

**Biology A**  
**Twenty First Century Science**

General Certificate of Secondary Education **J633**

**Mark Schemes for the Units**

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**June 2009**

**J633/MS/R/09**

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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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### GCSE Twenty First Century Science – Biology A (J633)

#### MARK SCHEMES FOR THE UNITS

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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. If a candidate alters his/her response, examiners should accept the alteration.
6. 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.

7. 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.

8. 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

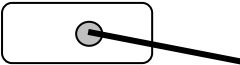
Edinburgh	
Manchester	
Paris	
Southampton	

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		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

## A221/01 Modules B1, B2, B3 Foundation Tier

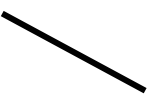
Question		Expected Answers	Marks	Rationale
1	a	The cells of the embryo separated into two groups	[1]	if more than one box is ticked then box scores zero <b>allow</b> any other clearly identified correct response e.g. shading in the box
1	b	There are differences between Neil and Ranjit caused by their environments.	[1]	if more than one box is ticked then box scores zero <b>allow</b> any other clearly identified correct response e.g. shading in the box
1	c	Deciding whether or not the pregnancy should be terminated.	[1]	if more than one box is ticked then box scores zero <b>allow</b> any other clearly identified correct response e.g. shading in the box
<b>Total</b>			<b>[3]</b>	

Question			Expected Answers	Marks	Rationale
2	a		 <p><u>instructions for how an organism develops are found here</u></p>	[1]	<p>line should be drawn from the shaded circle, exiting the cell, and clearly heading towards the label box  <b>accept</b> the label line if touches the edge or inner part of the shaded circle  <b>reject</b> any separate labels that may be drawn by the candidate</p>
2	b	i	recessive (1)	[1]	<b>allow</b> any other clearly identified response e.g. underlining or shading
2	b	ii	one (1)	[1]	
2	b	iii	50% (1)	[1]	<b>allow</b> any other clearly identified response e.g. underlining or shading
<b>Total</b>				<b>[4]</b>	

Question			Expected Answers	Marks	Rationale
3	a		Jane (1) Peter (1)	[2]	<b>accept</b> either way round
3	b		Peter (1)	[1]	
3	c		Stella (1)	[1]	
<b>Total</b>				<b>[4]</b>	

Question			Expected Answers			Marks	Rationale
4				<b>genes</b>	<b>environment</b>	<b>both</b>	one mark for each correct tick see guidance if there is more than 1 tick on each line
			Huntington's disorder	✓			
			the sex of a person	✓			
			heart disease			✓	
<b>Total</b>						<b>[3]</b>	



Question		Expected Answers	Marks	Rationale								
5	a	<p>fatty diet</p> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td><input type="checkbox"/></td></tr> <tr><td>✓</td></tr> <tr><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> <tr><td>✓</td></tr> </table> <p>smoking</p>	<input type="checkbox"/>	✓	<input type="checkbox"/>	<input type="checkbox"/>	✓	[1]	<p>both ticks required for the mark                      if more than two boxes are ticked then each incorrect box loses one mark from the total for the question                      the candidate cannot score less than zero</p>			
<input type="checkbox"/>												
✓												
<input type="checkbox"/>												
<input type="checkbox"/>												
✓												
5	b	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td>Dave's blood vessels built up fatty deposits</td></tr> <tr><td> </td></tr> </table>  <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td>Dave's heart muscle did not get enough oxygen</td></tr> </table>			Dave's blood vessels built up fatty deposits					Dave's heart muscle did not get enough oxygen	[2]	<p>if more than one line is drawn then line scores zero.                      one mark can be given for either the correct cause or correct effect only                      the candidate cannot score less than zero</p>
Dave's blood vessels built up fatty deposits												
Dave's heart muscle did not get enough oxygen												
5	c	<p>food</p> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> <tr><td>✓</td></tr> <tr><td><input type="checkbox"/></td></tr> </table>	<input type="checkbox"/>	<input type="checkbox"/>	✓	<input type="checkbox"/>	[1]	<p>if more than one box is ticked then box scores zero  <b>allow</b> any other clearly identified correct response e.g. shading in the box</p>				
<input type="checkbox"/>												
<input type="checkbox"/>												
✓												
<input type="checkbox"/>												
<b>Total</b>			<b>[4]</b>									

Question		Expected Answers	Marks	Rationale					
6	a	<p>antibiotics do not work against viruses</p> <p>the bacteria are resistant to the antibiotics</p>	<div style="display: flex; align-items: center; justify-content: center;"> <input type="checkbox"/>  <input checked="" type="checkbox"/>  <input type="checkbox"/>  <input checked="" type="checkbox"/>  <input type="checkbox"/> </div> <p>[2]</p>	<p>if more than two boxes are ticked then each incorrect box loses one mark from the total for the question</p> <p>the candidate cannot score less than zero</p>					
6	b	<table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td style="padding: 2px 10px;">D</td> <td style="padding: 2px 10px;">(E)</td> <td style="padding: 2px 10px;">B</td> <td style="padding: 2px 10px;">(A)</td> <td style="padding: 2px 10px;">C</td> </tr> </table>	D	(E)	B	(A)	C	<p>[2]</p>	<p>D before B = 1 mark</p> <p>B before C = 1 mark</p>
D	(E)	B	(A)	C					
<b>Total</b>			<b>[4]</b>						

Question			Expected Answers	Marks	Rationale
7	a		any age between 0 and 1½ inclusive (1)	[1]	accept 0-18 <u>months</u>
7	b		1 (years) (1)	[1]	
7	c		4 and 15 (1)	[1]	if more than one answer is ringed then ring scores zero the candidate cannot score less than zero <b>allow</b> any other clearly identified response e.g. underlining or shading
7	d		people did not have time to make enough antibodies	[1]	if more than one box is ticked then box scores zero <b>allow</b> any other clearly identified correct response e.g. shading in the box
7	e	i	Jane (1)	[1]	
7	e	ii	Stella (1)	[1]	
<b>Total</b>				<b>[6]</b>	

