



General Certificate of Education (A-level)
June 2013

Biology

BIO6T/Q13

(Specification 2410)

Unit 6T: Investigative Skills Assignment

Final

Marking Guidelines

Mark Schemes 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 Biology ISAs

Final Marking Guidelines must be used to mark students' work.

General principles

In general, you are looking for evidence that the student knows and understands the point 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
For example anaphase, the term must appear
For example and, both items must be present for a mark
- 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
- Additional instructions are shown in the comments column
- '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 point.

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 lower in the solution' is an acceptable converse of 'the water potential is higher in the cell'.

Very occasionally, a student will give a biologically correct answer that is not covered 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 student has written.

For each mark awarded, put a tick close to the marking point. In all cases, a tick should equal one mark and the total number of ticks should match the mark totals in the margins. The total mark for each part answer should be written in the right hand margin.

Put a cross against incorrect points. It is helpful to indicate omissions of key words or incomplete answers with a \wedge 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 which they appear 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 makes moderation much easier. It also helps 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.

Example:

Name two substances that are produced in photosynthesis. (2 marks)

Answer	Marks	Comment
Oxygen, glucose	2	Both correct
Oxygen, carbon dioxide	1	One correct, one incorrect
Carbon dioxide, oxygen, glucose	1	Carbon dioxide is clearly incorrect and cancels one of the marks
Oxygen, glucose, water	2	Regard water as a neutral point. It is not worth a mark but it is not incorrect

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 intermediate between 'mitosis' and 'meiosis', should result in the relevant marking point being withheld. Terms like this will be indicated in the comments column in the Marking Guidelines to show that misspellings must not be credited.

BIO6T/Q13 TASK

Before you mark any work, please make sure that you have read **Guidance for teachers marking Biology ISAs** on pages 3 and 4 of these Marking Guidelines.

Stage 1

The table of raw data collected during implementation is required for moderation and **must** be attached to the ISA test.

The following criteria should be used to mark the results of the students' calculations:

Question	Marking Guidance	Mark	Comments
1	Calculations of energy content per gram correct;	1	Check correct for both crackers and marshmallows Ignore the number of figures after decimal point
Total		1	

Stage 2 – Assessment of statistical analysis

Question	Marking Guidance	Mark	Comments
2	Null hypothesis clearly stated e.g. there is no difference in the energy content of (cream) crackers and marshmallows e.g. differences in energy content of crackers and marshmallows are due to chance;	1	
3(a)	Standard error (and 95% confidence limits);	1	
3(b)	Valid explanation for choice of statistical test i.e. (used to) compare two means/samples etc.;	1	Do not credit if wrong test is chosen
4	Test statistic calculated accurately;	1	Working must be shown Accept student's correct calculation here even if the test is not appropriate or calculations of energy content were incorrect
5	1. Correct interpretation of statistical test in terms of acceptance or rejection of null hypothesis; 2. Interpretation involves appropriate reference to the probability of the results being due to chance; <i>See comments for guidance</i>	2	Allow correct interpretation of calculated test statistic even if calculation or choice of test are incorrect If no overlap , then probability is less than 0.05/5% that (differences in) results are due to chance; reject the null hypothesis; If overlap , then probability is greater than 0.05/5% that (differences in) results are due to chance; accept the null hypothesis;
Total		6	

The Candidate Results Sheet: Stage 2 is required for moderation and must be attached to the ISA test.

BIO6T/Q13 Section A

Question	Marking Guidance	Mark	Comments
6	Larger surface area (of tube or water) heated / more of tube/glass heated;	1	Reject 'more water heated' (volume does not change)
7	Correct answer (from student's data); (Calculated from <u>mean</u> value per g \times 100 \div 1000)	1	NB A quick check can be made by dividing student's <u>mean</u> by 10 No mark if mean not used
8	<ol style="list-style-type: none"> Calculate intake of (named) food content (per day); Allow comparison of nutritional information/nutritive value/content/relevant named example of content between named foods/between cracker and marshmallow ; Calculate <u>energy</u> intake per day; To control the intake of a named substance; 	2 max	<p>2. The mark is not just for stating 'allow a comparison', a qualification is required</p> <p>3. This is different to point 1</p> <p>4. Appropriate substance must be identified</p>
9	<ol style="list-style-type: none"> Marshmallow/(cream) cracker is not only carbohydrate / also contain protein/fat; Energy/heat released also comes from protein/fat; 	2	
10	<ol style="list-style-type: none"> Not all of marshmallow burnt / remains left after burning; Loss of heat to air; Heat transferred into glass/tube/mounted needle/tongs / not all heat transferred into water; Loss of energy in smoke/soot on tube/light of flame; 	2 max	<p>For 'heat' accept 'energy'</p> <p>2. Accept atmosphere</p> <p>For points 2 and 3 reject 'environment' or 'surroundings' as too vague</p> <p>4. Accept energy lost in other forms (other than heat)</p>
11(a)	(Not 100g because) not all components are listed;	1	Credit named example of missing component e.g. 'does not include vitamins/sodium'

