

**Biology A**

General Certificate of Secondary Education **A223/02**

Unit 3: Ideas in Context plus B7 (Higher Tier)

**Mark Scheme for June 2010**

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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
<b>not/reject</b>	= answers which are not worthy of credit
<b>ignore</b>	= statements which are irrelevant - applies to neutral answers
<b>allow/accept</b>	= 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. Annotations:

The following annotations are available on SCORIS.

✓	= correct response
✗	= incorrect response
bod	= benefit of the doubt
nbod	= benefit of the doubt <b>not</b> given
ECF	= error carried forward
^	= information omitted
I	= ignore
R	= reject

6. If a candidate alters his/her response, examiners should accept the alteration.
7. 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 boxes 3 and 4 are required for the mark:

Put ticks (✓) in the two correct boxes.

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

This would be worth 0 marks.

Put ticks (✓) in the two correct boxes.

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

This would be worth one mark.

Put ticks (✓) in the two correct boxes.

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

This would be worth one mark.

8. 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.

9. 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

<b>Edinburgh</b>	
<b>Manchester</b>	
<b>Paris</b>	
<b>Southampton</b>	

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).

<b>Edinburgh</b>			✓			✓	✓	✓	✓	
<b>Manchester</b>	✓	x	✓	✓	✓				✓	
<b>Paris</b>				✓	✓		✓	✓	✓	
<b>Southampton</b>	✓	x		✓		✓	✓		✓	
<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			Expected Answers	Marks	Additional Guidance
1	a	i	<p><b>any two from:</b>            idea of fewer organisms;            idea of fewer species / less variety;            in a (specific) place eg ecosystem, habitat, world, Earth, planet, environment;</p> <p>QWC (1)</p>	[3]	<p><b>ignore</b> extinction</p> <p>QWC answer is clear on first reading even if incorrect.</p>
		ii	<p>idea of ecosystem more stable / effect on other species / keep food chains or webs going / maintains a potential resource for humans (1)</p>	[1]	<p><b>ignore</b> reference to gene pool  <b>ignore</b> extinction</p>
	b		<p>idea of world wide / gone forever / all dead (1)</p>	[1]	
	c		<p><b>any two from:</b>            test dead vultures (for diclofenac);            test live vultures (for diclofenac);            then compare effect of different amounts / (work out) lethal amount;</p>	[2]	<p>test vultures for diclofenac = 1 mark  <b>ignore</b> any reference to other drugs  <b>ignore</b> ban diclofenac to see if numbers of deaths decreases  <b>ignore</b> any reference to experiments on vultures as species is on verge of extinction and would not be allowed</p>
	d		<p>idea that numbers are only over a 26 year period / does not say when data collected / no dates specified / there is no graph (1)</p>	[1]	<p><b>ignore</b> any reference to 2008 study</p>
	e		<p>idea that it may not be reliable / atypical results / idea of not enough data / need replication (1)</p>	[1]	<p><b>ignore</b> accuracy</p>
	f		<p>they might be dying / problems caused in their winter (feeding) sites (1)</p> <p>they might be dying / problems caused on their migration routes (1)</p>	[2]	<p><b>ignore</b> gone to different site  <b>allow</b> the cause may not be in their summer nesting sites for 1 mark  <b>warning</b> migration must refer to numbers falling not just moving from one site to another</p>
	g		<p><b>any two from:</b>            vultures smaller (body mass) / ORA;            idea that vultures eat meat from <u>lots of/many</u> cows/cattle;            idea that poison accumulates in vultures / concentrated;</p>	[2]	<p><b>ignore</b> vultures eat cattle or cows containing diclofenac because the plural is not specific enough</p>
			<b>Total</b>	[13]	

Question		Expected Answers	Marks	Additional Guidance
2		transferred into glucose/sugar/starch/ photosynthesis (1)  one example of what chemical energy is used for eg respiration / cellulose / protein (1)	[2]	<b>accept</b> word or symbol equation for 1 mark  <b>ignore</b> make food / growth / repair / energy alone
		<b>Total</b>	[2]	
3	a	correct food chain (1) four or five trophic levels drawn (1) each step getting smaller from bottom to top (1) correct label of organism (1)	[4]	food chain must have arrows pointing in the right direction.  <b>examples of food chains are:</b> lettuce --> caterpillar --> shrew --> owl lettuce --> caterpillar --> robin --> owl rose --> caterpillar --> shrew --> owl rose --> caterpillar --> robin --> owl rose --> greenfly --> ladybird --> robin --> owl  <b>ignore</b> producer / primary / secondary consumer
	b	idea that energy is transferred / shows energy at each level (1) takes into account the mass / size of an organism (1)	[2]	<b>accept</b> idea of ignoring numbers of organisms in pyramid of biomass. <b>ignore</b> references to the shape of the pyramid
		<b>Total</b>	[6]	