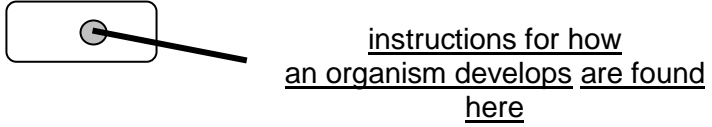
Question		Expected Answers	Marks	Rationale
8	a	3500 million years (1)	[1]	if more than one answer is ringed then ring scores zero the candidate cannot score less than zero <b>allow</b> any other clearly identified response e.g. underlining or shading
8	b	could copy themselves  <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	[1]	if more than one box is ticked then box scores zero <b>allow</b> any other clearly identified correct response e.g. shading in the box
8	c	    <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> natural selection	[1]	if more than one box is ticked then box scores zero <b>allow</b> any other clearly identified correct response e.g. shading in the box

Question		Expected Answers	Marks	Rationale
8	d	<p>... would not have taken place. <input type="checkbox"/></p> <p>... would have produced the same result. <input type="checkbox"/></p> <p>... could have produced a different result. <input checked="" type="checkbox"/></p> <p>... always happens more quickly. <input type="checkbox"/></p> <p>... always happens more slowly. <input type="checkbox"/></p>	[1]	if more than one box is ticked then box scores zero <b>allow</b> any other clearly identified correct response e.g. shading in the box
<b>Total</b>			<b>[4]</b>	

Question		Expected Answers	Marks	Rationale
9	a	Ranjit and Peter (1)	[2]	<b>accept</b> either way round if more than two answers are given then each incorrect answer loses one mark from the total for this question the candidate cannot score less than zero
9	b	Jane (1)	[1]	if more than one answer is given then score is zero
9	c	Peter (1)	[1]	if more than one answer is given then score is zero
<b>Total</b>			<b>[4]</b>	

Question		Expected Answers	Marks	Rationale						
10	a	<p>cells that contract in muscles</p> <p>cells in glands found in the body</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> </table>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	[2]	if more than two boxes are ticked then each incorrect box loses one mark from the total for the question the candidate cannot score less than zero	
<input type="checkbox"/>										
<input type="checkbox"/>										
<input checked="" type="checkbox"/>										
<input checked="" type="checkbox"/>										
<input type="checkbox"/>										
10	b	<p>brain</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td><input type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> </table> <p>spinal cord</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	[2]	if more than two boxes are ticked then each incorrect box loses one mark from the total for the question the candidate cannot score less than zero
<input type="checkbox"/>										
<input checked="" type="checkbox"/>										
<input type="checkbox"/>										
<input type="checkbox"/>										
<input checked="" type="checkbox"/>										
<input type="checkbox"/>										
10	c	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>hormonal system</th> <th>nervous system</th> </tr> </thead> <tbody> <tr> <td>chemical long lasting slow</td> <td>electrical fast short lasting</td> </tr> </tbody> </table>	hormonal system	nervous system	chemical long lasting slow	electrical fast short lasting	[2]	hormonal system: all three correct in any vertical order = 1 mark  nervous system: all three correct in any vertical order = 1 mark		
hormonal system	nervous system									
chemical long lasting slow	electrical fast short lasting									
<b>Total</b>			<b>[6]</b>							

## A221/02 Modules B1, B2, B3 Higher Tier

Question			Expected Answers	Marks	Rationale
1	a		 <p>instructions for how an organism develops are found here</p>	[1]	line should be drawn from the shaded circle, exiting the cell, and clearly heading towards the label box <b>accept</b> the label line if it touches the edge or inner part of the shaded circle <b>reject</b> any separate labels that may be drawn by the candidate
1	b	i	recessive (1)	[1]	<b>allow</b> any other clearly identified response e.g. underlining or shading
1	b	ii	one (1)	[1]	
1	b	iii	50% (1)	[1]	<b>allow</b> any other clearly identified response e.g. underlining or shading
<b>Total</b>				<b>[4]</b>	

Question			Expected Answers	Marks	Rationale
2	a		Peter (1)	[1]	if more than one answer is given then score is zero
2	b		Jane Ali	[1]	both correct for 1 mark <b>accept</b> either way round if more than two answers are given then score is zero the candidate cannot score less than zero
2	c		Stella Ali	[1]	both correct for 1 mark <b>accept</b> either way round if more than two answers are given then score is zero the candidate cannot score less than zero
<b>Total</b>				<b>[3]</b>	

Question			Expected Answers	Marks	Rationale
3	a	i	XY (1)	[1]	<b>accept</b> YX OR xy OR yx <b>accept</b> mixed cases e.g. Xy
3	a	ii	XX (1)	[1]	<b>accept</b> xx <b>reject</b> mixed upper and lower cases
3	b		<div style="display: flex; flex-wrap: wrap;"> <div style="border: 1px solid black; padding: 5px; width: 50%;">Sex is determined by a gene on both the X and the Y chromosome.</div> <div style="border: 1px solid black; padding: 5px; width: 50%;">It causes the embryo to develop into a female.</div> <div style="border: 1px solid black; padding: 5px; width: 50%;">Sex is determined by a gene on the X chromosome.</div> <div style="border: 1px solid black; padding: 5px; width: 50%;">It stops the sex organs from developing into either ovaries or testes.</div> <div style="border: 1px solid black; padding: 5px; width: 50%;">Sex is determined by a gene on the Y chromosome.</div> <div style="border: 1px solid black; padding: 5px; width: 50%;">It causes the sex organs to develop into either ovaries or testes.</div> <div style="border: 1px solid black; padding: 5px; width: 50%;">Sex is determine by the absence of a gene on the X and the Y chromosome.</div> <div style="border: 1px solid black; padding: 5px; width: 50%;">It causes the embryo to develop into a male.</div> </div>	[1]	if more than one line is drawn then score is zero the candidate cannot score less than zero
<b>Total</b>				<b>[3]</b>	