11(b)	<ol style="list-style-type: none"> 1. Sugars are (also) carbohydrates / sugars counted twice; 2. Fibre/cellulose is also carbohydrate; 	1 max	
12(a)	<ol style="list-style-type: none"> 1. 'Total carbohydrates' includes simple sugars, fibre and starch; 2. Sugar and fibre content are low; 3. No glycogen in plants/flour/crackers; 4. $(67.5 - [3.7 + 1.5]) = 62.3$ g of starch; 	2 max	2. Accept 'low' shown by figures
12(b)	<ol style="list-style-type: none"> 1. Add iodine (solution); 2. Blue/black colouration; 	2	<ol style="list-style-type: none"> 1. Accept potassium iodide (solution) 2. Accept reference to blue or black e.g. accept brown-black 2. Reject purple unless linked to blue or black
13	<ol style="list-style-type: none"> 1. Scatter diagram / scatter graph / scattergram; 2. Two continuous variables / two dependent variables / data are in pairs; 	2	2. Accept a description of the variables e.g. both mass and energy content vary
Total marks for Section A		16	

BIO6T/Q13 Section B

Question	Marking Guidance	Mark	Comments
14	<ol style="list-style-type: none"> 1. Glucose oxidase <u>and</u> peroxidase; 2. Dye (with colour A); 	2	<ol style="list-style-type: none"> 1. Both enzymes required 2. Reject 'dye with colour B'. Ignore named dyes
15	<ol style="list-style-type: none"> 1. Concentration is given as a range (for each colour) / measurement is not precise; 2. Only measures glucose concentration above normal/above 170 (mg 100 cm⁻³) (in blood); 3. 170 (mg 100 cm⁻³) is an average figure / concentration for loss to urine varies (between people); 4. Difficult to match colour against chart / colour match is subjective; 	2 max	
16	Treatment requires person receiving insulin (in some way);	1	<p>Accept descriptions e.g. insulin injection</p> <p>Reward idea that insulin must be received, not that it isn't being produced</p>
17	<ol style="list-style-type: none"> 1. No/fewer/abnormal receptors on (cell) membrane; 2. (So) fewer (glucose) transport proteins; 3. (So) less glucose can enter (cells); 4. (So) less glucose converted to glycogen; 5. (So, without treatment) blood glucose concentration not lowered when high/above normal; 	3 max	<ol style="list-style-type: none"> 4. Accept no/fewer enzymes (for this conversion) are activated 5. Accept converse
18	<ol style="list-style-type: none"> 1. Movement uses muscles; 2. Movement increases (rate of) respiration; 3. Respiration uses glucose / respiration reduces blood glucose concentration; 	2 max	

19	<ol style="list-style-type: none"> 1. Identification of 195 ± 2 <u>and</u> 113 ± 2; 2. Answer within range of 1.67 to 1.77 (times greater); 	2	<ol style="list-style-type: none"> 2. Ignore numbers after two decimal places <p>Correct answer = 2 marks</p>
20	<ol style="list-style-type: none"> 1. Meal/uncontrolled intake v 75 g glucose/controlled intake; 2. (Concentration) measured over 6 hours/6+ hours/longer v measured at 2 hours; 3. (After intake) regular monitoring/several measurements v only measured once/at 2 hours only; 4. No fasting v fasting before test; 5. Not (necessarily) at rest v remained at rest; 6. Tested during afternoon v tested in morning; 	3 max	<p>Must have both sides of the story for each point. Marking guidance shows researcher's method first</p> <ol style="list-style-type: none"> 1. Idea of could eat anything in meal as against just glucose 4. Credit other descriptions of fasting e.g. went without food as opposed to didn't have to 6. Accept idea of tested at different times of the day
21	<ol style="list-style-type: none"> 1. Pre-diabetics are at risk of developing diabetes / some pre-diabetics reach a concentration of $180 \text{ (mg } 100 \text{ cm}^{-3})$ after a meal; 2. Some pre-diabetics will now be classed as diabetic; 3. Detection leads to treatment (sooner); 4. Diabetes damages the body/is life-threatening; 	3 max	<ol style="list-style-type: none"> 4. Accept examples of damage e.g. blindness, heart disease
22	<ol style="list-style-type: none"> 1. Diabetics have (blood glucose) concentration greater than 140 mg cm^{-3}/than her estimate / estimate suggests she is pre-diabetic; 2. Colour change is subjective / blood on test strip masks colour change; 3. Concentration given as a range / estimation is not reliable; 4. May not have fasted; 5. May not have had a drink with 75 g glucose; 6. Only one test carried out; 	3 max	No mark for valid or not valid
Total marks for Section B		21	