



GCSE

## Biology A

General Certificate of Secondary Education

Unit **A222/01**: Modules B4, B5, B6 (Foundation Tier)

# **Mark Scheme for January 2012**

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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.

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## Annotations

Annotation	Meaning
?	Indicate uncertainty or ambiguity
BOD	Benefit of doubt
CON	Contradiction
X	Incorrect response
ECF	Error carried forward
O	Draw attention to a particular part of a candidate's response
	Draw attention to a particular part of a candidate's response
~~~~	Draw attention to a particular part of a candidate's response
NBD	No benefit of the doubt
RE	Reject
✓	Correct Response
	Draw attention to a particular part of a candidate's response
IA	Information omitted

Annotation	Meaning
/	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 which can be accepted

Annotation	Meaning
(words)	words which are not essential to gain credit
<u>words</u>	underlined words must be present in order to score a mark
ecf	error carried forward
AW/owtte	alternate wording
ORA	or reverse argument

### Subject-specific Marking Instructions

- Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).
- If a candidate alters his/her response, examiners should accept the alteration.
- 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.

e.g. for a one-mark question where ticks in the third and fourth boxes are required for the mark:

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

*This would be worth  
1 mark.*

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

*This would be worth  
0 marks.*

<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

*This would be worth  
1 mark.*

## d. 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.

## e. Marking method for tick-box questions:

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 and other markings. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses. Credit should be given according to the instructions given in the guidance column for the question. 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 cities in England:

Edinburgh	<input type="checkbox"/>
Manchester	<input type="checkbox"/>
Paris	<input type="checkbox"/>
Southampton	<input type="checkbox"/>

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	✓	✗	✓	✓	✓				✓	
Paris			✓	✓		✓	✓	✓		
Southampton	✓	✗		✓		✓	✓		✓	
<b>Score:</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NR</b>

Question		Answer	Marks	Guidance
1	(a)	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 20px;">is greater than his heat loss</div> <div style="border: 1px solid black; padding: 5px; margin-right: 20px;">is equal to his heat loss</div> <div style="border: 1px solid black; padding: 5px; margin-right: 20px;">is less than his heat loss</div> </div> <p>David's heat gain</p>	1	more than 1 line =0
	(b)	receptors; skin; receptors; blood;	2	1 mark for each correct line of responses
	(c)	water evaporates (from the head) (1) using heat from the body (1) body cools down (1)	3	<b>accept</b> it cools him down <b>accept</b> cools body/ head/ blood cooling mark must indicate cooling/ lowering temperature not just keeping it constant /same
		<b>Total</b>	<b>6</b>	

Question		Answer	Marks	Guidance
2	(a)	food (1) respiration (1)	2	eating <b>ignore</b> any other forms of drink e.g. apple juice <b>accept</b> in either order
	(b)	urine (1) fully (1) salt (1)	3	<b>must</b> be in correct order
		<b>Total</b>	<b>5</b>	

Question		Answer			Marks	Guidance																
3	(a)	(overall) movement/diffusion of water from a dilute/low to a more concentrated solution (1)  through a <b>partially</b> permeable membrane (1)			2	OWTTE <b>accept</b> from high to low concentration <b>of water</b> (molecules) <b>accept</b> less -ve to more -ve/ higher water potential to a lower water potential <b>accept</b> from a high to a low concentration if with ref to <b>diffusion</b> <b>ignore</b> particles <b>accept</b> semi/ selectively/ differentially= partially <b>ignore</b> abbreviations																