Question		Expected Answers	Marks	Rationale							
4		<p>Genes can code for structural proteins.</p> <p>Genes can code for enzymes.</p> <p>Genes are sections of a DNA molecule.</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td style="width: 30px; height: 20px;"></td></tr> <tr><td style="width: 30px; height: 20px;"></td></tr> <tr><td style="width: 30px; height: 20px; text-align: center;">✓</td></tr> <tr><td style="width: 30px; height: 20px;"></td></tr> <tr><td style="width: 30px; height: 20px; text-align: center;">✓</td></tr> <tr><td style="width: 30px; height: 20px; text-align: center;">✓</td></tr> <tr><td style="width: 30px; height: 20px;"></td></tr> </table> <p style="text-align: center;"><b>[3]</b></p>			✓		✓	✓		<p>If more than three boxes are ticked then each incorrect box loses one mark from the total for the question. The candidate cannot score less than zero.</p>
✓											
✓											
✓											
<b>Total</b>			<b>[3]</b>								

Question		Expected Answers	Marks	Rationale
5	a	any age between 0 and 1½ inclusive (1)	[1]	<b>accept</b> 0 – 18 <u>months</u>
5	b	1 (years) (1)	[1]	
5	c	4 & 15 (1)	[1]	if more than one answer is ringed then ring scores zero. the candidate cannot score less than zero <b>allow</b> any other clearly identified response e.g. underlining or shading

Question			Expected Answers	Marks	Rationale
5	d		<p>people did not have time to make enough antibodies</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px; text-align: center;">✓</div> </div>	[1]	if more than one box is ticked then box scores zero <b>allow</b> any other clearly identified correct response e.g. shading in the box
5	e	i	Jane (1)	[1]	
5	e	ii	Stella (1)	[1]	
<b>Total</b>				<b>[6]</b>	

Question			Expected Answers	Marks	Rationale
6	a		<p>Both drugs and placebos are used in the trial. Neither the doctor or the patient knows who is receiving the drug.</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px;"></div> </div>	[2]	if more than two boxes are ticked then each incorrect box loses one mark from the total for the question the candidate cannot score less than zero

Question		Expected Answers	Marks	Rationale
6	b	<p>Bacterial mutations can produce varieties that are less affected by the antibiotic.</p> <p>Bacteria become resistant to antibiotics.</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div>	[2]	if more than two boxes are ticked then each incorrect box loses one mark from the total for the question the candidate cannot score less than zero
<b>Total</b>			<b>[4]</b>	

Question		Expected Answers	Marks	Rationale
7	a	B (1)	[1]	if more than one answer is given then score is zero
7	b	C and D (1)	[2]	<b>accept</b> either way round if more than two answers are given then each incorrect answer loses one mark from the total for this question the candidate cannot score less than zero
7	c	A (1)	[1]	if more than one answer is given then score is zero
<b>Total</b>			<b>[4]</b>	

Question		Expected Answers	Marks	Rationale
8	a	Ranjit and Peter (1)	[2]	<b>accept</b> either way round if more than two answers are given then each incorrect answer loses one mark from the total for this question the candidate cannot score less than zero
8	b	Jane (1)	[1]	if more than one answer is given then score is zero
8	c	Peter (1)	[1]	if more than one answer is given then score is zero
<b>Total</b>			<b>[4]</b>	

Question		Expected Answers	Marks	Rationale
9	a	<p>direct and indirect human activity</p> <div style="display: flex; align-items: center; margin-left: 100px;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> </div> <p>Introduction of a new predator species</p> <div style="display: flex; align-items: center; margin-left: 100px;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> </div>	[1]	both answers correct for 1 mark if more than two boxes are ticked then score = zero <b>allow</b> any other clearly identified correct response e.g. shading in the box

Question		Expected Answers	Marks	Rationale								
9	b	<p>Organisms have a better chance of survival if they have a diverse food supply.</p> <p>The extinction of a species in a food web has implications for many other species.</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px; text-align: center;">✓</div> </div>	[1]	<p>both answers correct for 1 mark</p> <p>if more than two boxes are ticked then score = zero</p> <p><b>allow</b> any other clearly identified correct response e.g. shading in the box</p>								
9	c	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th style="width: 50%;">not likely to cause extinction</th> <th style="width: 50%;">may cause extinction</th> </tr> </thead> <tbody> <tr> <td>B</td> <td>A</td> </tr> <tr> <td>C</td> <td>D</td> </tr> <tr> <td>F</td> <td>E</td> </tr> </tbody> </table>	not likely to cause extinction	may cause extinction	B	A	C	D	F	E	[3]	<p>six correct = 3 marks</p> <p>five correct = 2 marks</p> <p>four correct = 1 mark</p> <p>one, two or three correct = 0 marks</p> <p>any letter written in both columns scores zero for that letter</p>
not likely to cause extinction	may cause extinction											
B	A											
C	D											
F	E											
<b>Total</b>			[5]									

Question		Expected Answers	Marks	Rationale
10	a	<p>Human evolution shows different groups evolving from one common group.</p> <p>Some species became extinct.</p>	<div style="display: flex; flex-direction: column; align-items: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> </div> <p>[2]</p>	<p>one mark for each correct answer if more than two boxes are ticked then each incorrect box loses one mark from the total for the question the candidate cannot score less than zero</p>
10	b	<p>A larger brain increases the chance of survival.</p> <p>A larger brain allowed the development of new skills.</p>	<div style="display: flex; flex-direction: column; align-items: center;"> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> </div> <p>[2]</p>	<p>one mark for each correct answer if more than two boxes are ticked then each incorrect box loses one mark from the total for the question the candidate cannot score less than zero</p>

Question		Expected Answers	Marks	Rationale
10	c	<p style="text-align: center;"><b>examples of responses</b></p> <pre> graph LR     A[controlled by hormones] --- B[catching a ball]     A --- C[control of growth]     A --- D[development of facial hair in boys]     A --- E[jumping after hearing a loud bang]     B --- F[controlled by nerves]     E --- F     style D fill:#ccc             </pre>	[2]	<p>three lines correct = 2 marks two lines correct = 1 mark. one line correct = 0 marks</p> <p>if more than three lines are drawn then each incorrect line loses one mark from the total for this question the candidate cannot score less than zero</p>
<b>Total</b>			<b>[6]</b>	

