

**Biology A**

General Certificate of Secondary Education

Unit **A163/02**: Ideas in Context plus B7 (Higher Tier)

**Mark Scheme for June 2013**

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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

Used in the detailed Mark Scheme:

Annotation	Meaning
/	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	credit alternative wording / or words to that effect
ORA	or reverse argument

Available in scoris to annotate scripts:

	correct response
	incorrect response
[BOD]	benefit of doubt
[NBOD]	no benefit of doubt
[ECF]	error carried forward
[0], [L1], [L2], [L3]	indicate level awarded for a question marked by level of response
[^]	information omitted
[CON]	contradiction
[R]	reject

	indicate uncertainty or ambiguity
	draw attention to particular part of candidate's response

1. **ADDITIONAL OBJECTS:** You **must** assess and annotate the additional objects for each script you mark. Where credit is awarded, appropriate annotation must be used. If no credit is to be awarded for the additional object, please use annotation as agreed at the SSU.

**Subject-specific Marking Instructions**

- a. Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).
  - b. 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:

		✗	✗	
--	--	---	---	--

This would be worth  
1 mark.

		✓	✗	
--	--	---	---	--

This would be worth  
0 marks.

✗	✗	✓	✓	
---	---	---	---	--

This would be worth  
1 mark.

- c. 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.

- d. 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	✓	x	✓	✓				✓		
Paris				✓	✓		✓	✓		
Southampton	✓	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>

- e. For answers marked by levels of response:

- Read through the whole answer from start to finish**
- Decide the level that best fits the answer** – match the quality of the answer to the closest level descriptor
- To determine the mark within the level**, consider the following:

Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

- Use the **L1, L2, L3** annotations in Scoris to show your decision; do not use ticks.

Quality of Written Communication skills assessed in 6-mark extended writing questions include:

- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Question	Answer	Marks	Guidance
1 (a)	86/1.70 <sup>2</sup> OR 86/1.7 <sup>2</sup> (1) 29.8 (1)	2	Any answer between and including 29 – 30 = 1 mark <b>do not accept</b> units / cm <sup>2</sup> 29.8 alone scores 2 marks
(b)	overweight	1	ecf
(c)	<b>accuracy</b> how close to true value / correct value (1) <b>repeatability</b> the readings are nearly the same / close to previous reading / similar (1)	2	<b>ignore</b> how accurate the readings were <b>ignore</b> / right value / valid / precise <b>ignore</b> equipment gives correct results
(d) (i)	<b>Any two from:</b> BMI change of 26 -> 25 / 1 / which is small / which is borderline ; so change in risk would be smaller (than 22%) / idea that not everyone in range would have same risk / those higher in range would have a higher risk ORA ; Idea that risk data is averaged / mean	2	<b>ignore</b> ref to risk factors <b>ignore</b> estimate
(ii)	the risk / probability is low (1) but the consequences are high / could die (1)	2	<b>ignore</b> lower / decreased
	<b>Total</b>	<b>9</b>	



Question	Answer	Marks	Guidance							
2 (a)	<p>A – (low white blood cell count), likely to get infection / disease / weak immune system (1)</p> <p>B – (low haemoglobin so) anaemic / get tired easily / less oxygen / breathless (1)</p> <p>C – (low platelets so) blood not clot as quickly / bleed for longer (1)</p>	3	<p>ignore illness</p> <p>ignore pale</p> <p>ignore scabs / wounds not healing</p>							
(b)	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">contains haemoglobin</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">no nucleus</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">biconcave shape</div> <table border="1" style="border-collapse: collapse; text-align: left;"> <tr><td>only survives for six weeks</td></tr> <tr><td>has a larger volume to hold oxygen</td></tr> <tr><td>to bind with oxygen</td></tr> <tr><td>cannot divide to produce new cells</td></tr> <tr><td>more space for haemoglobin</td></tr> <tr><td>helps the red blood cell move through the blood</td></tr> <tr><td>increased surface area to volume ratio for oxygen exchange</td></tr> </table> </div>	only survives for six weeks	has a larger volume to hold oxygen	to bind with oxygen	cannot divide to produce new cells	more space for haemoglobin	helps the red blood cell move through the blood	increased surface area to volume ratio for oxygen exchange	3	
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increased surface area to volume ratio for oxygen exchange										
	<b>Total</b>	<b>6</b>								

