

**Biology A**

General Certificate of Secondary Education **A222/02**

Unit 2: Modules B4, B5, B6 (Higher Tier)

**Mark Scheme for June 2010**

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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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Question			Expected Answers	Marks	Additional Guidance
1	a	i	the maintenance of a constant internal environment (1)	[1]	OWTTE <b>Accept</b> 'inside body' = internal environment <b>Ignore</b> references to internal temperature
		ii	energy gain is the same as energy loss (1)	[1]	OWTTE <b>Accept</b> 'input' = gain, 'output' = loss <b>Accept</b> 'they are the same'/balanced <b>Accept</b> 'it' = energy gain
	b		receptors (1) skin (1) brain (1)	[3]	if more than three responses, deduct one mark for each additional response candidates cannot score less than zero marks <b>accept</b> clear indication of correct response eg use of arrows
	c		respiration (1)	[1]	more than one response = 0 marks <b>accept</b> a clear indication of correct response eg underlined, other options deleted, tick
<b>Total</b>				<b>[6]</b>	

2	a			[1]	three correct lines = 1 mark more than one line from left hand boxes = 0 marks
	b		<b>mechanism/process</b> use of a feedback loop/changes being reversed (1) <b>outcome</b> (conditions kept) constant / creates a balance / (establish a) set point/normal level (1) <b>detail within the process</b> (created due to action of) antagonistic effectors / OWTTE (1)	[3]	<b>accept</b> correct scenario details for artificial systems – look for key marking points
<b>Total</b>				<b>[4]</b>	

Question		Expected Answers	Marks	Additional Guidance
3	a	eating food (1) respiring (1)	[2]	if more than two responses – deduct 1 mark for each additional response <b>Accept</b> a clear indication of correct response eg. underlined, other options deleted, tick
	b	i	[1]	if more than one response = 0 marks <b>Accept</b> a clear indication of correct response eg. underlined, other options deleted, tick
		ii	[3]	responses must be in context of <b>excess water</b> <b>ignore</b> account of ADH under conditions of low water intake
			<b>Total</b>	[6]

4	a	<table border="1"> <thead> <tr> <th>description</th> <th>label</th> </tr> </thead> <tbody> <tr> <td>where the genetic code is found</td> <td>A</td> </tr> <tr> <td>where proteins are made</td> <td>B</td> </tr> </tbody> </table>	description	label	where the genetic code is found	A	where proteins are made	B	[1]	more than one response in each box = 0 marks <b>accept</b> a clear indication of correct response eg use of linking arrows with diagram, correct description alongside label on diagram (A = genetic code, B = proteins) or nucleus = A, cytoplasm = B within the box																			
description	label																												
where the genetic code is found	A																												
where proteins are made	B																												
	b	<table border="1"> <thead> <tr> <th>DNA ...</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>... strands</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>... bases</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>... bases ...</td> <td>single</td> <td>pairs</td> <td>triplets</td> <td>fours</td> </tr> <tr> <td>shape ...</td> <td>circular</td> <td>cubic</td> <td>helix</td> <td>zig-zag</td> </tr> </tbody> </table>	DNA ...	1	2	3	4	... strands	1	2	3	4	... bases	2	3	4	5	... bases ...	single	pairs	triplets	fours	shape ...	circular	cubic	helix	zig-zag	[3]	four <b>rows</b> correct = 3 marks three <b>rows</b> correct = 2 marks one or two <b>rows</b> correct = 1 mark  more than one response in a row means that this row is incorrect  <b>accept</b> any clear indication of correct response eg tick, other options crossed out, clearly underlined, shaded
DNA ...	1	2	3	4																									
... strands	1	2	3	4																									
... bases	2	3	4	5																									
... bases ...	single	pairs	triplets	fours																									
shape ...	circular	cubic	helix	zig-zag																									
			<b>Total</b>	[4]																									