## A222/01 Modules B4, B5 and B6 Foundation Tier

Question		Expected Answers	Marks	Rationale
1	a	protein <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <span>(1)</span> </div>	[1]	more than one response = 0 mark <b>accept</b> any clear response e.g. underline the correct sentence, use of a single cross, shade the box.
1	b	increases (1)	[1]	more than one response = 0 marks <b>accept</b> any clear response e.g. underline the correct sentence.
1	c	stop (1) shape (1)	[2]	1 mark per correct response in each sentence response is incorrect if more than one word per line
<b>Total</b>			[4]	



Question		Expected Answers	Marks	Rationale
2	a	a more concentrated solution of glucose <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="margin-left: 10px;">(1)</div> </div>	[1]	more than one response = 0 marks  <b>accept</b> any clear response e.g. underline the correct sentence, use of a single cross, shade the box.
2	b	more water molecules will move from B to A <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="margin-left: 10px;">(1)</div> </div>	[1]	more than one response = 0 marks  <b>accept</b> a clear response e.g. underline the correct sentence, use of a single cross, shade the box
2	c	diffusion water dilute concentrated	[2]	four correct = 2 marks two or three correct = 1 mark 0 or 1 correct = 0 marks response is incorrect if more than 1 word per space.
<b>Total</b>			<b>[4]</b>	

Question		Expected Answers	Marks	Rationale
3	a	increases slightly (1)	[1]	more than one response = 0 marks <b>accept</b> a clear response e.g. underlining the correct words.
3	b	brain skin brain	[2]	three correct responses = 2 marks one or two correct responses = 1 mark  response is incorrect if more than one word per line
3	c	respiring (1)	[1]	more than one response = 0 marks <b>accept</b> a clear response e.g. underlining the correct word
3	d		[2]	one mark for each correct line  if two lines or more on one side = 0 marks for that marking point.
<b>Total</b>			<b>[6]</b>	

Question		Expected Answers	Marks	Rationale					
4	a	D (1)	[1]	more than one response = 0 marks					
4	b	halves (1)	[1]	more than one response = 0 marks <b>accept</b> a clear response e.g. underlining the correct words.					
4	c	<p>... combination of chromosomes.</p> <p>... chromosomes from each parent.</p> <p>... chromosomes found in the sperm.</p> <div style="display: flex; align-items: center; margin-left: 100px;"> <table border="1" style="border-collapse: collapse;"> <tr><td style="text-align: center;">✓</td></tr> <tr><td style="text-align: center;">✓</td></tr> <tr><td style="text-align: center;"> </td></tr> <tr><td style="text-align: center;">✓</td></tr> <tr><td style="text-align: center;"> </td></tr> </table> </div>	✓	✓		✓		[2]	<p>look at each row</p> <p>3 correct rows = 2 marks</p> <p>2 correct rows = 1 mark</p> <p>deduct 1 mark for each additional incorrect response</p> <p><b>accept</b> any clear response e.g. underlining the correct words, use of a single cross, shading of the box</p>
✓									
✓									
✓									
4	d	46 (1)	[1]	more than one response = 0 marks <b>accept</b> any clear response e.g. underlining the correct word					
<b>Total</b>			<b>[5]</b>						

Question		Expected Answers	Marks	Rationale
5	a	nucleus (1) cytoplasm (1)	[2]	correct response per box=1 mark if more than one response in box = 0 marks for that box
5	b	double (1) bases (1)	[2]	correct response per space = 1mark response is incorrect if more than one word per line.
5	c	<p>Most animal cells become highly specialised.</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px; text-align: center;">✓</div> </div> <p>Some plant cells remain unspecialised.</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px; text-align: center;">✓</div> </div>	[2]	1 mark for each correct box. if more than two responses deduct 1 mark for each additional response <b>accept</b> any clear response e.g. underlining the correct words, use of a single cross, shading of boxes.
<b>Total</b>			<b>[6]</b>	

Question		Expected Answers	Marks	Rationale				
6	a	phototropism (1)	[1]	more than one response = 0 marks <b>accept</b> phonetic spelling options				
6	b	<p>... give the plant a light source from above.</p> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td>✓</td></tr> <tr><td> </td></tr> </table> (1)			✓		[1]	more than one response = 0 marks <b>accept</b> any clear response e.g. underline the correct sentence, use of a single cross, shade the box
✓								
6	c	hormones (1) roots (1) unspecialised (1)	[3]	1 mark per correct response in each sentence response is incorrect if more than one word per line				
<b>Total</b>			<b>[5]</b>					

Question		Expected Answers	Marks	Rationale
7	a	C A D B	[2]	three or four correct responses = 2 marks one or two correct responses = 1 mark if more than one response in any box then that box is an incorrect response.
7	b	<p>... insulates the neuron from ...</p> <p>... increases the speed of transmission ...</p> <div style="display: flex; align-items: center; margin-left: 40px;"> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="margin-left: 5px;">(1)</div> </div> <div style="display: flex; align-items: center; margin-left: 40px; margin-top: 5px;"> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px; text-align: center;">✓</div> <div style="margin-left: 5px;">(1)</div> </div>	[2]	1 mark for each correct response if more than two responses deduct one mark for each additional response 4 or 5 responses=0 marks <b>accept</b> any clear response e.g. underlining the correct words, use of a single cross, shading of box.
7	c	sensory neurons (1) motor neurons (1)	[2]	1 mark for correct response in each sentence response is incorrect if more than 1 word per line.
<b>Total</b>			<b>[6]</b>	

Question		Expected Answers	Marks	Rationale			
8	a	learning language (1) thinking to solve problems(1)	[2]	1 mark per correct response if more than two responses deduct 1 mark per additional response. 4 or 5 responses =0 marks. <b>accept</b> any clear response e.g. underlining the correct words, ticking of correct response.			
8	b	... storage and retrieval of information.  <div style="display: inline-block; vertical-align: middle;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td style="width: 20px; height: 20px;"></td></tr> <tr><td style="width: 20px; height: 20px;">✓</td></tr> <tr><td style="width: 20px; height: 20px;"></td></tr> </table> </div> (1)		✓		[1]	more than one response = 0 marks <b>accept</b> any clear response e.g. underlining the correct words, use of a single cross, shading of box.
✓							
<b>Total</b>			<b>[3]</b>				

