



GCSE

Science A (Twenty First Century)

General Certificate of Secondary Education **J630**

Mark Scheme for the Units

June 2009

J630/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 Science A (Twenty First Century) (J630)

MARK SCHEMES FOR THE UNITS

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Guidance for Examiners

Rationale 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, eg. 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
not/reject	= answers which are not worthy of credit
ignore	= statements which are irrelevant - applies to neutral answers
allow/accept	= 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

Eg. 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, eg. 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, eg. 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.

Eg. 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	✓	✗	✓	✓	✓					✓	
Paris				✓	✓		✓	✓	✓		
Southampton	✓	✗		✓		✓	✓		✓		
Score:	2	2	1	1	1	1	0	0	0	NR	

A211/01 Modules B1, C1, P1 Foundation Tier

Question		Expected Answers	Marks	Rationale
1	a	<input type="checkbox"/> <input type="checkbox"/> One egg by a single sperm cell <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	1	accept any clear and unambiguous response more than 1 response = 0 marks
	b	i 1 (1)	1	
		ii 2 (1)	1	
		iii XY (1)	1	accept YX
		iv XX (1)	1	
		Total	5	

2	a	i	Zaheer (1)	1	
		ii	Isabella and Amy (1)	1	
		iii	Amy (1)	1	
	b		<input type="checkbox"/> <input type="checkbox"/> Embryonic stem cells are unspecialised ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	1	accept any clear and unambiguous response more than 1 response = 0 marks
			Total	4	

Question		Expected Answers	Marks	Rationale									
3	a	5 (1)	1										
	b	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">gene</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">a different version ...</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">allele</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">two copies are ...</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">dominant</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">carry instructions ...</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">recessive</div> <div style="border: 1px solid black; padding: 2px;">only one copy is ...</div> </div>	2	<p>three correct links = 2 marks one or two correct links = 1 mark two links from the same left hand box is incorrect</p>									
	c	50% (1) <div style="text-align: center; margin-top: 10px;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td></td> <td style="background-color: #d3d3d3;">H</td> <td style="background-color: #d3d3d3;">h</td> </tr> <tr> <td style="background-color: #d3d3d3;">h</td> <td>Hh</td> <td>hh</td> </tr> <tr> <td style="background-color: #d3d3d3;">h</td> <td>Hh</td> <td>hh</td> </tr> </table> <p>(1)</p> </div>		H	h	h	Hh	hh	h	Hh	hh	2	<p>mark each point independently accept hH in place of Hh all 4 boxes must be correct for the second mark</p>
	H	h											
h	Hh	hh											
h	Hh	hh											
		Total	5										

Question		Expected Answers	Marks	Rationale
4	a	any two from: cereals; soya (bean); rape (seed); sugar cane; palm (trees);	1	two (or more) from the list of expected answers, in any order, for 1 mark do not accept 'crop(s)', 'beans', 'seeds' or 'trees'
	b	Crops for biofuels take in ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1	accept any clear and unambiguous response more than one box ticked = 0 marks
	c	Rainforest habitats may be destroyed. <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> The amount of food grown may decrease. <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	2	accept any clear and unambiguous response one mark for each correct response if more than 2 responses, deduct 1 mark for each incorrect response candidate cannot score less than zero marks

A211/01

Mark Scheme

June 2009

Question			Expected Answers	Marks	Rationale
4	d	i	air (1) hot (1)	2	
		ii		2	first mark is for 2 shaded circles (or circles with N/n in) and 4 unshaded circles (or circles with O/o in) on the right hand side second mark is for correct arrangement(s) for nitrogen dioxide i.e. arrangement(s) of 3 circles only with one shaded circle between two unshaded circles all 3 circles must be touching in at least one arrangement
Total			8		

5	a	i	40 (1)	1	
		ii	50 (1)	1	accept any clear and unambiguous response
	b		true false Data is given for the same ... <input checked="" type="checkbox"/> <input type="checkbox"/> As the level of nitrogen dioxide ... <input type="checkbox"/> <input checked="" type="checkbox"/> There is a correlation ... <input checked="" type="checkbox"/> <input type="checkbox"/>	2	accept any clear and unambiguous response three correct responses = 2 marks two correct responses = 1 mark
	c	i	Matt (1)	1	accept Anna
		ii	Kate (1)	1	
Total			6		