	(b)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th></th> <th>cells burst</th> <th>cells shrink</th> <th>cells stay the same</th> </tr> <tr> <td>cells in pure water</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>cells in a salt solution that is the same concentration as inside the cells</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>cells in a salt solution that is more concentrated than inside the cells.</td> <td></td> <td>✓</td> <td></td> </tr> </table>				cells burst	cells shrink	cells stay the same	cells in pure water	✓			cells in a salt solution that is the same concentration as inside the cells			✓	cells in a salt solution that is more concentrated than inside the cells.		✓		2	marked by rows  3 correct responses = 2 marks 1 or 2 correct responses = 1 mark  more than 1 tick in a row = negates the response for the row  <b>accept</b> any clear indication of correct response e.g. shaded boxes/ crosses (but without ticks)  <b>ignore</b> crosses if tick shown clearly in correct box
	cells burst	cells shrink	cells stay the same																			
cells in pure water	✓																					
cells in a salt solution that is the same concentration as inside the cells			✓																			
cells in a salt solution that is more concentrated than inside the cells.		✓																				
		<b>Total</b>			4																	

A222/01

## Mark Scheme

January 2012

Question		Answer	Marks	Guidance						
4	(a)	<table border="1"> <tr> <td>cell growth</td> <td>mitosis</td> </tr> <tr> <td>B</td> <td>A</td> </tr> <tr> <td>D</td> <td>C</td> </tr> </table>	cell growth	mitosis	B	A	D	C	2	4 correct = 2 marks 3 correct = 1 mark
cell growth	mitosis									
B	A									
D	C									
	(b)	18 (1)	1	<b>accept</b> any clear indication of correct response						
	(c)	gametes (1)	1	<b>accept</b> any clear indication of correct response						
	(d)	(gametes) fuse during fertilisation (1)  this allows the full/ correct chromosome number to be reinstated; A/W (1)	2	<b>accept</b> combine, join, come together, carry out, form zygote <b>ignore</b> meet  <b>accept</b> gives full set of chromosomes / correct number/ right amount of chromosomes <b>accept</b> correct reference to haploid and diploid state/ correct ref to haploid and diploid numbers e.g. $23 + 23 = 46$						
		<b>Total</b>	<b>6</b>							

Question		Answer	Marks	Guidance
5	(a)	Liam; Arthur;	1	<b>accept</b> either order
	(b)	cytoplasm;  nucleus;	1	<b>accept</b> phonetic spellings  both correct responses = 1 mark
		<b>Total</b>	<b>2</b>	

Question		Answer	Marks	Guidance												
6	(a) (i)	<table border="1"> <tr> <td>Each specialised cell only produces the specific protein it needs.</td> <td>✓</td> </tr> <tr> <td>Many of the genes in a particular cell are not active.</td> <td>✓</td> </tr> <tr> <td>New genes are produced during cell specialisation.</td> <td></td> </tr> <tr> <td>Some of the genes are lost as each cell becomes more specialised.</td> <td></td> </tr> <tr> <td>Specialised cells in the same seedling contain different genes.</td> <td></td> </tr> <tr> <td>The specialised cells only contain half the number of genes needed.</td> <td></td> </tr> </table>	Each specialised cell only produces the specific protein it needs.	✓	Many of the genes in a particular cell are not active.	✓	New genes are produced during cell specialisation.		Some of the genes are lost as each cell becomes more specialised.		Specialised cells in the same seedling contain different genes.		The specialised cells only contain half the number of genes needed.		2	<p><b>accept</b> any clear indication of correct response e.g. shaded boxes/ crosses (but without ticks)</p> <p>more than 2 ticks = negates one mark for each extra tick</p>
Each specialised cell only produces the specific protein it needs.	✓															
Many of the genes in a particular cell are not active.	✓															
New genes are produced during cell specialisation.																
Some of the genes are lost as each cell becomes more specialised.																
Specialised cells in the same seedling contain different genes.																
The specialised cells only contain half the number of genes needed.																
	(ii)	unspecialised; grow;	1	<b>both</b> correct = 1 mark												
	(b) (i)	phototropism (1)	1	<p><b>allow</b> phonetic spellings</p> <p><b>allow</b> phototropic</p>												