Question		Expected Answers	Marks	Additional Guidance															
5	a	Jo and Ray (1)	[1]	two correct responses = 1 mark more than two responses = 0 marks <b>accept</b> responses in either order <b>accept</b> linking arrows to correct people on the diagram															
	b	a set of chromosomes / different genes from <b>each parent</b> (1)	[1]	<b>ignore</b> reference to 50% chromosomes/ 'information' <b>accept</b> alleles/DNA															
	c	i organelles (1) eight (1)	[2]	if more than two responses, deduct 1 mark for each additional response candidate cannot score less than zero marks responses must be in the correct order <b>accept</b> linking arrows to correct words in list															
		ii <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;"></th> <th style="width: 10%; text-align: center;">true</th> <th style="width: 10%; text-align: center;">false</th> </tr> </thead> <tbody> <tr> <td>The cells no longer contain the same genes.</td> <td style="text-align: center;"></td> <td style="text-align: center;">✓</td> </tr> <tr> <td>Some of the genes are no longer active.</td> <td style="text-align: center;">✓</td> <td style="text-align: center;"></td> </tr> <tr> <td>Each cell produces only the specific proteins it needs.</td> <td style="text-align: center;">✓</td> <td style="text-align: center;"></td> </tr> <tr> <td>The cells form different types of tissues.</td> <td style="text-align: center;">✓</td> <td style="text-align: center;"></td> </tr> </tbody> </table>		true	false	The cells no longer contain the same genes.		✓	Some of the genes are no longer active.	✓		Each cell produces only the specific proteins it needs.	✓		The cells form different types of tissues.	✓		[2]	four rows correct = 2 marks three rows correct = 1 mark two or one rows correct = 0 marks  <b>accept</b> a clear indication of correct response eg shaded, circled, crosses (if no ticks)
	true	false																	
The cells no longer contain the same genes.		✓																	
Some of the genes are no longer active.	✓																		
Each cell produces only the specific proteins it needs.	✓																		
The cells form different types of tissues.	✓																		
		<b>Total</b>	[6]																

Question		Expected Answers	Marks	Additional Guidance
6	a	meristem (1)	1	more than one response = 0 marks <b>accept</b> a clear indication of correct response eg underlined, other options deleted, tick
	b	auxin (1)	1	more than one response = 0 marks <b>accept</b> a clear indication of correct response eg underlined, other options deleted, tick
	c	stays the same unspecialised genes	2	three correct = 2 marks two correct = 1 mark one or zero correct = 0 marks if more than three responses – deduct 1 mark for each additional response candidate cannot score less than zero marks <b>accept</b> clear indication of correct response eg use of arrows
<b>Total</b>			<b>[4]</b>	
7	a	light sensory	1	need both responses in the correct order <b>accept</b> clear indication of correct response eg use of arrows
	b	i	1	more than one response = 0 marks  <b>accept</b> a clear indication of correct response eg other options crossed out, clearly underlined, shaded, circled, crosses (if no ticks)
		ii	2	<b>ignore</b> 'stops interference' from surrounding cells <b>accept</b> sends information more quickly <b>accept</b> a clear reference to saltatory response / jumping of impulse = increased speed of transmission
<b>Total</b>			<b>[4]</b>	

Question		Expected Answers	Marks	Additional Guidance					
8	a	<table border="1" style="margin: auto;"> <tr> <td>F</td> <td>A</td> <td>D</td> <td>C</td> <td>E</td> </tr> </table>	F	A	D	C	E	2	<p>F before A A before D D before C</p> <p>three correct steps = 2 marks one or two correct steps = 1 mark zero correct steps = 0 marks</p> <p>if B is included in overall response, continue to mark and look for sequence eg F before A</p>
F	A	D	C	E					
	b	the sensory neuron membrane does not contain the chemical receptor (binding sites) / OWTTE (1)	1						
	c	serotonin <b>not reabsorbed</b> (by pre synaptic vesicles) / serotonin reabsorption site is <b>blocked</b> (1)	1	<b>ignore</b> 'serotonin stays in synapse'					
<b>Total</b>			<b>[4]</b>						

Question		Expected Answers	Marks	Additional Guidance												
9	a	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: center;"><b>B</b></td> <td style="width: 40%;"></td> <td style="width: 50%;"></td> </tr> <tr> <td style="text-align: center;"><b>C</b></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;"><b>A</b></td> <td></td> <td></td> </tr> </table>	<b>B</b>			<b>C</b>			<b>A</b>			2	<p>B before C (1 mark), C before A (1 mark)</p> <p>if more than two responses, deduct 1 mark for each additional response</p> <p><b>accept</b> clear indication of correct response eg use of arrows</p>			
<b>B</b>																
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	b	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">true</th> <th style="text-align: center;">false</th> </tr> </thead> <tbody> <tr> <td>The bell was used ...</td> <td style="text-align: center;"></td> <td style="text-align: center;">✓</td> </tr> <tr> <td>The conditioned reflex ...</td> <td style="text-align: center;"></td> <td style="text-align: center;">✓</td> </tr> <tr> <td>The dog learned ...</td> <td style="text-align: center;">✓</td> <td style="text-align: center;"></td> </tr> </tbody> </table>		true	false	The bell was used ...		✓	The conditioned reflex ...		✓	The dog learned ...	✓		2	<p>three rows correct = 2 marks two rows correct = 1 mark one or zero rows correct = 0 marks</p> <p><b>accept</b> a clear indication of correct response eg shaded, circled, crosses (if no ticks)</p>
	true	false														
The bell was used ...		✓														
The conditioned reflex ...		✓														
The dog learned ...	✓															
<b>Total</b>			<b>[4]</b>													

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