Question		Expected Answers				Marks	Rationale																																							
6	a	<table border="1"> <thead> <tr> <th></th><th>Ryle</th><th>Hoyle</th><th>both</th><th>neither</th></tr> </thead> <tbody> <tr> <td>Galaxies are moving ...</td><td></td><td></td><td>✓</td><td></td></tr> <tr> <td>In the past, all the ...</td><td>✓</td><td></td><td></td><td></td></tr> <tr> <td>Older galaxies have newer ...</td><td></td><td>✓</td><td></td><td></td></tr> <tr> <td>The Universe will ...</td><td></td><td></td><td></td><td>✓</td></tr> </tbody> </table>						Ryle	Hoyle	both	neither	Galaxies are moving ...			✓		In the past, all the ...	✓				Older galaxies have newer ...		✓			The Universe will ...				✓	4	<p>one mark per correct row</p> <p>accept any clear and unambiguous response more than one response in any row does not score that row*</p> <p>*for first row only accept 'Ryle' and 'Hoyle' (and/or 'both') as correct</p> <table border="1"> <thead> <tr> <th></th><th>Ryle</th><th>Hoyle</th><th>both</th><th>neither</th></tr> </thead> <tbody> <tr> <td>Galaxies are moving ...</td><td>✓</td><td>✓</td><td>(✓)</td><td></td></tr> </tbody> </table>					Ryle	Hoyle	both	neither	Galaxies are moving ...	✓	✓	(✓)	
	Ryle	Hoyle	both	neither																																										
Galaxies are moving ...			✓																																											
In the past, all the ...	✓																																													
Older galaxies have newer ...		✓																																												
The Universe will ...				✓																																										
	Ryle	Hoyle	both	neither																																										
Galaxies are moving ...	✓	✓	(✓)																																											
	b					2	<p>three correct links = 2 marks one or two correct links = 1 mark two links from the same left hand box is incorrect</p>																																							
		Total				6																																								

Question		Expected Answers	Marks	Rationale
7	a i	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">4.0</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">5.0</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">6.0</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">7.0</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">Roof tiles fall off ...</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">Photographs fall off ...</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">Serious damage to ...</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">Just noticeable indoors.</div> </div>	2	<p>three correct links = 2 marks one or two correct links = 1 mark two links from the same left hand box is incorrect</p>
	ii	37 000 (1)	1	accept any clear and unambiguous response
	b i	<p>where two tectonic plates meet <input type="checkbox"/> (1)</p>	1	<p>accept any clear and unambiguous response more than one box ticked = 0 marks</p>
	ii	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">Make sure all buildings are ...</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">Educate all the people about ...</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">Emergency services practise ...</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">The whole population ...</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">Fewer buildings will fall down.</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">Trained staff go into action quickly.</div> </div>	2	<p>three correct links = 2 marks one or two correct links = 1 mark two links from the same left hand box is incorrect</p>
		Total	6	

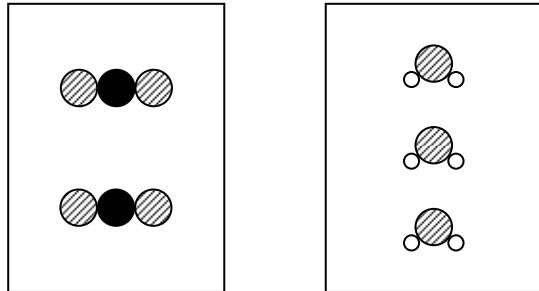
Question	Expected Answers						Marks	Rationale
8	<input type="checkbox"/> B <input type="checkbox"/> D <input type="checkbox"/> A <input type="checkbox"/> C <input type="checkbox"/> E <input type="checkbox"/> F						2	all correct =2 marks A before C AND C before E = 1 mark
	Total						2	

