



**GCSE**

**Biology A**

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

General Certificate of Secondary Education

**Mark Scheme for June 2016**

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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
words	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	alternative wording
ORA	or reverse argument




Available in RM Assessor to annotate scripts

	indicate uncertainty or ambiguity
	benefit of doubt
	contradiction
	incorrect response
	error carried forward
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	no benefit of doubt
	reject

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	correct response
	draw attention to particular part of candidate's response
	information omitted

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**Subject-specific Marking Instructions**

- a. If a candidate alters his/her response, examiners should accept the alteration.
- 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 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  
1 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 checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth  
1 mark.

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- 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 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>

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## MARK SCHEME:

Question		CBT Question Numbers	Answer	Mark	Guidance
1	a	i	<p><b>Any two from lifestyle:</b>            Alcohol consumption;            Tobacco smoked;            Activity / exercise / fitness;            Diet;  <b>Recreation / illegal drugs</b></p>	1	<p>2 needed for 1 mark</p> <p>Accept first answer on each question.</p> <p>If second question is blank accept first two answers</p>
		ii	<p><b>Any two from medical history:</b>            Existing / previous treatments / symptoms / health issues / injuries;            Current medication;  <b>Family</b> medical history;</p>	1	<p>2 needed for 1 mark</p> <p>Accept first answer on each question.</p> <p>If second question is blank accept first two answers</p>
	b	i	<p>1.3            28 /28.0</p>	1	
		ii	<p><b>Any three from:</b>  <b>Increase to muscles</b> to provide oxygen / glucose / for energy / respiration;  <b>Not much change to brain</b> because not affected by exercise;  <b>Decrease to digestive</b> system and idea of not needed;  <b>Increase to skin</b> to lose heat / cool down;  <b>Increase to heart muscle</b> because it pumps harder;  <b>Increase to other body parts</b> provide oxygen / glucose / for energy / respiration;  <b>Increase in total blood flow</b> because some parts need more oxygen / glucose / energy / respiration;</p>	3	Reasons must be included
		iii	<p>Idea that <b>all</b> blood goes to lungs;            5 (litres per minute);</p>	2	

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Question		CBT Question Numbers	Answer	Mark	Guidance												
	C		<table border="1"> <tr> <td>The risk of doing the fitness programme.</td> <td></td> </tr> <tr> <td>The accuracy of the monitoring technique.</td> <td>✓</td> </tr> <tr> <td>A peer review of other fitness trainers.</td> <td></td> </tr> <tr> <td>The fitness trainer's prediction of the outcome.</td> <td></td> </tr> <tr> <td>An understanding of cause and effect.</td> <td></td> </tr> <tr> <td>The repeatability of the data obtained.</td> <td>✓</td> </tr> </table>	The risk of doing the fitness programme.		The accuracy of the monitoring technique.	✓	A peer review of other fitness trainers.		The fitness trainer's prediction of the outcome.		An understanding of cause and effect.		The repeatability of the data obtained.	✓	2	Deduct one mark for each additional incorrect answer.
The risk of doing the fitness programme.																	
The accuracy of the monitoring technique.	✓																
A peer review of other fitness trainers.																	
The fitness trainer's prediction of the outcome.																	
An understanding of cause and effect.																	
The repeatability of the data obtained.	✓																
			<b>Total</b>	<b>10</b>													



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Question	CBT Question Numbers	Answer	Mark	Guidance
2	✓	<p><b>[Level 3]</b> Includes some indicatives points from all three areas. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Includes some indicative points from two areas. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> Includes some indicative points from one area. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p><b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p><b>This question is targeted at grades up to C</b></p> <p><b>Indicative scientific points referring to the tables may include:</b></p> <ul style="list-style-type: none"> <li>• BMI = 90 / 2.89</li> <li>• = 31.(14)</li> <li>• Needs to be 24 or below</li> <li>• Refers to 29% fat</li> </ul> <p><b>Indicative scientific points concerning conclusions</b></p> <ul style="list-style-type: none"> <li>• Neil is obese</li> <li>• Neil is above average on fat scale</li> <li>• Idea that BMI is not completely reliable / accurate</li> </ul> <p><b>Indicative scientific points for action may include:</b></p> <ul style="list-style-type: none"> <li>• Yes (he should be concerned.)</li> <li>• He should lose weight</li> <li>• (Do more) exercise</li> <li>• Idea of improved diet</li> </ul> <p><b>Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.</b></p>
		<b>Total</b>	<b>6</b>	

