



GCSE

Biology A

General Certificate of Secondary Education

Unit **A222/02**: Modules B4, B5, B6 (Higher Tier)

Mark Scheme for January 2011

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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Guidance for Examiners

Additional Guidance within any mark scheme takes precedence over the following guidance.

1. Mark strictly to the mark scheme.
2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
3. Accept any clear, unambiguous response which is correct, e.g. mis-spellings if phonetically correct (but check additional guidance).
4. Abbreviations, annotations and conventions used in the detailed mark scheme:

/	= alternative and acceptable answers for the same marking point
(1)	= separates marking points
not/reject	= answers which are not worthy of credit
ignore	= statements which are irrelevant - applies to neutral answers
allow/accept	= answers that can be accepted
(words)	= words which are not essential to gain credit
<u>words</u>	= underlined words must be present in answer to score a mark
ecf	= error carried forward
AW/owtte	= alternative wording
ORA	= or reverse argument

e.g. mark scheme shows 'work done in lifting / (change in) gravitational potential energy' (1)

"work done" = 0 marks

"work done lifting" = 1 mark

"change in potential energy" = 0 marks

"gravitational potential energy" = 1 mark

5. If a candidate alters his/her response, examiners should accept the alteration.
6. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

The example below illustrates how to apply this principle to an objective question.

e.g. for a one mark question, where ticks in boxes 3 and 4 are required for the mark

Put ticks (✓) in
the two correct
boxes.

✓
✗

This would be
worth zero marks.

Put ticks (✓) in
the two correct
boxes.

✗
✗

This would be
worth one mark.

Put ticks (✓) in
the two correct
boxes.

✗
✗
✓
✓

This would be
worth one mark.

7. The list principle:

If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, e.g. one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

8. Marking method for tick boxes:

Always check the additional guidance.

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.

If there is at least one tick, ignore crosses. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses.

Credit should be given for each box correctly ticked. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

e.g. if a question requires candidates to identify a city in England, then in the boxes

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

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Question			Expected Answers	Marks	Additional Guidance
1	a		homeostasis (1)	[1]	more than 1 response = 0 marks accept any other indication of a correct response
	b		<div> <div> part of the space suit <div>temperature probe</div> <div>heating system</div> <div>control circuit</div> </div> <div> part of the body <div>brain</div> <div>effector</div> <div>receptor</div> </div> <div> function <div>detects the temperature</div> <div>processing centre</div> <div>produces the response</div> </div> </div>	[2]	left hand side correct = 1 mark right hand side correct = 1 mark
	c		rate of reaction increases (1) molecules move faster (1) increased frequency (and energy) of collisions/ more collisions/ successful collisions/ energetic collisions (between molecules) (1)	[3]	OWTTE accept bigger/more/larger accept particles = molecules accept correct ref to kinetic energy accept correct ref to enzyme/substrate complexes reject unqualified 'more energy'
	d	i	11.5 / 11.54 (2) if incorrect then: 4.5 / 39 X 100 (1)	[2]	correct response = 2 marks accept 12.0 / 12 (%) incorrect response but correct calculation = 1 mark max
		ii	20 to 25 (1)	[1]	accept any time within the range, including 20 or 25
			Total	[9]	

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Question			Expected Answers	Marks	Additional Guidance
2	a		the movement of water AND from a high concentration of water/ dilute solution to a low concentration of water/ concentrated solution AND through a partially permeable membrane	[1]	OWTTE accept diffusion = movement accept correct references to water potential (from high to low or from less negative to more negative) accept area = solution accept semi-permeable / selectively permeable
	b		A B C	[1]	responses must be in the correct order three correct responses = 1 mark accept any other indication of a correct response
	c		(cells) in solution A /the smaller cells return to original shape/size / burst; (cells) in solution B /the original /normal cells will burst / bigger; cell fragments/ solution C not affected;	[2]	OWTTE 3 correct responses = 2 marks 2 correct responses = 1 mark 1 or 0 correct responses = 0 marks accept animal cells/cells get bigger = 1 response
			Total	[4]	

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Question		Expected Answers	Marks	Additional Guidance
3	a	pituitary gland (1)	[1]	more than one response = 0 marks accept any other indication of a correct response
	b	<p>production of ADH</p> <pre> graph TD ADH[production of ADH] -- decreases --> alcohol[alcohol] ADH -- increases --> Ecstasy[Ecstasy] alcohol -- "greater ... more ..." --> urine[urine] Ecstasy -- "smaller ... less ..." --> urine </pre>	[2]	<p>two correct lines for alcohol = 1 mark</p> <p>two correct lines for Ecstasy = 1 mark</p> <p>max = 2 marks</p> <p>more than two lines from either alcohol or ecstasy boxes – deduct 1 mark for each additional line</p>
	c	<p>EITHER ADH secretion/production is affected by the concentration/ amount of water/salt in the blood (plasma) OR as blood concentration increases then ADH secretion/ production increases (1)</p> <p>concentration of blood (plasma) returns to normal level / set point which suppresses/switches off ADH secretion/production (1)</p>	[2]	<p>OWTTE</p> <p>accept body = blood accept reverse argument</p> <p>accept body = blood</p>
Total			[5]	