Question		Expected Answers	Marks	Additional Guidance
4	a	starch is not soluble / glucose is soluble (1)  so will stay where put (inside cells) / no osmotic effect (1)	[2]	<b>ignore</b> will not be lost
	b	i 12 noon / noon / mid day / 12pm (1)	[1]	<b>ignore</b> 12 <b>reject</b> 12am
		ii 7.30 } = (1)                      am } = (1) 4.30 }                                      pm }	[2]	7.30 and 16.30 = 2 marks  <b>accept</b> morning and afternoon
		iii idea that photosynthesis is greater than respiration / cannot photosynthesise at night / ORA (1)  idea of to make food or glucose or starch / have <b>more</b> energy (1)	[2]	do not credit reference to X and Y, only to respiration and photosynthesis <b>ignore</b> references to CO <sub>2</sub> and oxygen  <b>do not penalise</b> references to making / creating energy
		<b>Total</b>	[7]	
5	a	temperature; carbon dioxide; light;	[2]	<b>accept</b> in any order <b>ignore</b> heat / water / minerals  3 correct = 2 marks 2 correct = 1 mark 1 correct = 0 marks
	b	<b>any three from:</b> errors in counting; do not know the volume of the bubbles/gases in bubble / bubbles different sizes; some of the oxygen is used by respiration; some bubbles will stick to the pond weed / not float to top; 1 minute not long enough;	[3]	<b>ignore</b> 'human error' on its own  <b>ignore</b> mention changing variable such as temperature as it is only for 1 minute
		<b>Total</b>	[5]	

Question		Expected Answers	Marks	Additional Guidance
6	a	<p><b>any two from:</b>  mutated / faulty allele / changed gene or DNA;  is co-dominant / recessive;  alters haemoglobin / shape of Red Blood Cell;  idea of less oxygen;</p>	[2]	
	b	<p>idea that it protects against malaria (1)</p> <p>idea that people with sickle cell are more likely to survive (than non carriers) / ORA (1)</p> <p>and reproduce / pass (gene / sickle cell anaemia) on to next generation / ORA (1)</p>	[3]	ignore reference to natural selection
		<b>Total</b>	[5]	
7		<p><b>one mark for each set of words used correctly:</b>  idea that DNA is the cause of the problem / makes someone the carrier of the disease / faulty gene (1)</p> <p>DNA/gene <b>taken from</b> white blood cells (1)</p> <p>gene probe attaches to (mutated) gene / DNA (1)</p> <p>use of autoradiography to locate gene probe (1)</p>	[4]	<p>ignore reference to cheek cells</p> <p>ignore reference to UV and fluorescence</p>
		<b>Total</b>	[4]	



Question	Expected Answers	Marks	Additional Guidance
8 a	(used) to make ATP (1)	[1]	<b>accept</b> released as heat
b	muscle contracts / shorter / fatter (1)	[1]	<b>reject</b> relax
c	<b>any two from:</b> different levels of fitness/physical condition/ exercise; do different sports; idea of different genetic makeup/age/gender;	[2]	<b>ignore</b> environmental factors such as life style / size and weight
d	glucose only on left (1) lactic acid only on right (1)	[2]	<b>ignore</b> 'energy'
	<b>Total</b>	<b>[6]</b>	

9 a	B } = (1)                      antigens } = (1) A }	[2]																										
b	<p style="text-align: center;"><b>donor</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>A</td> <td>B</td> <td>AB</td> <td>O</td> </tr> <tr> <td><b>recipient</b></td> <td>A</td> <td>x</td> <td>x</td> <td>✓</td> </tr> <tr> <td>B</td> <td>x</td> <td>✓</td> <td>x</td> <td>✓</td> </tr> <tr> <td>AB</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>O</td> <td>x</td> <td>x</td> <td>x</td> <td>✓</td> </tr> </table>		A	B	AB	O	<b>recipient</b>	A	x	x	✓	B	x	✓	x	✓	AB	✓	✓	✓	✓	O	x	x	x	✓	[3]	O column correct = 1 mark  AB row correct = 1 mark  rest are all 'x's = 1 mark
	A	B	AB	O																								
<b>recipient</b>	A	x	x	✓																								
B	x	✓	x	✓																								
AB	✓	✓	✓	✓																								
O	x	x	x	✓																								
c	blood will clot (1) idea of blocking blood vessels / stop blood flow / stroke (1)	[2]	<b>ignore</b> heart attack																									
	<b>Total</b>	<b>[7]</b>																										

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