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Question			CBT Question Numbers	Answer	Mark	Guidance
3	a	i		4.5 (cm);	1	
		ii		<b>2 from:</b> Any idea / example of different circumstance or risk eg age / weight / health / lifestyle / fitness / etc; Some were in group 1; Some decided not to have surgery;	2	AO is same size so ignore "more urgent" arguments. "They" refers to group 1
	b			Idea of benefit outweighs risk;	1	<b>Accept</b> risk of aneurism outweighs risk of surgery Risk of not having the surgery is greater.
	c			Calculated risk is 5.7% / based on data / stats / results / numbers; Perceived risk is what the patient thinks (the risks are) / opinion;	2	<b>Ignore</b> risk is calculated / probability / value  <b>Ignore</b> doctors opinion
				<b>Total</b>	<b>6</b>	

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Question			CBT Question Numbers	Answer	Mark	Guidance
4	a	i	✓	Less than / before 30; ( age) when stopped smoking;	2	<b>Do not accept</b> 30 (and under)
		ii	✓	11 – 5.6; 5.4;	2	5.4 alone = 2 marks
		iii	✓	<i>Any two from:</i> The <b>younger</b> you are when you <b>stop</b> the lower the risk / the <b>older</b> you are when you <b>stop</b> the higher the risk; Even if never smoked still have a risk / low(est) risk; <b>Rate</b> of increase of risk increases with age / doubles every ten years;	2	<b>Do NOT ACCEPT</b> the LONGER you smoke the higher the risk ORA <b>Do not accept</b> The longer / later (you leave it) to stop smoking the higher the risk <b>Accept</b> positive correlation between age and risk for 1 mark
		iv	✓	(As) <b>how long</b> they have smoked.....;  .....increases, risk increases;	2	<b>Accept</b> idea that it is uncertain how long they have been smoking.  Trend must be identified for 2 <sup>nd</sup> mark e.g. longer you smoke the bigger the risk ORA = 2 marks;
	b		✓	<b>Food / intake idea</b> eg Poor diet explained eg fat clogs arteries; <b>Exercise idea</b> eg Lack of exercise explained eg unfit ORA;	2	<b>Accept</b> recreational / illegal drugs and alcohol for Food idea <b>Accept</b> any good explanation. e.g fat clogs arteries / salt raises blood pressure
				<b>Total</b>	<b>10</b>	

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Question	CBT Question Numbers	Answer	Mark	Guidance
5		<p><b>[Level 3]</b> Includes some indicatives points from all three areas. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Includes some indicative points from two areas. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> Includes some indicative points from one area Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p><b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p><b>This question is targeted at grades up to A-B</b></p> <p><b>Indicative scientific points referring to sustainability may include:</b></p> <ul style="list-style-type: none"> <li>• Idea of replace / replant what is taken</li> <li>• Impact on food chain or web / damages ecosystem</li> </ul> <p><b>ignore habitat</b></p> <ul style="list-style-type: none"> <li>• Reduces biodiversity / fewer species / extinction</li> </ul> <p><b>Indicative scientific points concerning world community may include:</b></p> <ul style="list-style-type: none"> <li>• Provides medical resources</li> <li>• Provides oxygen ORA</li> <li>• Removes carbon dioxide ORA</li> <li>• Ref to Timber</li> <li>• Global warming /climate change</li> </ul> <p><b>Indicative scientific points for local community may include:</b></p> <ul style="list-style-type: none"> <li>• Fuel</li> <li>• Sale of resources / income / jobs</li> <li>• Room to grow crops / livestock</li> <li>• Idea of slash and burn effects eg smoke /pollution / erosion / desertification / floods</li> </ul> <p><b>Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.</b></p>
		<b>Total</b>	<b>6</b>	