Question		Expected Answers	Marks	Rationale				
9	a	... are formed.  <div style="display: inline-block; vertical-align: middle;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td style="width: 20px; height: 20px;"></td></tr> <tr><td style="width: 20px; height: 20px;"></td></tr> <tr><td style="width: 20px; height: 20px;">✓</td></tr> <tr><td style="width: 20px; height: 20px;"></td></tr> </table> </div> (1)			✓		[1]	more than one response = 0 marks <b>accept</b> any clear response e.g. underline the correct sentence, use a single cross, shade the box
✓								
9	b	repetition (1) new (1)	[2]	1 mark per correct response in each sentence response is incorrect if more than one word per line				
<b>Total</b>			<b>[3]</b>					

# A222/02 Modules B4, B5 and B6 Higher Tier

Question		Expected Answers	Marks	Rationale
1	a	brain skin brain	[2]	three correct responses = 2 marks one or two correct responses = 1 mark  response is incorrect if more than one word per line
1	b	respiring (1)	[1]	more than one response = 0 marks <b>accept</b> other clear response e.g. underline
1	c		[2]	one mark for each correct line  if two lines or more on one side – 0 mark for marking point
<b>Total</b>			<b>[5]</b>	



Question		Expected Answers	Marks	Rationale				
2	a	<div style="text-align: right;"> <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>            ... speed up chemical reactions in cells <input checked="" type="checkbox"/> (1)         </div>	[1]	more than one response = 0 marks  <b>accept</b> a clear response e.g. underline the correct sentence, use a single cross, shade the box				
2	b	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 2px;">B</td> <td style="padding: 2px;">C</td> <td style="padding: 2px;">E</td> <td style="padding: 2px; background-color: #cccccc;">D</td> </tr> </table> <p style="text-align: center;">(2)</p>	B	C	E	D	[2]	B before C = 1 mark C before E = 1 mark
B	C	E	D					
2	c	... affects the shape of the active site ... (1)	[1]	more than one response = 0 marks  <b>accept</b> a clear response e.g. underline the correct sentence, use a single cross, shade the box				
2	d	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 5px; text-align: center;"><b>right</b></td> <td style="padding: 5px; text-align: center;"><b>wrong</b></td> </tr> <tr> <td style="padding: 5px; text-align: center;">Jane Sharon</td> <td style="padding: 5px; text-align: center;">Paul Scott</td> </tr> </table>	<b>right</b>	<b>wrong</b>	Jane Sharon	Paul Scott	[2]	all four correct = 2 marks two or three correct = 1 mark 1 or 0 correct = 0 marks if a name appears in both boxes – incorrect response (one response cancels out the other)
<b>right</b>	<b>wrong</b>							
Jane Sharon	Paul Scott							
<b>Total</b>			<b>6</b>					

Question			Expected Answers	Marks	Rationale				
3	a		urea (1) <i>then (either order):</i> sugar (1) water (1)	[3]					
3	b	i	ADH	[1]	more than one response = 0 marks <b>accept</b> other clear response e.g. underline				
3	b	ii	... increases. <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td>✓</td></tr><tr><td> </td></tr><tr><td> </td></tr></table> (1)		✓			[1]	more than one response = 0 marks <b>accept</b> a clear response e.g. underline the correct sentence, use a single cross, shade the box
✓									
<b>Total</b>				<b>[5]</b>					

Question		Expected Answers	Marks	Rationale				
4	a	phototropism (1)	[1]	more than one response = 0 marks <b>accept</b> phonetic spelling options				
4	b	<p>... give the plant a light source from above.</p> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td>✓</td></tr> <tr><td> </td></tr> </table> (1)			✓		[1]	more than one response = 0 marks <b>accept</b> a clear response e.g. underline the correct sentence, use a single cross, shade the box
✓								
4	c	hormones (1) roots (1) unspecialised (1)	[3]	1 mark per correct response in each sentence response is incorrect if more than one word per line				
<b>Total</b>			<b>[5]</b>					

Question		Expected Answers	Marks	Rationale
5	a	bases (1) amino acids (1)	[2]	responses must be in the correct order response is incorrect if more than one term per line
5	b	... to form two new strands of DNA.  <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>	[1]	more than one response = 0 marks <b>accept</b> a clear response e.g. underline the correct sentence, use a single cross, shade the box
5	c	Meiosis produces gametes.  ... new cells identical to each other.  <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  ... each contain 46 chromosomes.  <input checked="" type="checkbox"/>	[2]	three correct responses = 2 marks 2 correct responses = 1 mark 1 or 0 correct responses = 0 marks more than three responses deduct one mark for each additional response  <b>accept</b> clear responses e.g. underline the correct sentences, shade the boxes, put crosses in correct boxes (if <b>no</b> ticks in other boxes)
<b>Total</b>			<b>[5]</b>	

Question		Expected Answers	Marks	Rationale															
6	a	mitosis unspecialised	[1]	responses must be in the correct order 1 mark = <b>both</b> correct responses more than two responses = 0 marks															
6	b	8 cell stage	[1]	more than one response = 0 marks <b>accept</b> other clear response e.g. underline															
6	c	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 10%; text-align: center;">True</th> <th style="width: 10%; text-align: center;">False</th> </tr> </thead> <tbody> <tr> <td>All animal cells remain unspecialised ...</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>All plant cells become specialised ...</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>Nuclei from plant and animal cells ...</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Many cells in plants and animals ...</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </tbody> </table>		True	False	All animal cells remain unspecialised ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	All plant cells become specialised ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Nuclei from plant and animal cells ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Many cells in plants and animals ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	[2]	all four correct responses = 2 marks two or three correct responses = 1 mark 1 or 0 correct responses = 0 marks  if both boxes ticked on a line = incorrect response
	True	False																	
All animal cells remain unspecialised ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>																	
All plant cells become specialised ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>																	
Nuclei from plant and animal cells ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>																	
Many cells in plants and animals ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>																	
<b>Total</b>			<b>[4]</b>																