	(ii)	<p><b>any three from:</b></p> <p><u>more</u> light;</p> <p><u>more</u> photosynthesis;</p> <p><u>more</u> growth/taller/ faster growth;</p> <p>increases its chances of survival/ compete better;</p>	3	<p><b>accept</b> sunlight = light</p> <p><b>ignore</b> sun</p> <p><b>accept</b> energy – but must be qualified e.g. from sun</p> <p><b>ignore</b> food   <b>accept</b> more glucose</p> <p><b>ignore</b> better photosynthesis and <b>ignore</b> better growth</p>												
		<b>Total</b>	7													

Question		Answer	Marks	Guidance										
7	(a)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; padding: 5px;">structure</th> <th style="text-align: center; padding: 5px;">function</th> </tr> </thead> <tbody> <tr> <td style="padding: 10px;">receptor</td> <td style="padding: 10px;">carries impulses from receptors to the CNS</td> </tr> <tr> <td style="padding: 10px;">sensory neuron</td> <td style="padding: 10px;">detects the stimulus</td> </tr> <tr> <td style="padding: 10px;">central nervous system (CNS)</td> <td style="padding: 10px;">carries impulses from the CNS to the effector</td> </tr> <tr> <td style="padding: 10px;">motor neuron</td> <td style="padding: 10px;">coordinates the mouse's response</td> </tr> </tbody> </table>	structure	function	receptor	carries impulses from receptors to the CNS	sensory neuron	detects the stimulus	central nervous system (CNS)	carries impulses from the CNS to the effector	motor neuron	coordinates the mouse's response	2	<p>4 correct lines =2 marks 3 or 2 correct lines =1 mark</p> <p>more than 1 line from or to any box loses the mark</p>
structure	function													
receptor	carries impulses from receptors to the CNS													
sensory neuron	detects the stimulus													
central nervous system (CNS)	carries impulses from the CNS to the effector													
motor neuron	coordinates the mouse's response													
	(b)	peripheral nervous system (1)	1	<b>accept</b> any clear indication of correct response										
	(c) (i)	long fibre of cytoplasm surrounded by a cell membrane (1)	1	<b>accept</b> any clear indication of correct response										
	(ii)	<p>increases the speed of (transmission) of a nerve impulse (1)</p> <p>insulates the neuron (from neighbouring cells) (1)</p>	2	<b>accept</b> reverse argument <b>ignore</b> ref. to responses/ reactions										
		<b>Total</b>	<b>6</b>											

Question		Answer	Marks	Guidance
8	(a)	MRI scans / study patients with brain damage/CAT scan/ CT scan (1)	1	<b>ignore</b> brain scan <b>not</b> X ray
	(b) (i)	the storage and retrieval of information (1)	1	<b>accept</b> any clear indication of correct response
	(ii)	intelligence; language development;	1	2 correct responses = 1 mark more than 2 responses = 0 marks <b>accept</b> any clear indication of correct response
		<b>Total</b>	<b>3</b>	

Question		Answer	Marks	Guidance												
9	(a)	brain; learning <b>and</b> impulses; repetition;	2	3 correct responses = 2 marks 2 correct responses = 1 mark 1 or 0 correct responses =0 marks												
	(b)	<table border="1"> <tr><td>Jumping in response to a sudden, loud noise.</td><td></td></tr> <tr><td>Maintaining a constant body temperature.</td><td></td></tr> <tr><td>Quickly moving your hand from a sharp object.</td><td></td></tr> <tr><td>Reducing the size of the pupils in the eyes.</td><td></td></tr> <tr><td>Remembering a telephone number.</td><td>✓</td></tr> <tr><td>Speaking a language.</td><td>✓</td></tr> </table>	Jumping in response to a sudden, loud noise.		Maintaining a constant body temperature.		Quickly moving your hand from a sharp object.		Reducing the size of the pupils in the eyes.		Remembering a telephone number.	✓	Speaking a language.	✓	1	2 correct responses = 1 mark  <b>accept</b> any clear indication of correct response e.g. shaded boxes/ crosses (but without ticks)  more than 2 ticks =0 marks
Jumping in response to a sudden, loud noise.																
Maintaining a constant body temperature.																
Quickly moving your hand from a sharp object.																
Reducing the size of the pupils in the eyes.																
Remembering a telephone number.	✓															
Speaking a language.	✓															
		<b>Total</b>	<b>3</b>													

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