate might change over
30 seconds; *Accept converse for 10 seconds*
Error in counting magnified more at 10 seconds because error is   2
multiplied × 6; *Accept converse for 30 seconds*

Question 5

Stroke volume;
Cardiac output = heart rate × stroke volume;   2

Question 6

More impulses down sympathetic nerve;
To pacemaker / sino-atrial node / SAN;   2

Question 7

Dropped (rapidly) <u>and</u> levelled off after / at 50 seconds;   1

Question 8

Large differences in individual responses to exercise / related to fitness, so
wide variation in pulse rate immediately after exercise;   2
Resting pulse rates are similar;

Question 9

To calculate a more reliable mean / reduce the effect of anomalies /
outliers / extremes;
Accept statistical calculations / make statistical calculations valid;
Reduce effects of difference in size / gender;   max 1

Question 10

Can read it at any time interval;
No delay when finding pulse / pulse might be hard to find;
Pulse rate may change during period of taking by hand;
No risk of miscount;
Could be linked to data logger;
Will record the data in the same way every time;   3 max

SECTION B

Question 11

Athletes always lower than non-athletes / athletes level off at a lower value;
Relevant figures quoted;
Both show rise then level off;   max 2

Question 12

To allow comparison / to eliminate the different masses of athletes;   1

Question 13

Range only records highest and lowest values / gives no information about
distribution of the rest of the data;
Standard deviation gives comment on distance from the mean / uses all the
data / eliminates the effect of anomalous data;
Range shows lower value for non-athletes was above highest value for athletes;
SD shows data more spread out from mean for non-athletes than for athletes;   max 3

Question 14

Hearts become stronger / develop more muscle;
Hearts have larger stroke volume;
So need lower heart rate to pump the same volume of blood;   max 2
Accept converse for answers relating to hearts of non-athletes;

Question 15

27/27.5(%);;   OR $1.4/5.1 \times 100$;   max 2

Question 16

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 17

Oxygen needed for <u>aerobic</u> respiration / ATP production;
Muscle contraction requires energy;
More red blood cells provide greater surface area to take up oxygen;
More haemoglobin per red blood cell increases diffusion gradient into red
blood cells;
Oxygen uptake by diffusion;   4 max