A211/02 Modules B1, C1, P1 Higher Tier

Question		Expected Answers	Marks	Rationale												
1	a	<p style="text-align: center;">true false</p> <p>... sperm nucleus and an egg nucleus. <input type="checkbox"/> <input checked="" type="checkbox"/></p> <p>... will all be genetically identical. <input checked="" type="checkbox"/> <input type="checkbox"/></p> <p>... sperm nucleus with an animal egg ... <input type="checkbox"/> <input checked="" type="checkbox"/></p> <p>... cell nucleus with an animal egg ... <input type="checkbox"/> <input checked="" type="checkbox"/></p> <p>... cell nucleus into an empty animal ... <input checked="" type="checkbox"/> <input type="checkbox"/></p> <p>... produced will be unspecialised cells. <input checked="" type="checkbox"/> <input type="checkbox"/></p>	3	<p>mark each row independently count correct responses more than 1 tick in a row = incorrect response for that row</p> <p>all rows correct = 3 marks 5 correct rows = 2 marks 4 correct rows= 1 mark 3 or less correct rows = 0 marks</p> <p>accept any clear and unambiguous response</p>												
	b	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>supports</td> <td>opposes</td> <td>neither</td> </tr> <tr> <td>1</td> <td>2</td> <td>5</td> </tr> <tr> <td>3</td> <td>6</td> <td></td> </tr> <tr> <td>4</td> <td></td> <td></td> </tr> </table>	supports	opposes	neither	1	2	5	3	6		4			3	<p>check for numbers in correct columns any repeated numbers are treated as incorrect</p> <p>all correct = 3 marks 5 in correct columns = 2 marks 3 or 4 in correct columns = 1 marks</p>
supports	opposes	neither														
1	2	5														
3	6															
4																
		Total	6													

Question		Expected Answers	Marks	Rationale									
2	a	5 (1)	1	accept any clear and unambiguous response accept line 5 circled in the article above only if response space is left blank.									
	b	50% (1) <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">H</td> <td style="text-align: center;">h</td> </tr> <tr> <td style="text-align: center;">h</td> <td style="text-align: center;">Hh</td> <td style="text-align: center;">hh</td> </tr> <tr> <td style="text-align: center;">h</td> <td style="text-align: center;">Hh</td> <td style="text-align: center;">hh</td> </tr> </table> (1)		H	h	h	Hh	hh	h	Hh	hh	2	mark each point independently accept hH in place of Hh all 4 boxes must be correct for the second mark
	H	h											
h	Hh	hh											
h	Hh	hh											
	c	If one allele is defective the ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1	accept any clear and unambiguous response									
		Total	4										

Question		Expected Answers	Marks	Rationale												
3	a	<p>one egg was released and ...</p> <p>The quads are an example ...</p> <p>The quads will differ from ...</p> <p>The quads were produced ...</p> <p>The quads are not clones ...</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td>true</td> <td>false</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table>	true	false	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2	<p>mark each row independently count correct responses more than 1 tick in a row = incorrect response for that row</p> <p>all rows correct = 2 marks 3 or 4 correct rows = 1 mark 2 or less correct rows = 0 marks</p> <p>accept any clear and unambiguous response</p>
true	false															
<input checked="" type="checkbox"/>	<input type="checkbox"/>															
<input checked="" type="checkbox"/>	<input type="checkbox"/>															
<input type="checkbox"/>	<input checked="" type="checkbox"/>															
<input checked="" type="checkbox"/>	<input type="checkbox"/>															
<input type="checkbox"/>	<input checked="" type="checkbox"/>															
	b	i Y (1)	1	accept 'y' lower case												
		ii ovary/ovaries (1)	1	accept phonetically correct spelling if more than one organ named award 0 marks												
		Total	4													

Question		Expected Answers	Marks	Rationale
4	a	<p>When biofuels are made and used ...</p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p>	1	accept any clear and unambiguous response more than one box ticked = 0 marks
	b	<p>Large areas of land in developing ...</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/> (1)</p> <p>Habitats may be damaged and ...</p> <p><input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p>	2	1 mark for each correct answer if 3 boxes ticked deduct 1 mark 4 or 5 ticks = 0 marks accept any clear and unambiguous response
	c	 <p>carbon dioxide</p> <p>water</p>	3	left box – check for: 1 black circle with 2 shaded circles touching it shaded circles must not touch each other size of circles unimportant = 1 mark right box – check for: 1 shaded circle with 2 clear circles touching it clear circles must not touch each other size of circles unimportant = 1 mark finally left box = 2 identically drawn molecules right box = 3 identically drawn molecules = 1 mark
		Total	6	<div style="border: 1px solid black; padding: 10px;"> <p>NOTE: allow</p>  <p>for left hand box and</p>  <p>for the right hand box</p> </div>

