



General Certificate of Education (A-level)
June 2013

Human Biology

HBI6T/P13

(Specification 2405)

Unit 6T: 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.

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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
Egand....., 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 student 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.

HBI6T P14 Investigation into whether reaction time is different using dominant and non-dominant hands

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				
Candidate's own data presented clearly with full descriptions of both the independent variable, "dominant hand" and "non-dominant hand", and dependent variable "distance fallen (by ruler)";	1	This may be recorded either by a full title for the table or by complete headings at the top of the columns in the table.				
Independent variable, hand, in first column; OR If a candidate produces a table with headings equivalent to those shown below give both first and second marking points <table><tr><td colspan="2">Distance fallen by ruler</td></tr><tr><td>Using dominant hand</td><td>Using non-dominant hand</td></tr></table>	Distance fallen by ruler		Using dominant hand	Using non-dominant hand	1	If a candidate has a first column of trial number, ignore it and give credit as appropriate for the rest of the table.
Distance fallen by ruler						
Using dominant hand	Using non-dominant hand					
Appropriate units for the dependent variable, cm <u>or</u> mm, clearly stated and <u>only</u> in the heading to the appropriate column(s), separated from the variable by a solidus;	1	Do not accept mixed units, i.e. cm and mm. Accept brackets in place of a solidus.				
Stage 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 statistical analysis of data collected by the candidate.

Question	Marking Guidelines	Mark	Comments
1	Correct conversion of distances fallen to reaction times;	1	
2	Clear statement of the null hypothesis e.g. there is no difference between reaction times when using the dominant hand and the non-dominant hand;	1	Both variables must be specifically mentioned
3 (a)	Choice of statistical test appropriate to the data collected i.e. <i>t</i> test or Standard Error (and 95% confidence limits);	1	
3 (b)	Justification of test with a clear explanation of why the specific test was chosen i.e. looking for differences between measurements from different samples for <i>t</i> test, comparing two means for standard error;	1	
4	Test statistic calculated correctly;	1	Accept candidate's correct calculation even if the test chosen is not appropriate
5	Correct interpretation of calculated test statistic, in terms of acceptance or rejection of null hypothesis; Interpretation involves appropriate reference to <u>probability</u> of difference being due to <u>chance</u> ;	2	Accept candidate's interpretation of calculated test statistic, if correct, even if there is an error in calculation.
Stage 2 Total		7	

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

HBI6T P13 Written Test: Section A

Question	Marking Guidelines	Mark	Comments
6	So always take measurement from same point (on thumb) / to have a point to measure from;	1	Allow appropriate descriptions of reliability, validity, accuracy, precision
7	So forearm did not move / height of forearm did not change / forearm did not follow ruler (as it fell);	1	Ignore references to following instructions. Do not credit “to support forearm” without further qualification
8	1. So only eyes involved in detecting release/fall of ruler / person might feel ruler move before seeing movement; 2. Might slow fall of ruler / might reduce time taken to catch ruler; 3. (Introduces) source of error/variability / results not reliable; 4. So only one nerve pathway involved;	2 max	2. Ignore references to accuracy or validity or precision.
9	1. Getting/holding zero (on ruler) (exactly) opposite (pencil) line on thumbnail; 2. Variation in distance apart of (person's) finger and thumb; 3. Person not concentrating/ being distracted/ beginning to move finger and thumb together before ruler released; 4. Position of person's hand changing / wrist moving (while ruler falls.); 5. Conversion chart gives distances to nearest cm;	2 max	1. Ignore references to difficulty in reading position of line on thumbnail against ruler (when caught) 2. Ignore references to finger or thumb being in contact with ruler

10	(Disadvantage) 1. Takes more time / person has to keep changing position; (Advantage) 2. (Changing hands) prevents reaction time improving through practice / reaction time might improve/decrease with practice/repetition;	2	2. Accept: alternating hands might reduce any difference due to practice/ repetition.
11 (a)	14 (cm);	1	Ignore definitions of mode
11(b)	Dominant (hand) because range is 13 to 27 compared with 11 to 24 for non-dominant hand;	1	Allow correct answers with highest value first. Accept correct differences between highest and lowest values (i.e.14 and 13).
11(c)	1. Range uses only two /extreme/highest and lowest values; 2. SD uses/takes into account all values/shows the spread of the data around the mean; 3. Allows statistical test to be carried out;	2 max	1. Assume 'it' refers to range
12	1. (Because) reaction time is (very) small / reaction time is (much) less than a second; 2. (Because) using seconds would give numbers (much) less than one / small decimal values;	1 max	
13(a)	(Any suitable method such as) toss a coin / pull names from a hat / draw straws / use a random number generator;	1	

13(b)	1. Reduces effect (on results) of (any) anomaly/ unusual response (to caffeine); 2. Allows identification of anomalies/unusual responses; 3. Allows calculation of mean / average / SD; 4. Can do statistical test / can test for significance;	2 max	Do not credit answers which suggest that number of anomalies is reduced.
Section A Total		16	

HBI6T P13 Written Test: Section B

Question	Marking Guidelines	Mark	Comments
14(a)	- Reaction time increases with age / older (women have) longer reaction time; - Increase (in reaction time) is greater between middle and old age groups (than between young and middle age groups);	2	- Accept gets slower - Ignore use of figures without reference to the trend
14(b)	- Nerve conduction velocity/speed of impulse decreases with age; - Older people more likely to be visually impaired / have poor eyesight;	1 max	Accept any valid age related visual impairment
15	(May be) Significant in 20-30/youngest age group; - SEs don't overlap in youngest group / SEs overlap in older groups; OR (May be) significant for 20-30/youngest age group; (But) need statistical test (to see if significant);	2	Accept converse for older groups
16	- Synapse; - Optic nerve; - Optic chiasma; - Lateral geniculate nucleus; - Visual cortex;	4 max	Award marks for components in sequence up to a maximum of 4. Do not penalise omissions. (e.g. optic nerve – optic chiasma – visual cortex would gain 3 marks). An error in the sequence cancels 1 mark e.g optic nerve – visual cortex-optic chiasma would gain 2 marks. Synapse can be credited at any point in the sequence before visual cortex.

17	1. Synapses between neurones / between neurones and muscles; 2. Synaptic transmission slower than nerve impulses / synaptic transmission involves time for diffusion of chemical/ neurotransmitter; 3. Movement of finger / pressing of button involves muscle contraction; 4. Muscle contraction takes time;	4	Ignore references to anomalies/variation between individuals. Ignore references to errors in measurement.
18	1. Eliminates (any) effect (act of) drinking /temperature of drink might have; 2. Coffee might have other components/ components other than caffeine that affect driver performance; 3. To see whether drinking decaffeinated coffee has a placebo effect;	1 max	

19	1. Less line crossing <u>and</u> less exceeding of speed limit with normal coffee/coffee containing caffeine / caffeine; 2. Correct use of any figures from the table to support MP1; 3. Do not know if results significant / no statistical test; 4. Small group / only 7 drivers; 5. Only young men (tested) / (tested) group not representative /women/older people might be affected differently; 6. Practice/doing test first with decaffeinated coffee might improve (later) performance with normal coffee; 7. Preliminary study / no peer review (of research); 8. Do not know caffeine dose /might be different results with different amounts of caffeine/ coffee / different strength of coffee; 9. Simulator measured only 2 factors / real driving more difficult / more factors in real driving / simulator may not give same difficulty as real driving;	4 max	Accept converse statement for decaffeinated coffee.
Section B Total		18	