Question		Expected Answers	Marks	Rationale
7	a	... are formed. <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px;"></div> <div style="margin-left: 10px;">(1)</div> </div>	[1]	more than one response = 0 marks  <b>accept</b> a clear response e.g. underline the correct sentence, use a single cross, shade the box
7	b	repetition (1) new (1)	[2]	1 mark per correct response in each sentence  response is incorrect if more than one word per line
<b>Total</b>			<b>[3]</b>	

Question		Expected Answers	Marks	Rationale					
8	a	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">D</td> <td style="padding: 2px 5px;">E</td> <td style="padding: 2px 5px;">C</td> <td style="padding: 2px 5px;">F</td> <td style="padding: 2px 5px;">A</td> </tr> </table> (3)	D	E	C	F	A	[3]	E before C (1) C before F (1) F before A (1)
D	E	C	F	A					
8	b	... can only travel in one direction. <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px;"></div> <div style="margin-left: 10px;">(1)</div> </div>	[1]	more than one response = 0 marks  <b>accept</b> a clear response e.g. underline the correct sentence, use a single cross, shade the box					
<b>Total</b>			<b>[4]</b>						

Question		Expected Answers	Marks	Rationale
9	a	<p>... saliva by a dog when a bell rings</p> <p>... brightly-coloured caterpillars ...</p> <div style="display: flex; align-items: center; gap: 10px;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px; text-align: center;">✓</div> <span>(1)</span> </div> <div style="display: flex; align-items: center; gap: 10px;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px; text-align: center;">✓</div> <span>(1)</span> </div>	[2]	<p>one mark for each correct response if more than two responses deduct one mark for each additional response</p> <p><b>accept</b> clear responses e.g. underline the correct sentences, shade the boxes, put crosses in correct boxes (if <b>no</b> ticks in other boxes)</p>
9	b	<p>A secondary stimulus is associated ...</p> <div style="display: flex; align-items: center; gap: 10px;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px; text-align: center;">✓</div> </div> <div style="display: flex; align-items: center; gap: 10px;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 5px; text-align: center;">✓</div> </div> <p>The final response has no direct ...</p>	[1]	<p>two correct responses = 1 mark if more than two responses = 0 marks</p> <p><b>accept</b> clear responses e.g. underline the correct sentences, shade the boxes, put crosses in correct boxes (if <b>no</b> ticks in other boxes)</p>
9	c	<p>brain</p> <p>neuron</p> <p>motor</p> <p>reflex arc</p>	[2]	<p>4 correct responses = 2 marks 2 or 3 correct responses = 1 mark 1 or 0 correct response = 0 marks</p> <p>response is incorrect if more than one term per space</p>
<b>Total</b>			[5]	

## A223/01 Ideas in Context plus Module B7 Foundation Tier

Question			Expected Answers	Marks	Rationale
1	a	i	3 (times) (1)	1	
		ii	<b>any two from:</b> longer than normal pregnancy; having older brothers/sisters; level of oestrogen / synthetic hormone / oestrogen;	2	
		iii	idea of ... increases the chance of getting it / something that could cause harm (1)	1	<b>ignore</b> use of the word 'risk' <b>reject</b> causes disease <b>reject</b> 'what causes it' 'It' = the disease <b>accept</b> 'what could cause it'
	b		distance from one hip bone to the other / hip width (1)	1	
	c	i	beginning <b>and</b> end (1)	1	
		ii	changes to breast tissue (1)	1	
	d		women given synthetic hormone (to stop miscarriage) (1) babies/offspring/children were more at risk (of getting breast cancer) (1)	2	
	e		reliable / confident / significant / valid / confirm/ reduces effect of outliers (1)	1	<b>Ignore</b> accurate
	f		<b>any two from:</b> (develop/use) drugs; to lower/control oestrogen (to normal levels); regular screening for those at risk;	2	
<b>Total</b>				<b>12</b>	



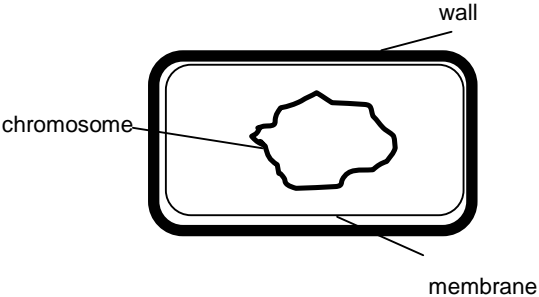
Question		Expected Answers	Marks	Rationale
2		starts with the sun; <u>autotrophs</u> before <u>heterotrophs</u> ; chemical energy used correctly;	2	All 3 correct = 2 marks 2 correct = 1 mark 1 correct = 0 marks reference to energy created/made/produced then max 1 mark
<b>Total</b>			<b>2</b>	

Question		Expected Answers	Marks	Rationale
3		30 or 140-110 shown (1) 20 (1)	2	if 20 given then = 2 marks
<b>Total</b>			<b>2</b>	

Question		Expected Answers	Marks	Rationale
4	a	A (is pyramid of) number (1) B (is pyramid of) (bio)mass (1)	2	<b>accept</b> pyramid of 'energy' for biomass
	b	A shows the numbers of organisms at each level (1) B shows (bio)mass/energy at each level (1)	2	use ecf e.g. if in (a) B is given as pyramid of number then mark (b) accordingly
<b>Total</b>			<b>4</b>	

Question		Expected Answers	Marks	Rationale
5	a	water on left of arrow (1) oxygen on right of arrow (1)	2	
	b	(low) light / (low) temperature / (low) levels of carbon dioxide (1)	1	<b>accept</b> 'put in the dark' do not accept 'less Sun' (must be sunlight) <b>accept</b> (less) water do not accept reference to 'rain'
	c	i starch / cellulose (1) ii proteins / polypeptides / peptides/ enzymes (1)	2	
<b>Total</b>			<b>5</b>	