Question		Expected Answers	Marks	Rationale			
5	a	<p>true false</p> <p>Data is given for the same ... <input checked="" type="checkbox"/> <input type="checkbox"/></p> <p>As the level of nitrogen dioxide ... <input type="checkbox"/> <input checked="" type="checkbox"/></p> <p>There is a correlation ... <input checked="" type="checkbox"/> <input type="checkbox"/></p>	2	accept any clear and unambiguous response three correct responses = 2 marks two correct responses = 1 mark			
	b i	Matt (1)	1	accept Anna			
	ii	Kate (1)	1				
	c	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>F</td><td>A</td><td>D</td></tr> </table>	F	A	D	2	any 2 from F, A and D in any order = 1 mark all 3, correct order = 2 marks
F	A	D					
	d	1 (1) 3 (1)	2	1 mark for each answer in any order			
		Total	8				

Question		Expected Answers				Marks	Rationale																																							
6	a	<table border="1"> <thead> <tr> <th></th><th>Ryle</th><th>Hoyle</th><th>both</th><th>neither</th></tr> </thead> <tbody> <tr> <td>Galaxies are moving ...</td><td></td><td></td><td>✓</td><td></td></tr> <tr> <td>In the past, all the ...</td><td>✓</td><td></td><td></td><td></td></tr> <tr> <td>Older galaxies have newer ...</td><td></td><td>✓</td><td></td><td></td></tr> <tr> <td>The Universe will ...</td><td></td><td></td><td></td><td>✓</td></tr> </tbody> </table>						Ryle	Hoyle	both	neither	Galaxies are moving ...			✓		In the past, all the ...	✓				Older galaxies have newer ...		✓			The Universe will ...				✓	4	<p>one mark per correct row</p> <p>accept any clear and unambiguous response more than one response in any row does not score that row*</p> <p>*for first row only accept 'Ryle' and 'Hoyle' (and/or 'both') as correct</p> <table border="1"> <thead> <tr> <th></th><th>Ryle</th><th>Hoyle</th><th>both</th><th>neither</th></tr> </thead> <tbody> <tr> <td>Galaxies are moving ...</td><td>✓</td><td>✓</td><td>(✓)</td><td></td></tr> </tbody> </table>					Ryle	Hoyle	both	neither	Galaxies are moving ...	✓	✓	(✓)	
	Ryle	Hoyle	both	neither																																										
Galaxies are moving ...			✓																																											
In the past, all the ...	✓																																													
Older galaxies have newer ...		✓																																												
The Universe will ...				✓																																										
	Ryle	Hoyle	both	neither																																										
Galaxies are moving ...	✓	✓	(✓)																																											
	b					3	<p>check for a single correct link from each box on the left</p> <p>accept any clear and unambiguous response (eg. matched numbering to boxes on the right etc)</p> <p>all five links correct = 3 marks four links correct = 2 marks two or three links correct = 1 mark one link correct = 0 marks</p> <p>if more than 1 line from a box on the left, treat that as an incorrect link for that box</p>																																							
		Total				7																																								

Question			Expected Answers			Marks	Rationale								
7	a	i	37 000 (1)			1	accept any clear and unambiguous response								
		ii	true false ... 8 release 10 million joules. <input type="checkbox"/> <input checked="" type="checkbox"/> ... less than 3 cannot be detected. <input type="checkbox"/> <input checked="" type="checkbox"/> A magnitude 8 earthquake ... <input checked="" type="checkbox"/> <input type="checkbox"/> Earthquakes releasing at least ... <input type="checkbox"/> <input checked="" type="checkbox"/>	2	mark each row independently count correct responses more than 1 tick in a row = incorrect response for that row all rows correct = 2 marks 2 or 3 correct rows = 1 mark 1 or less correct row = 0 marks accept any clear and unambiguous response										
	b	i	data exp both ... are common in Chile. <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ... of two tectonic plates. <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ... movement of the mantle. <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> ... slip against each other. <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>		mark each row independently count correct responses more than 1 tick in a row = incorrect response for that row* *For third row only accept 'data' and 'exp' (and/or 'both') as correct	2									
			<table border="1"> <tr> <td></td> <td>data</td> <td>exp</td> <td>both</td> </tr> <tr> <td>... movement of the mantle.</td> <td>✓</td> <td>✓</td> <td>(✓)</td> </tr> </table> all rows correct = 2 marks 2 or 3 correct rows = 1 mark 1 or less correct rows = 0 marks accept any clear and unambiguous response				data	exp	both	... movement of the mantle.	✓	✓	(✓)		
	data	exp	both												
... movement of the mantle.	✓	✓	(✓)												

