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General Certificate of Education (A-level)
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Human Biology HBI3T/P12

(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/P12 TASK

The effect of different concentrations of sodium chloride solution on the rate of osmosis through an artificial membrane

Stage 1: Assessment of the presentation of raw data table

Students 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 'Volume of sodium chloride solution and volume of water' or 'Concentration of sodium chloride solution' and dependent variable 'Volume of liquid taken from (Visking) tubing / volume of solution in (Visking) tubing';	**1**	This may be recorded either by a full title or by complete headings at the top of the table (e.g. If 'Volume' only is recorded in the table, the title should/must give more detail by reference to the nature of the solution). Do not accept 'amount' in this context.
Independent variable, concentration of sodium chloride/salt solution in first column;	**1**	
Appropriate units clearly stated, cm^3 and mol dm^{-3},and only in the heading to the appropriate columns;	**1**	Units may be separated from the variable by a solidus or brackets. Accept ml.
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
Mean volume (of solution/liquid taken from Visking tubing) calculated correctly;	**1**	Units may be assumed to be the same as in the previous columns.
Graph with independent variable *'concentration'* on x axis and dependent variable *volume of solution/liquid (taken from Visking tubing)* 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, y axis 'Volume of water/ liquid/solution removed / cm^3' X axis, Concentration of sodium chloride solution/mol dm^{-3};	**1**	Volume should be expressed in cm^3 or ml.
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 line graph and not extrapolated beyond the range of the data;	**1**	Points joined with ruled lines unless the student'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 and given credit.
Total	**6**	

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

HBI3T/P12: SECTION A

Question	Marking Guidelines	Mark	Comments
1	Stops leakage / so that all movement of molecules/ materials/substances goes through the membrane;	**1**	Idea of leakage may be expressed in a number of different ways. Ignore references to whether movement is in or out.
2(a)	1. Standardises length of time in water; 2. Diffusion / osmosis / movement through membrane / tubing starts at same time;	**1 max**	Accept 'so all the tubing was in the water for the same length of time', or 'so that none was in for a longer / shorter / different length of time'.
2(b)	Whole length/maximum/same surface in water / submerged;	**1**	
3	1. Dried outside of tube; 2. Squeezed tube flat; 3. Used a funnel; 4. Make sure tubes same length / knot same distance from end;	**2 max**	Ignore references to repeats.
4	1. For comparison with other tubes / tubes filled with salt solution; 2. To check no change / change not just due to tubing; 3. To give a larger range; 4. To show the effect of salt;	**1 max**	Do not credit 'acts as a control' without qualification.
5(a)	Same amounts enter and leave;	**1**	No need to mention 'osmosis', Reject 'no movement'.
5(b)	1. Leakage through knot / via paperclip; 2. Excess water on outside included; 3. Some liquid left in measuring cylinder/tubing;	**2 max**	Accept 'did not dry it properly'.

5(c)	1. Lowest water potential; 2. Biggest difference in water potential/concentration of salt between contents of tubing and water (in this tube); 3. More water moves in; 4. By osmosis/diffusion;	**2 max**	Accept 'biggest osmotic gradient'.
6(a)	Results would be lower (volumes)/reduces volume (of liquid) inside the tubing; ***OR*** By raising the water potential in the tubing;	**1**	Accept amount as an alternative to volume.
6(b)	Less salt / lower concentration/higher water potential inside tubing; ***OR*** (so) lower water potential / osmotic gradient; (so) less water enters by osmosis/diffusion;	**2 max**	Accept converse for liquid outside the tube.
	Section A Total	**14**	

HBI3T/P12: SECTION B

Question	Marking Guidance	Mark	Comments
7	80;;	**2**	Award one mark for (4.8/6)x100.
8	(Useful as) 1. Could calculate daily intake amount eaten; 2. Compare foods; (Not useful as) 3. Need to know portion size; 4. Most people do not know mass/amount of food (they eat) / portion size; 5. People might not know what recommended amount is; 6. (Most) people do not know what mg are/how to convert mg to g;	**3 max**	
9	1. (Salt) lowers water potential; 2. They will be thirsty/ drink a lot of water; 3. Water moves into blood / is absorbed; 4. Increases blood volume; 5. Greater volume causes greater (blood) pressure;	**3 max**	
10(a)	1. Sex; 2. Mass/weight; 3. Race; 4. Healthy; 5. Lifestyle factor e.g. fitness/smoker;	**2 max**	Accept gender. Credit one lifestyle factor only.

10(b)	1. Take many measurements (of blood pressure); 2. At same times each year/named time interval/regularly; 3. Subtract (mean) result for previous year / first year (to find increase);	**2 max**	
11	1. Prevent volunteers cheating/lying/giving false information; 2. Need to know what was eaten/how much was eaten; 3. Hard to be sure how much in some / all foods / some foods have hidden salt; 4. Salt intake will vary (from day to day); 5. Do not know how much salt is actually absorbed; 6. Would have to know/control how much salt put on food;	**2 max**	Accept 'need to know portion sizes / weigh everything.'
12	As salt intake increases blood pressure increases / positive correlation;	**1**	Accept converse of first alternative.
13(a)	Outside the range of rest of data;	**1**	Accept 'a long way form the rest of the data'. Do not accept answers that do not refer to the rest of the data.
13(b)	No (no mark) Only one result in lots of others / trend is otherwise very obvious / one result would have little effect on any calculations/ mean / all the other results show a clear correlation;	**1**	
14	Blood pressure higher / rises faster; From 3.0 to 6.2 (arbitrary units) increase/2.1 fold increase/3.2 increase;	**2**	Allow converse for 6g intake. Accept a range of 2.8 to 6.5 / 2.0 to 2.3 fold increase / 3.2 to 3.7 increase.

15	1. Can use large numbers; 2. Can control what they eat better (than humans); 3. Can feed them large amounts of salt; 4. Can use inbred strains / genetically similar rats / (too) much genetic variation in humans; 5. Easier to control other variables; 6. Easy to keep / to sample regularly; 7. Shorter life span (so get answers quicker); 8. Can kill them / cannot endanger humans / can endanger rats; 9. Not ethical to use / experiment on humans; 10. Mammals, so same/similar physiology / blood pressure;	**2 max**	Accept clones

Section B Total	**21**	