Question		Expected Answers	Marks	Rationale
6	a	<b>parasite</b> benefits (1) <b>host</b> gets harmed (1)	2	must specify which organism benefits and which is harmed
	b	<b>any three from:</b> identifying the three incorrect sentences; animals and plants can be parasites ; parasites can / sometimes kill their host; the parasite can live inside or outside of the host;	3	maximum 3 marks
<b>Total</b>			<b>5</b>	

Question		Expected Answers	Marks	Rationale
7	a	 <p>The diagram shows a rectangular cell with a thick outer boundary labeled 'wall' and a thinner inner boundary labeled 'membrane'. Inside the cell is a large, irregularly shaped structure labeled 'chromosome'.</p>	3	
	b	<b>any two from:</b> quorn/TVP; yoghurt; antibiotics/named antibiotic; single cell protein; enzymes; alcohol/alcoholic drinks; cheese product; vinegar; insulin;	2	<b>accept</b> 'food'
	c	ethical (1) personal or religious belief / we should not do it / idea of morals / unnatural / wrong to do it / not based on data (1)	2	<b>reject</b> social arguments e.g. we do not understand the risks / might cause harm etc
<b>Total</b>			<b>7</b>	

Question		Expected Answers	Marks	Rationale
8	a	contract (1)	1	<b>accept</b> shorten
	b	heart rate increases (1) breathing rate increases (1) clear ordered answer (1)	3	answer must be relevant to the question, clear and easily understood
	c	glucose on left (1) lactic acid on right (1)	2	
	d	uses oxygen / releases more energy / releases CO <sub>2</sub> / does not produce lactic acid (1)	1	<b>accept</b> reverse argument if applied to anaerobic respiration
<b>Total</b>			<b>7</b>	

Question		Expected Answers	Marks	Rationale
9	a	white cell - fights infection (1) platelet - clots blood (1) red cell - transports oxygen (1)	3	
	b	has (AB) antigens <u>on</u> red cells (1) no (AB) antibodies <u>in</u> plasma (1)	2	<b>ignore</b> reference to universal donors and recipients
	c	B (1) 4 chambers (in heart) / 2 circuits (through heart) (1)	2	must include heart in the description of the two circuits
<b>Total</b>			<b>7</b>	

Question		Expected Answers	Marks	Rationale
10	a	ligament - holds two bones together; tendon - attaches muscle to bone; synovial fluid - lubricates; cartilage - prevents bones rubbing together;	2	4 or 3 correct = 2 marks 2 or 1 correct = 1 mark
	b	i	1	<b>not</b> blood type <b>not</b> 'has anyone else in your family sprained their elbow?'
		ii	1	<b>accept</b> make diagnosis
<b>Total</b>			<b>4</b>	

## A223/02 Ideas in Context plus Module B7 Higher Tier

Question		Expected Answers	Marks	Rationale
1	a	(women given) <u>synthetic</u> hormone (to stop miscarriage) (1) <b>babies / offspring / children</b> were more at risk (of getting breast cancer) (1)	2	<b>ignore</b> reference to immature breast tissue
	b	idea of ...increases/affects the chance of harm/disease/cancer / something that could/may cause harm/disease/cancer (1)	1	<b>reject</b> causes (harm/disease/cancer)
	c	reliable / confident / significant / valid / confirm / evidence / reduces effect of outliers;	1	<b>ignore</b> accurate
	d	experts e.g. scientists (read the article) (1) decide if it seems OK (1)	2	<b>ignore</b> colleagues / peers / other people second mark is for understanding the word 'review' e.g. accurate / idea of quality / trustworthiness / credible / reliable / not made up etc
	e	<b>any two from:</b> (develop) drugs / chemicals / treatment; to lower / control oestrogen (to normal levels); regular screening for those at risk;	2	
	f	DNA/genes/genetic code/allele for wide hips/oestrogen production (1) idea that it is the baby/children/daughter at risk (of breast cancer/wide hips/high oestrogen levels) (1)	2	<b>ignore</b> chromosomes <b>ignore</b> future generations  e.g. wide hips / oestrogen gene can be passed to child = 2 marks

Question		Expected Answers	Marks	Rationale
1	g	<p><b>any two from:</b>            recognise that it is a correlation/link (rather than causation)            e.g. idea of possible to have wide hips but not develop breast cancer;            (but it) increases the risk;            other risk factors / oestrogen may be involved;</p>	2	<p>'no / not a cause' on its own does not score            'yes' scores 0 marks</p>
<b>Total</b>			<b>12</b>	


Question		Expected Answers	Marks	Rationale
2		<p>idea that starts with the Sun;            idea of <u>autotrophs</u> before <u>heterotrophs</u>;            chemical energy used correctly;</p>	2	<p>3 correct = 2 marks            2 correct = 1 mark            1 correct = 0</p> <p>reference to energy created/made/produced then max 1 mark            autotrophs get chemical energy from the Sun gets first marking point but <b>not</b> third marking point</p> <p>do not award chemical energy if candidate just links words with arrows</p>
<b>Total</b>			<b>2</b>	

Question		Expected Answers	Marks	Rationale
3		<p>30 or 140-110 shown (1)            20 (1)</p>	2	<p>if 20 given then = 2 marks</p>
<b>Total</b>			<b>2</b>	

Question		Expected Answers	Marks	Rationale
4	a	10 (1)	1	<b>Accept</b> ten
	b	<b>any 2 from:</b> energy is lost/wasted (from food chain); at each level; as heat/movement/waste/uneaten bits;	2	<b>ignore</b> reference to respiration / reproduction / 'bodily functions' / life processes / death / energy is used
	c	not enough <u>energy</u> / too much <u>energy</u> lost / too little <u>energy</u> (to support any more stages) (1)	1	<b>ignore</b> animals get fewer or bigger
<b>Total</b>			<b>4</b>	