Question	Answer	Marks	Guidance
3	<p><b>Level 3 (5–6 marks)</b> Includes description of diffusion AND tissue fluid AND changes in concentration Quality of written communication does not impede communication of science at this level.</p> <p><b>Level 2 (3–4 marks)</b> Includes description of diffusion AND tissue fluid OR Includes description of diffusion AND changes in concentration OR Includes description of tissue fluid AND changes in concentration. Quality of written communication partly impedes the communication of science at this level.</p> <p><b>Level 1 (1–2 marks)</b> Includes description of diffusion OR tissue fluid OR changes in concentration. Quality of written communication impedes the communication of science at this level.</p> <p><b>Level 0</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades B to A*</b></p> <p><b>Relevant points include:</b></p> <p><b>diffusion</b></p> <ul style="list-style-type: none"> <li>• Oxygen diffuses into cells / from blood</li> <li>• Carbon dioxide diffuses out of cells / into blood</li> </ul> <p><b>tissue fluid</b></p> <ul style="list-style-type: none"> <li>• Tissue fluid / lymph transports (dissolved) gases</li> <li>• Tissue fluid / lymph leaves blood at start of capillary</li> <li>• Tissue fluid / lymph goes back to blood at end of capillary</li> </ul> <p><b>changes in concentration</b></p> <ul style="list-style-type: none"> <li>• Idea of concentration gradient</li> <li>• More oxygen at arterial end of capillary ORA</li> <li>• Less carbon dioxide at arterial end of capillary ORA</li> <li>• Comment on high / low pressure being incorrect</li> </ul> <p><b>Use the L1, L2, L3 annotations in Scorris; do not use ticks.</b></p>
	<b>Total</b>	<b>6</b>	

Question	Answer	Marks	Guidance
4	<p><i>Do not credit Yes or No</i></p> <p><b>Any three from:</b></p> <p>hairs lie flat ;</p> <p>sweating ;</p> <p>evaporates / removes (latent) heat ;</p> <p>idea of vasodilation ;</p> <p>denaturing of enzymes</p>	3	ignore cooling down
	<b>Total</b>	<b>3</b>	

Question	Answer	Marks	Guidance
5 (a)	<p>take vitamin supplements</p> <p>have a high fibre diet</p> <p>eat more protein</p> <p>increase energy (food) intake</p> <p>eat more complex carbohydrates</p> <p>take mineral supplements</p>	2	3 ticks = 1 mark max. 4 or more ticks = 0 marks
(b)	<p>Huntington's disorder</p> <p>obesity</p> <p>bacteria causing sore throat</p> <p>heart disease</p> <p>skin cancer</p> <p>virus causing common cold</p> <p>cystic fibrosis</p> <p>colour blindness inherited from father</p>	1	4 ticks or more ticks = 0 marks
(c)	C A B	2	3 correct = 2 marks 2 or 1 correct = 1 mark

Question	Answer	Marks	Guidance
5 (d)	<p>Insulin in tablets enters the blood stream too quickly.</p> <p>Tablets are more likely to cause infection.</p> <p>Insulin in tablets is more likely to cause an overdose.</p> <p>Insulin in injections will work faster.</p> <p>Insulin is injected straight into the pancreas.</p> <p>Insulin in tablets is likely to be digested and broken down.</p>	2	3 ticks = 1 mark max. 4 or more ticks = 0 marks
<b>Total</b>		<b>7</b>	

Question	Answer	Marks	Guidance
6	<p><b>Level 3 (5–6 marks)</b> Includes a correct reference to <b>closed loop AND explanation AND example</b> of human activity. Quality of written communication does not impede communication of science at this level.</p> <p><b>Level 2 (3–4 marks)</b> Includes a correct reference to <b>closed loop AND explanation</b>. OR includes a correct reference to <b>closed loop AND example</b> of human activity. OR includes a correct reference to <b>explanation AND example</b> of human activity. Quality of written communication partly impedes the communication of science at this level.</p> <p><b>Level 1 (1–2 marks)</b> Includes a correct reference to <b>closed loop OR explanation OR example</b> of human activity. Quality of written communication impedes the communication of science at this level.</p> <p><b>Level 0</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p>This question is targeted at grades D to A</p> <p><b>Relevant points include:</b></p> <p><b>Closed loop</b></p> <ul style="list-style-type: none"> <li>• no waste</li> <li>• idea of output from one part becomes input for another part</li> <li>• sustainable</li> <li>• example given</li> </ul> <p><b>Examples of human activity</b></p> <ul style="list-style-type: none"> <li>• fishing</li> <li>• emission from burning fossil fuels</li> <li>• palm oil / soya plantations</li> <li>• slash and burn / deforestation</li> <li>• waste / pollution</li> <li>• any good example</li> </ul> <p><b>Explanation of how it becomes (open loop)</b></p> <ul style="list-style-type: none"> <li>• consequence of removing biomass</li> <li>• consequence of introducing waste</li> <li>• reason why not sustainable</li> </ul> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>
	<b>Total</b>	<b>6</b>	