Question			Expected Answers	Marks	Rationale
7	b	ii	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">Make sure all builders ...</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">Fewer buildings will fall down.</div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">Emergency services practise ...</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">Trained staff go into action quickly.</div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">Educate all the people about ...</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">The whole population ...</div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">Write regulations for making ...</div> </div>	2	<p>check for a single correct link from each box on the left accept any clear and unambiguous response (eg. matched numbering to boxes on the right etc)</p> <p>all four links correct = 2 marks two or three links correct = 1 mark one link correct = 0 marks</p> <p>if more than 1 line from a box on the left, treat that as an incorrect link for that box</p>
Total			7		

A212/01 Modules B2, C2, P2 Foundation Tier

Question		Expected Answers	Marks	Rationale
1	a	<p>The sand bags are heavy</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p>	1	1 mark for correct tick more than 1 tick = 0 marks
	b	<p>They are flexible</p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> (1)</p>	1	1 mark for correct tick more than 1 tick = 0 marks
	c	<p>They do not rot easily</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> (1)</p> <p>They are stronger</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/> <input type="checkbox"/></p>	2	1 mark for each correct tick if 3 ticks deduct 1 mark 4 ticks=0 marks
		<p>Total</p>	4	

Question		Expected Answers	Marks	Rationale																					
2	a	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <p>To make sure the results were reliable. <input checked="" type="checkbox"/> (1)</p>	1	1 mark for correct tick more than 1 tick = 0 marks																					
	b	95 (1)	1	allow 95 written near question if more than one reading is circled 0 marks																					
	c	<p>New cotton plants can be grown. <input checked="" type="checkbox"/> (1)</p> <input type="checkbox"/> <p>Nylon is made from a non-renewable ... <input checked="" type="checkbox"/> (1)</p> <input type="checkbox"/>	2	1 mark for each correct tick if 3 ticks deduct 1 mark 4 ticks=0 marks																					
	d	<table border="1"> <tr> <th>cotton</th> <th>nylon</th> <th></th> </tr> <tr> <td>plants</td> <td>crude oil</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>Victorian</td> <td>1950s</td> <td></td> </tr> <tr> <td>2 years</td> <td>10 years</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>soft</td> <td>harder</td> <td></td> </tr> <tr> <td>threads</td> <td>different shapes</td> <td></td> </tr> <tr> <td>biodegradable</td> <td>non-biodegradable</td> <td><input checked="" type="checkbox"/></td> </tr> </table>	cotton	nylon		plants	crude oil	<input checked="" type="checkbox"/>	Victorian	1950s		2 years	10 years	<input checked="" type="checkbox"/>	soft	harder		threads	different shapes		biodegradable	non-biodegradable	<input checked="" type="checkbox"/>	2	3 correct boxes ticked = 2 marks 1 or 2 correct boxes ticked = 1 mark if 4 boxes ticked deduct 1 mark 5 boxes ticked = 0 marks
cotton	nylon																								
plants	crude oil	<input checked="" type="checkbox"/>																							
Victorian	1950s																								
2 years	10 years	<input checked="" type="checkbox"/>																							
soft	harder																								
threads	different shapes																								
biodegradable	non-biodegradable	<input checked="" type="checkbox"/>																							
		Total	6																						

Question		Expected Answers	Marks	Rationale
3	a	stop flexible	1	BOTH words correct for 1 mark
	b	i Usha (1)	1	if answer line is blank allow Usha indicated on picture more than one name = 0 marks
		ii Anna (1)	1	if answer line is blank allow Anna indicated on picture more than one name = 0 marks
		iii Josh (1)	1	if answer line is blank allow Josh indicated on picture more than one name = 0 marks
		Total	4	

4	a		Ionising radiation can damage ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Ultraviolet radiation is ionising ... <input checked="" type="checkbox"/> (1)	2	1 mark for each correct tick if 3 ticks deduct 1 mark 4 ticks=0 marks
	b	i	Iris <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Shaun <input checked="" type="checkbox"/> (1)	2	1 mark for each correct tick if 3 ticks deduct 1 mark 4 ticks=0 marks

Question			Expected Answers	Marks	Rationale
4	b	ii	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Shaun <input checked="" type="checkbox"/> (1)	1	1 mark for correct tick more than 1 tick = 0 marks
		iii	<input type="checkbox"/> <input type="checkbox"/> Omar <input checked="" type="checkbox"/> (1)	1	1 mark for correct tick more than 1 tick = 0 marks
Total			6		

