General Certificate of Education

Biology
Investigative Skills Assignment

BIO3T/Q09/MG

Marking Guidelines
2009 examination – June series

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.

Guidance for teachers marking 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 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 i.e. 'sucrose concentration ' and 'distance moved by the drop in 30 seconds'; *This may be recorded either by a full title or by complete headings at the top of the table. (e.g. If 'concentration' and/or 'distance' only recorded in the table, the title should give more detail by reference to sucrose and the time the distance relates to.)*	1
Independent variable (concentration of sucrose) in first column;	1
Units clearly stated and only in the heading to the appropriate columns; *Although AQA uses the IOB convention of separating the units by a solidus (/), credit should not be awarded or withheld for the way in which they are presented, provided they are clear.* *(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.

Rate of rise or fall of the drop calculated correctly;	1
Mean values of either rate of rise or fall of the drop or distance moved by the drop in 30 seconds calculated correctly;	1
Graph has independent variable (sucrose concentration) on x axis and dependent variable (rate of rise or fall of the drop or distance moved by the drop in 30 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 including use of solidus(/); *(Accept brackets instead of solidus)*	1
Mean values plotted. 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; *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 produced is required for moderation and must be attached to the ISA test.

SECTION A

Question 1

So that equilibrium is reached / no further change in density/concentration;
To obtain a large change in density/concentration;   2

Question 2

To reduce/prevent evaporation/loss (of water from the tissue/cells);
Loss of water <u>from the cells/tissue</u> would change initial water potential;   2
*(For the second mark to be awarded there must be reference to the cells/
tissue)*

Question 3

Answer which refers to variation in data collected for at least one value of
sucrose concentration e.g. two repeats sufficient if both measurements very
similar/three repeats if first two measurements are not consistent;   1

Question 4

Mean value with largest range of raw data measurements;   1

Question 5

(a) The rate of movement decreases then increases;
     Rate gradually slows after 0.35; *(accept a value between 0.30 and 0.4)*
     Zero at 0.25;   2 max

(b) 0.1 to 0.25 mol dm^{-3} sucrose;
     Water potential lower (more negative) in potato/higher in sucrose
     solution;
     So water enters potato due to osmosis;
     Loss of water from surrounding solution increases concentration/
     density;   3 max

Question 6

(Water potential of 0.25 mol dm^{-3} sucrose is) $-$ 680 kPa;
At 0.25 mol dm^{-3} there is no change in density as no difference in water
potential/no <u>net</u> movement of water into or out (of the potato tissue);   2

Question 7

Dye gradually disperses into solution;
Drops of different sizes move at different speeds;
Variation in water potential of potato cells;
Temperature not constant;
Drop moves too quickly to measure distance/time accurately;   2 max

Total 15

SECTION B

Question 8

(a) Inverse correlation between ORS use and deaths from diarrhoea/as
number of packets of ORS used rises the number of infant deaths falls;   1

(b) Not possible to infer a causal relationship from a correlation;
May be some other factors causing fall in infant deaths;   2

Question 9

It would be unethical to withhold treatment when it is available as lack of
treatment may cause suffering/death;   1

Question 10

They require alterative treatment/intravenous drips;
Investigation should not put children at greater risk (than recommended
available treatments);   2

Question 11

To avoid bias / so they could be analysed statistically;   1

Question 12

Increase/no loss in body mass;
Over a specified time period/during course of treatment;   2

Question 13

(a) Large variation in mean change in body mass;   1

(b) In some children the body mass decreased / stayed the same
(over the study period);   1

Question 14

(a)   Experimental group – faecal output decreases over the 4 hours;
      Control – initially (first 2 hours) faecal output decreases, but then
      increase during the next 2 hours,
      Lower at all values;
      Falls all the time;   2 max

(b)   Rice-based ORS has higher (less negative) water potential than blood;
      So water uptake from intestines by osmosis;

      OR

      Standard ORS has lower (more negative) water potential than blood;
      So water enters intestines by osmosis;   2

Question 15

Rice-based just as effective/better in treating dehydration;
As body mass gain similar/greater during hospital stay;
Better over first 5 hours;   2 max

Question 16

Cholera toxin causes loss of chloride ions into intestines;
Sodium/chloride ions in intestine lowering water potential;
Resulting in water movement by osmosis from blood to intestines;   2 max

                                                                 Total 19