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General Certificate of Education (A-level)
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Human Biology HBI3T/P13

(Specification 2405)

Unit 3T: Investigative and Practical Skills

Final

Marking Guidelines

These Marking Guidelines are prepared by the Principal Moderator and considered, together with the relevant questions, by a panel of subject teachers.

Further copies of these Marking Guidelines are available from: aqa.org.uk

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Guidance for teachers marking Human Biology ISAs

General principles

In general, you are looking for evidence that the student knows and understands the fact, principle or concept required by the Marking Guidelines.

It is important to mark what the student 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 student's answer
- 'Accept' and 'reject' show answers which should be allowed or not allowed.
- '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 student 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 student 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 student'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 student 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 student 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 students from gaining full marks from a list of right and wrong answers. For example, if in answer to 'Name **two** products of photosynthesis' a student 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.

HBI3T P13 Investigating the effect of time of day on mitosis

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
Candidates own data presented clearly in columns;	1	Do not penalise the sequence of the columns. They may be allowed credit in either order.
Data presented clearly with full descriptions of which cells had been counted i.e., 'number of cells counted' and 'number of cells in mitosis;	1	This may be recorded either by a full title for the table or by complete headings at the top of each column in the table. Accept 'number of cells showing chromosomes' / 'dividing'. Do not credit 'number of cells' unless there is a full title for the table.
Stage 1 Total	**2**	

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
Percentage of cells calculated correctly for supplied data, answer is 12.7;	1	Accept 12.71 Percentage of cells calculation is only for teacher's data. There is no mark for calculating percentage of cells from candidates' own data.
Graph with independent variable (time of day cells were collected) on x axis and dependent variable (percentage of cells in mitosis) on y axis;	1	Candidates should be penalised if they plot raw data, i.e., a cell count, rather than a percentage.
Appropriate scale selected for the y axis;	1	Scale should be linear and of a size that allows for both accurate plotting and reading of the graph.
Both axes labelled appropriately 'percentage of cells (in mitosis)' and 'time of day';	1	Credit may be given for 'number of cells' rather than 'percentage'.
Both values 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 bar graph;	1	Credit should only be given if there is a gap between the columns. Candidates should be penalised if they have joined the tops of the bars.
Stage 2 Total	**6**	

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

HBI3T P13 Written Test: Section A

Question	Marking Guidance	Mark	Comments
1 (a)	1. Denatures proteins/enzymes; 2. Damages membranes/ organelles; 3. Stops respiration / stops them respiring;	1 max	
1 (b)	Stops mitosis / division;	1	Accept: 1. Get a single layer of cells 2. So that chromosomes / nuclei can be seen
2	Growth involves mitosis;	1	
3	1. Get a single layer of cells; 2. So that chromosomes/nuclei can be seen;	1 max	1. Accept 'make the layer of cells thinner' ***OR*** 'to let the light through'
4	Chromosomes become wider / (super-)coiled / condensed;	1	Accept any form of widening Ignore any reference to length
5 (a)	Interphase;	1	Accept G1 / G2 / S phase
5 (b)	Replication (of DNA);	1	Accept a description of DNA replication. Accept translation of DNA (or any accurate description of this) which also "happens to DNA" during interphase.
6	To allow for different numbers of cells to be counted;	1	Do not allow unqualified references to making comparisons.
7	1. Means are different; 2. Standard deviations overlap; 3. Data in numbers of cells, not percentages; 4. Size of sample / number of fields of view unknown;	2 max	Ignore references to validity or reliability if the answer clearly shows signs of comparison listed in points 1-4 which can be rewarded.

8 (a)	At the equator / middle of cell / on the spindle;	1	
8 (b)	7.3;	1	
8 (c)	4525 (seconds);;	2	Award one mark if working shown (83.8/100)x90 x60; Award one mark if correct answer is expressed in minutes (75.42 minutes) or 75 minutes 25 seconds; Do not accept 75 minutes 42 seconds
8 (d)	0.3;;	2	Award one mark if working shown 259/863;
	Section A Total	**16**	

HBI3T P13 Written Test: Section B

Question	Marking Guidance	Mark	Comments
9	As amount of retinyl palmitate used increases time taken to develop cancer decreases / cancer develops faster / shows a negative correlation;	1	Accept answers which make correct reference to inverse proportionality
10	1. Make the mean more reliable; 2. Make it easier to spot anomalies; 3. Reduce the effect of anomalies; 4. Reduces influence of chance (events); 5. Compensates for (genetic) variation in animals used;	2 max	1. Answers must refer to the mean 2. & 3. Reject answers that suggest disregarding anomalies. Reject answers that suggest the numbers of anomalies is reduced. 4. Accept 'to carry out a statistical test'
11 (a)	1. Are mammals / likely to behave in a similar way to humans / have a similar physiology to humans; 2. Easy/cheap to keep / live together in colonies in laboratory / don't take up much space;	1 max	
11 (b)	Could cause cancer / kill;	1	
12	1. To check if they would get cancer without it (retinyl palmitate); 2. To check on the effect of it (retinyl palmitate) on the skin;	2	1. Accept 'tumours' 2. Accept 'to check for side effects' Ignore any references to 'placebo' or 'controls' without qualification given in points 1 or 2.

13	1. Does not cause cancer; 2. Does prevent damage to skin from UV light; 3. Non allergenic/will not cause allergy/rash;	2 max	1. Accept 'tumours' 2. Accept 'sunlight' 3. Ignore references to cosmetic or handling effects.
14 (a)	16.00;	1	Accept '4 o'clock' or '4pm'
14 (b) (i)	Two hours;	1	Accept approx.120 minutes.
14 (b) (ii)	8.3 (percent);	1	Accept answers calculated correctly but based on candidates incorrect answer to question 14bi
15	1. Only one patient / need a large number of results; 2. Cannot calculate a mean; 3. Can only calculate standard deviation of a mean value;	2 max	
16	1. Can break away; 2. Can spread to other areas of the body; 3. Can give rise to secondary tumours/ growths/cancers;	2 max	Award 2 marks for 'can metastasise'
17	1. (Best time) around 16.00 2. Greatest difference in mitotic index; 3. Least radiation needed (for greatest effect); 4. Least damage to healthy cells; 5. Most damage to cancer cells;	4 max	1. Accept '4 o'clock or 4pm' or 'late afternoon'
	Section B Total	**20**	