Question		Expected Answers	Marks	Rationale	
5	a	water and carbon dioxide on left of arrow (1) glucose or starch <b>and</b> oxygen on right of arrow (1)	2	either way round either way round <b>allow</b> chemical equation providing it is correct	
5	b	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 60%;"> <p style="text-align: center;">temperature and carbon dioxide</p> <p style="text-align: center;">carbon dioxide and light</p> </div> <div style="width: 35%;"> <p style="text-align: center;"><input type="checkbox"/></p> <p style="text-align: center;"><input checked="" type="checkbox"/> (1)</p> <p style="text-align: center;"><input type="checkbox"/></p> <p style="text-align: center;"><input type="checkbox"/></p> <p style="text-align: center;"><input checked="" type="checkbox"/> (1)</p> <p style="text-align: center;"><input type="checkbox"/></p> <p style="text-align: center;"><input type="checkbox"/></p> </div> </div>	2	if more than 2 boxes are ticked then lose 1 mark for each incorrect response candidate cannot score less than zero marks <b>Accept</b> any clearly correct response e.g. shading etc	
	c	i	starch/cellulose (1)	1	
		ii	proteins/polypeptides/peptides/enzymes (1)	1	
<b>Total</b>			<b>6</b>		

Question		Expected Answers	Marks	Rationale
6	a	red (blood) cells recessive	1	both needed for 1 mark <b>accept</b> 'not dominant' or 'co-dominant'
	b	HH (1)	1	<b>ignore</b> 'healthy person'
	c	<b>any two from:</b> idea that carriers / allele have some protection from malaria / survive malaria (1) idea that these people (survive to) reproduce; (survivors) pass on allele / gene to next generation;	2	<b>accept</b> reverse argument  more likely survive to reproduce = 2 marks <b>ignore</b> pass on sickle cell anaemia to next generation
<b>Total</b>			<b>4</b>	

Question		Expected Answers	Marks	Rationale
7	a	 <p>chromosome / DNA / genes / genetic information</p>	2	3 correct = 2 marks 1 or 2 correct = 1 mark  <b>ignore</b> plasmid / capsule
	b	how isolated e.g. cut / enzymes (1) vector transfers (idea of gene) (1) example of how transferred e.g. bacteriophage / plasmid / virus (1)	3	
	c	ethical (1) personal or religious belief / 'we should not do it' / idea of morals / unnatural / wrong to do it / not based on data (1)	2	if first mark for ethical <b>is not awarded</b> do not award second mark  <b>reject</b> social arguments e.g. we do not understand the risks or might cause harm etc
<b>Total</b>			<b>7</b>	



Question		Expected Answers	Marks	Rationale
8	a	<p>... available supply of energy ... <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p>... muscle tissue to contract. <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p>	2	<p>if more than 2 boxes are ticked then lose 1 mark for each incorrect response</p> <p>candidate cannot score less than zero marks</p> <p><b>accept</b> any clearly correct response e.g. shading etc</p>
	b	<p>glucose on left (1)</p> <p>lactic acid on right (1)</p>	2	
	c		4	<p>6 lines correct = 4 marks</p> <p>5 correct = 3 marks</p> <p>4 correct = 2 marks</p> <p>3 correct = 1 mark</p> <p>2 or 1 correct = 0 marks</p>
	d	<p>produces lactic acid / lactic acid broken down (1)</p> <p>idea of needing oxygen (1)</p> <p><b>then</b></p> <p>clear ordered answer (1)</p>	3	<p>answer must be clear and easily understood without a third reading required</p>
<b>Total</b>			<b>11</b>	

Question		Expected Answers	Marks	Rationale
9	a	A - platelet – idea of clots blood (1) B - white cell – idea of kills microorganisms / produces antibodies / fights infection etc (1) C - red cell – idea of transports oxygen (1)	3	for A <b>accept</b> stops bleeding / seals wounds for B <b>accept</b> leucocyte or neutrophil and any correct method of killing microorganisms
	b	has (AB) antigens on red cells (1) no (AB) antibodies in plasma (1)	2	<b>ignore</b> reference to universal donors and recipients
<b>Total</b>			<b>5</b>	

Question		Expected Answers	Marks	Rationale
10		<b>any two from:</b> one example of a measurement which could affect recovery e.g. weight/age/blood pressure/ level of fitness/diet/medical background / one example of a measurement which is directly related to the elbow injury e.g. range of movement / elapsed time since injury / pain level / amount of exercise done; idea of <b>change</b> or <b>comparison</b> before and after / improvement; accuracy of monitoring / equipment; reliability of data e.g. same time every day;	2	<b>ignore</b> progress as in stem of question
<b>Total</b>			<b>2</b>	

# Grade Thresholds

General Certificate of Secondary Education  
Biology A (Specification Code J633)  
June 2009 Examination Series

## Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
A221/01	Raw	42	N/A	N/A	N/A	30	26	22	19	16	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A221/02	Raw	42	39	35	31	27	23	21	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A222/01	Raw	42	N/A	N/A	N/A	26	22	18	15	12	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A222/02	Raw	42	37	32	26	21	16	13	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A223/01	Raw	55	N/A	N/A	N/A	23	19	15	11	7	0
	UMS	100	N/A	N/A	N/A	60	50	40	30	20	0
A223/02	Raw	55	45	37	29	21	16	13	N/A	N/A	0
	UMS	100	90	80	70	60	50	45	N/A	N/A	0
A229	Raw	40	33	30	26	23	19	15	12	9	0
	UMS	100	90	80	70	60	50	40	30	20	0
A230	Raw	40	33	31	28	25	21	18	15	12	0
	UMS	100	90	80	70	60	50	40	30	20	0

A229/A230 (Coursework) - The grade thresholds have been determined on the basis of the work that was presented for award in June 2009. The threshold marks will not necessarily be the same in subsequent awards.

## Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks):

	Maximum Mark	A*	A	B	C	D	E	F	G	U
<b>J633</b>	300	270	240	210	180	150	120	90	60	0

The cumulative percentage of candidates awarded each grade was as follows:

	A*	A	B	C	D	E	F	G	U	Total No. of Cands
<b>J633</b>	16.6	46.8	76.2	92.7	98.0	99.4	99.9	100.0	100.0	16407

**16793 candidates were entered for aggregation this series**

For a description of how UMS marks are calculated see:

[http://www.ocr.org.uk/learners/ums\\_results.html](http://www.ocr.org.uk/learners/ums_results.html)

Statistics are correct at the time of publication.

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