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Question		CBT Question Numbers	Answer	Mark	Guidance												
6	a		<p><b>Any three from:</b>            Idea of environmental impact;            from raw materials / manufacture / made / production / transportation;            to being disposed / destroyed / thrown away/            recycled / biodegradability;            energy used;</p>	3	<b>Accept</b> environmentally friendly												
	b		<table border="1"> <tbody> <tr> <td>Does adding coloured dye to the plastic make the plastic weaker?</td> <td></td> </tr> <tr> <td>How much will it cost to manufacture the new plastic for both wrapping and for bags?</td> <td></td> </tr> <tr> <td>Is it a good idea to fine people for dropping the plastic in the street?</td> <td>✓</td> </tr> <tr> <td>Should plastic bags have holes to prevent children from suffocating themselves?</td> <td>✓</td> </tr> <tr> <td>How thick does the plastic need to be to stop the bags from tearing too easily?</td> <td></td> </tr> <tr> <td>When the plastic is thrown away, will it biodegrade and how long will it take?</td> <td></td> </tr> </tbody> </table>	Does adding coloured dye to the plastic make the plastic weaker?		How much will it cost to manufacture the new plastic for both wrapping and for bags?		Is it a good idea to fine people for dropping the plastic in the street?	✓	Should plastic bags have holes to prevent children from suffocating themselves?	✓	How thick does the plastic need to be to stop the bags from tearing too easily?		When the plastic is thrown away, will it biodegrade and how long will it take?		2	
Does adding coloured dye to the plastic make the plastic weaker?																	
How much will it cost to manufacture the new plastic for both wrapping and for bags?																	
Is it a good idea to fine people for dropping the plastic in the street?	✓																
Should plastic bags have holes to prevent children from suffocating themselves?	✓																
How thick does the plastic need to be to stop the bags from tearing too easily?																	
When the plastic is thrown away, will it biodegrade and how long will it take?																	
	c		<p><b>1 from:</b>            resent the charges            Increase cost of shopping</p> <p><b>1 from:</b>            Harmful to wildlife;            Prevents littering / throwing away / production of rubbish / landfill ;            Encourages re-use / bring own bag;            Conserve raw materials / energy;</p>	2	<p><b>Ignore</b> has impact on environment</p> <p><b>Ignore</b> fewer bags are used.</p> <p><b>Ignore</b> recycling</p>												
			<b>Total</b>	<b>7</b>													

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Question		CBT Question Numbers	Answer	Mark	Guidance	
7	a		prevent soil erosion	✓	3	Deduct one mark for each additional incorrect response.
			causes water to run off the land			
			prevents light from reaching the ground			
			stops nutrients from soaking into the soil			
			stops fires from spreading			
			prevent extremes of temperature	✓		
			causes cloud formation	✓		
	b		<p><i>Any three from:</i>            Oxygen / carbon dioxide absorbed;            Water;            Minerals / mining;            Pollination;            (Example of) food;            Tourism;            Medicines / drugs;            Fuel;</p>	3	Ignore "clean air" / soil / agriculture / crops	
	c		<p><i>Any two from:</i>            Oxygen;            Carbon dioxide;            Dead or decaying material or example / methane;            Faeces;            Urine / urea / ammonia;</p>	2		
				<b>Total</b>	<b>8</b>	

Question		CBT Question Numbers	Answer	Mark	Guidance
8	a		<p><b>[Level 3]</b> Some details from three areas. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Some details from two areas. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> Some details from one area. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p><b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p> <p><b>Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.</b></p>	6	<p><b>This question is targeted at grades up to A*</b> <b>Indicative scientific points regarding PROCESS of obtaining the gene:</b></p> <ul style="list-style-type: none"> <li>• Idea of gene from a human</li> <li>• Isolate / remove / cut out gene</li> <li>• Use of enzymes</li> <li>• Replicate gene</li> <li>• (Put gene into) vector / virus / plasmid</li> </ul> <p><b>Indicative scientific points regarding INSERTION into bacteria may include:</b></p> <ul style="list-style-type: none"> <li>• (DNA) incorporated into bacteria</li> <li>• Replication of bacteria</li> <li>• (Bacteria start) producing insulin</li> </ul> <p><b>Indicative scientific points regarding SELECTING bacteria include:</b> <b>Either with fluorescent marker</b></p> <ul style="list-style-type: none"> <li>• Production of <b>gene probe</b></li> <li>• Addition of <b>probe</b> to DNA</li> <li>• <b>Probe</b> attaches to correct gene</li> <li>• <b>Probe</b> fluoresces under UV</li> </ul> <p><b>Or with antibiotic resistant gene</b></p> <ul style="list-style-type: none"> <li>• Antibiotic resistant gene attached to insulin</li> <li>• Both genes taken up by bacteria</li> <li>• Bacteria treated with antibiotic</li> <li>• Bacteria with resistant gene and insulin gene survive / others do not</li> </ul>

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Question		CBT Question Numbers	Answer		Mark	Guidance
	b		rapid reproduction		1	
			presence of plasmids			
			may cause disease	✓		
			ability to make complex molecules			
			simple biochemistry			
			lack of ethical concerns in their production			
			<b>Total</b>		<b>7</b>	
			<b>Paper Total</b>		<b>60</b>	



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