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Question			Expected Answers	Marks	Additional Guidance
4	a		<div> <div>number of types of bases</div> <div> <div></div> <div></div> <div>four</div> </div> <div> <div>joined together</div> <div>in twos</div> <div></div> <div></div> </div> </div>	[1]	more than one response = 0 marks
	b		separate/divide (1) copy/duplicate/replicate (1)	[2]	OWTTE accept part/open up = separate accept correct references to mRNA production reject copy followed by divide (incorrect order)
	c		any two from: <ul style="list-style-type: none"> order of bases in DNA codes for the sequence of amino acids/ protein production; order of amino acids forms the type of protein; correct reference to mRNA production/activity (transcription/translation); 	[2]	OWTTE accept correct ref to triplet code/codon accept the sequence of amino acids determines the protein formed

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Question			Expected Answers	Marks	Additional Guidance															
4	d			[1]	all four responses correct = 1 mark more than one response in a row = 0 marks															
			<table><tr><td></td><td>true</td><td>false</td></tr><tr><td>The sequence of bases in the DNA molecule will stay the same.</td><td></td><td>✓</td></tr><tr><td>The sequence of amino acids used in the protein molecule will change.</td><td>✓</td><td></td></tr><tr><td>The protein molecule produced is likely to stay the same.</td><td></td><td>✓</td></tr><tr><td>Different amino acids may be used in protein production.</td><td>✓</td><td></td></tr></table>				true	false	The sequence of bases in the DNA molecule will stay the same.		✓	The sequence of amino acids used in the protein molecule will change.	✓		The protein molecule produced is likely to stay the same.		✓	Different amino acids may be used in protein production.	✓	
						true	false													
			The sequence of bases in the DNA molecule will stay the same.				✓													
			The sequence of amino acids used in the protein molecule will change.			✓														
The protein molecule produced is likely to stay the same.		✓																		
Different amino acids may be used in protein production.	✓																			
			Total	[6]																

5	a		leaves; light; photosynthesis; sugars;	[2]	four correct = 2 marks three correct = 1 mark two or one correct = 0 marks accept any other indication of a correct response
	b		auxin AND hormone (1)	[1]	two correct responses = 1 mark accept any other indication of a correct response
	c		<div><div><input type="checkbox"/></div><div><input type="checkbox"/></div><div>... on the side of the shoot in the dark. <input checked="" type="checkbox"/> (1)</div><div><input type="checkbox"/></div></div>	[1]	more than one response = 0 marks
			Total	[4]	

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Question		Expected Answers	Marks	Additional Guidance
6	a	George (1) Charley (1)	[2]	more than two responses – deduct 1 mark for each additional response accept any order of response accept any other indication of a correct response
	b	meristem/ cambium (1)	[1]	accept phonetic spelling
Total			[3]	
7	a	receptor diffusion receptor effector	[2]	four correct responses = 2 marks three correct responses = 1 mark two, one or zero correct responses = 0 marks accept any other indication of a correct response
	b	<p>Only the sensory neuron releases ... <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p>The sensory neuron membrane ... <input checked="" type="checkbox"/> (1)</p>	[2]	<p>one mark for each correct response.</p> <p>more than two responses – deduct 1 mark for additional response.</p> <p>ignore crosses in the remaining boxes.</p> <p>accept any other indication of a correct response</p>
	c	<p>removal of serotonin in the brains synapses</p> <p>concentration of serotonin in the synapse</p> <p>reduced</p> <p>Ecstasy</p> <p>increased</p>	[1]	<p>both correct lines = 1 mark</p> <p>more than one line on right hand or left hand side = 0 marks</p>
			[5]	

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Question			Expected Answers			Marks	Additional Guidance																	
8	a		storage AND retrieval of information (1)			[1]	OWTTE must refer to both features accept accessed = retrieval																	
	b		<table><tr><th>factors</th><th>enhance</th><th>inhibit</th></tr><tr><td>the information has a pattern</td><td>✓</td><td></td></tr><tr><td>the information is repeated</td><td>✓</td><td></td></tr><tr><td>the cerebral cortex is damaged</td><td></td><td>✓</td></tr><tr><td>the information is associated with a colour</td><td>✓</td><td></td></tr></table>			factors	enhance	inhibit	the information has a pattern	✓		the information is repeated	✓		the cerebral cortex is damaged		✓	the information is associated with a colour	✓		[2]	four correct responses = 2 marks three correct responses = 1 mark two or one correct responses = 0 marks		
factors	enhance	inhibit																						
the information has a pattern	✓																							
the information is repeated	✓																							
the cerebral cortex is damaged		✓																						
the information is associated with a colour	✓																							
			Total			[3]																		

9	a		<div style="display: flex; align-items: center;"> <div style="flex: 1;">There is no direct connection ...</div> <div style="display: flex; flex-direction: column; align-items: center;"> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div style="margin-left: 10px;">(1)</div> </div>	[1]	
	b		brain (1) motor (1)	[2]	responses must be in the correct order accept any other indication of a correct response
			Total	[3]	

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