Question	Answer	Marks	Guidance					
7	<p>(a)</p> <p>Resources are not taken from the environment.  Resources are used faster than they are replaced.  Resources are only used if they are urgently needed.  Resources are used at a rate at which they are replaced.  Resources are looked for in new areas.</p> <table border="1"> <tr><td></td></tr> <tr><td></td></tr> <tr><td></td></tr> <tr><td>✓</td></tr> <tr><td></td></tr> </table>				✓		1	2 or more ticks = 0 marks
✓								
(b)	<p><b>any two from:</b></p> <p><i>idea of restrictions on:</i>  number of fish taken / idea of quotas ;  size / age/ species taken ;  fishing at certain times / at certain places</p>	2	<p><b>ignore</b> fish farming  <b>ignore</b> reference to need  <b>accept</b> bans</p>					
(c)	<p>idea that local people need the resources</p>	1	<p><b>ignore</b> want</p>					
	<b>Total</b>	<b>4</b>						

Question	Answer	Marks	Guidance
8 (a)	<p>sexual reproduction in plants</p> <p>bacterial synthesis of medicines</p> <p>testing for genetic disorders</p> <p>selective breeding</p> <p>asexual reproduction in animals</p> <p>herbicide resistance in crop plants</p>	2	3 ticks = 1 mark max. 4 or more ticks = 0 marks
(b)	<p>idea of need or benefit (1)</p> <p>relevant comparison to UK (1)</p>	2	



Question	Answer	Marks	Guidance
(c)	<p><b>Level 3 (5–6 marks)</b> Includes reference to <b>getting</b> the gene AND <b>transferring</b> the gene AND <b>expressing</b> the gene. Quality of written communication does not impede communication of science at this level.</p> <p><b>Level 2 (3–4 marks)</b> Includes reference to <b>getting</b> the gene AND <b>transferring</b> the gene OR <b>getting</b> the gene AND <b>expressing</b> the gene. OR <b>transferring</b> the gene AND <b>expressing</b> the gene. Quality of written communication partly impedes the communication of science at this level.</p> <p><b>Level 1 (1–2 marks)</b> Includes reference to <b>getting</b> the gene OR <b>transferring</b> the gene OR <b>expressing</b> the gene. Quality of written communication impedes the communication of science at this level.</p> <p><b>Level 0</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p>This question is targeted at grades D to C</p> <p><b>Relevant points include:</b></p> <p><b>Getting the gene</b></p> <ul style="list-style-type: none"> <li>• identify gene</li> <li>• isolate gene</li> <li>• replicate gene</li> </ul> <p><b>Transferring the gene</b></p> <ul style="list-style-type: none"> <li>• put gene into vector</li> <li>• example of vector eg virus, aerosol / plasmid / phage</li> <li>• explanation of how insertion occurs</li> </ul> <p><b>Expressing the gene</b></p> <ul style="list-style-type: none"> <li>• idea that DNA is common in all organisms</li> </ul> <p><i>in humans</i></p> <ul style="list-style-type: none"> <li>• transferred gene makes Factor 8</li> </ul> <p><i>in bacteria</i></p> <ul style="list-style-type: none"> <li>• transferred gene makes Factor 8</li> <li>• bacteria reproduce</li> <li>• isolate / purify F8 / give people F8</li> <li>•</li> </ul> <p><b>If they inject bacteria into human, then max L2</b></p> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>
	<b>Total</b>	<b>10</b>	

Question	Answer	Marks	Guidance
9 (a)	2 before 3; 3 before 1; 1 before 6; 6 before 5	2	2 or 3 steps correct for 1 mark 4 steps correct for 2 marks  23165 = 2 marks
(b)	0.001 0.000 001 (0.000 000 001) 0.000 000 000 001 0.000 000 000 000 001	1	
(c)	virus is 1000 nm (in diameter) (1) therefore need <u>electron microscope</u> (1)	2	<b>accept</b> less than 2000nm  <b>ignore</b> "need to use a more powerful microscope  <b>ignore</b> "may not be completely safe"
(d) (i)	not enough is known about nanoparticles (1) (10% are) released when socks are washed / into washing water (1)	2	
(ii)	make them so none / less are released when washed	1	<b>ignore</b> use less nanoparticles
(e)	<b>idea</b> that 101 nm may be just as dangerous as 99 nm	1	
	<b>Total</b>	<b>9</b>	
	<b>Paper Total</b>	<b>60</b>	

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