



General Certificate of Education

Human Biology

Unit 3T AS Investigative Skills Assignment

HBI3T/Q10/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 the intensity of exercise on breathing rate

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 (time/interval between standing/sitting) and dependant variable (breathing rate); <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 in first column (e.g. time intervals used);	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.

Graph with independent variable (number of standings/sittings per minute or interval/time between standings/sittings) on x axis and dependent variable (breathing rate) on y axis;	1
Appropriate scales selected for both the 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; <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 5	

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

SECTION A (18 marks)

Q	Part	Sub Part	Marking Guidelines	Mark	Comments
1			Breathing rate might be different when standing and sitting/posture might affect breathing rate;	1	<i>Ignore references to being tired</i>
Q	Part	Sub Part	Marking Guidelines	Mark	Comments
2			(How long it took for) breathing rate; To return to normal/resting;	2	
Q	Part	Sub Part	Marking Guidelines	Mark	Comments
3	a		Reduces chance of random error/anomaly/variation affecting result; Allows identification of anomalies; Allows calculation of average/mean;	2 max	
3	b		Fatigue/get tired which could affect breathing rate; Not enough time to repeat whole investigation/all time intervals;	1 max	
Q	Part	Sub Part	Marking Guidelines	Mark	Comments
4			Group A : over one minute/longer period breathing rate will be falling/difficult to maintain count over one minute; Group B : over 20 seconds/shorter period any error in counting is multiplied (x3)/ shorter period small count;	2	<i>Ignore references to error in/difficulty of calculation</i>

Q	Part	Sub Part	Marking Guidelines	Mark	Comments
5	a		61.7/62(%);;	2	<i>If answer incorrect but identifies resting rate as 14.1 and fastest as 22.8 or difference between resting and fastest rate as 8.7 allow 1 mark</i>
5	b		Different body mass/weight/BMI; Different fitness/exercise patterns; Smoker/non-smoker; Different sexes; Different ages; State of health (e.g. cold/asthma/hayfever);	3 max	
Q	Part	Sub Part	Marking Guidelines	Mark	Comments
6	a		Remove excess CO ₂ /supply more O ₂ /allow faster respiration;	1	
6	b		Rise in CO ₂ /fall in pH in blood; Detected by receptors in medulla/aortic bodies/carotid bodies; Impulses to medulla/respiratory centre; More impulses down phrenic/ <u>intercostal</u> nerves; To inspiratory muscles/ <u>intercostals</u> /diaphragm;	3 max	<i>Reject message/signal once</i>
Q	Part	Sub Part	Marking Guidelines	Mark	Comments
7			Increase depth of breathing;	1	

SECTION B (18 marks)

Q	Part	Sub Part	Marking Guidelines	Mark	Comments
8			Can provide continuous measurement/measurement whilst activity taking place; No risk of miscount; No chance of breathing rate being affected by conscious thought; Could be linked to data logger/output could be analysed by computer;	2 max	<i>Ignore more accurate</i>

Q	Part	Sub Part	Marking Guidelines	Mark	Comments
9	a		8;; If answer incorrect but 2 points correctly identified on straight part of ascending section of curve (i.e. between 80s/16 breaths per minute and 180s/28 breaths per minute) allow 1 mark	2	<i>Allow values between 7.8 and 8.2</i>
9	b		300 seconds /from 180 to 480;	1	<i>Allow any answer from 288 to 312, or an answer in terms of from 180 to any value between 468 and 492</i>

Q	Part	Sub Part	Marking Guidelines	Mark	Comments
10	a		(Group) X rises more/ (Group) Y rises less; Group Y levels off sooner/at a lower level after six minutes/ Group X levels off later/at a higher level/Group Y levels off but Group X doesn't;	2	
10	b		Variation (about the mean);	1	

Q	Part	Sub Part	Marking Guidelines	Mark	Comments
10	c		Group Y, because they have a lower starting/resting breathing rate/smaller increase in breathing rate;	1	
10	d		Carry out similar amount of work/exercise; (similar oxygen uptake required for) similar amount of respiration; OR Individuals may vary in depth of breathing/different tidal volumes; Individual may have greater blood flow to lungs/better pulmonary circulation; Oxygen uptake by blood/gas exchange may be more efficient in some individuals;	2 max	
Q	Part	Sub Part	Marking Guidelines	Mark	Comments
11	a		Constant up to 15 km h^{-1} ; Then increases;	2	
11	b		At lower speeds/below $16/17 \text{ km h}^{-1}$ aerobic respiration (supplies energy); At higher speeds/ above $16/17 \text{ km h}^{-1}$ anaerobic respiration (as well); Anaerobic respiration produces lactate; At higher speeds lungs/circulatory system cannot provide any more O_2 ;	3 max	
Q	Part	Sub Part	Marking Guidelines	Mark	Comments
12			Longer distance = more lactate produced; Lactate needs O_2 for removal; More lactate produced requires more O_2 for removal/greater O_2 debt to be repaid;	2 max	