Question		Expected Answers				Marks	Rationale																
5	a	Professor Morgan <input checked="" type="checkbox"/> (1) Professor Rankin <input type="checkbox"/> both scientists <input type="checkbox"/>				1	1 mark for correct tick more than 1 tick = 0 marks																
	b	<table border="1"> <thead> <tr> <th>statement</th> <th>Prof. Morgan</th> <th>Prof. Rankin</th> <th>both</th> </tr> </thead> <tbody> <tr> <td>Rain came in...</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>Warm air can...</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>Rivers are...</td> <td></td> <td>✓</td> <td></td> </tr> </tbody> </table>				statement	Prof. Morgan	Prof. Rankin	both	Rain came in...			✓	Warm air can...	✓			Rivers are...		✓		3	one mark per correct tick or other clear indication of choice one tick only per row
statement	Prof. Morgan	Prof. Rankin	both																				
Rain came in...			✓																				
Warm air can...	✓																						
Rivers are...		✓																					
	c	electromagnetic (1) absorbed (1) carbon dioxide (1) fossil fuels (1)				4	one mark for each correct answer																
		Total				8																	

Question		Expected Answers	Marks	Rationale
6	a	<p>food <input type="checkbox"/></p> <p>oxygen <input checked="" type="checkbox"/> (1) <input type="checkbox"/></p>	2	1 mark for each correct tick if 3 ticks deduct 1 mark 4 ticks = 0 marks
	b	<p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p>taking regular exercise <input checked="" type="checkbox"/> (1) <input type="checkbox"/></p>	1	1 mark for correct tick more than 1 tick = 0 marks
	c i	Peru (1)	1	if answer line is blank allow Peru indicated on graph more than one country named = 0 marks
	ii	<p><input type="checkbox"/></p> <p>The more fat ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/></p>	1	1 mark for correct tick more than 1 tick = 0 marks

A212/01

Mark Scheme

June 2009

Question		Expected Answers	Marks	Rationale
6	d	<p>... large numbers of people <input type="checkbox"/> <input checked="" type="checkbox"/> (1)</p> <p>... peer reviewed <input type="checkbox"/> <input checked="" type="checkbox"/> (1)</p>	2	1 mark for each correct tick if 3 ticks deduct 1 mark 4 ticks = 0 marks
Total		7		

7	a	2 (1)	1	1 mark for correct number more than one number = 0 marks				
	b	<table border="1" style="margin-left: auto; margin-right: auto;"><tr><td>B</td><td>A</td><td>D</td><td>C</td></tr></table>	B	A	D	C	2	A (anywhere) before D = 1 mark D (anywhere) before C = 1 mark
B	A	D	C					
	c	<p><input type="text"/> Some partly ...</p> <p><input type="text"/></p> <p><input type="text"/> Always finish ...</p> <p><input type="text"/></p>	1	correct line scores one mark more than one line scores 0 marks				
Total		4						

Question		Expected Answers	Marks	Rationale
8	a	Julian (1)	1	if answer line is blank allow Julian indicated on picture more than one name = 0 marks
	b	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">... healthy ...</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">... safety only</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">... the illness ...</div> <div style="border: 1px solid black; padding: 5px;">test for both ...</div> </div>	2	1 mark for each correct line more than one line from 'type of trial' box, no mark for that box
Total			3	

A212/02 Modules B2, C2, P2 Higher Tier

Question			Expected Answers	Mark	Rationale
1	a	i	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1	1 mark for correct tick more than 1 tick = 0 marks
			To make sure the tests were reliable <input checked="" type="checkbox"/> (1)		
	b	i	95 (1)	1	allow 95 written near question if more than one reading is circled 0 marks
		ii	68 (1)	1	if answer line is blank look in bottom right hand box in table
		iii	<input type="checkbox"/> The ranges of readings ... <input checked="" type="checkbox"/> There is a significant difference ... <input checked="" type="checkbox"/> <input type="checkbox"/>	1	both ticks correct for 1 mark more than 2 ticks = 0 marks

Question		Expected Answers		Mark	Rationale																					
	c		<table border="1"> <tr><td>cotton</td><td>nylon</td><td></td></tr> <tr><td>plants</td><td>crude oil</td><td>✓</td></tr> <tr><td>over 500 years</td><td>1950s</td><td></td></tr> <tr><td>2 years</td><td>10 years</td><td>✓</td></tr> <tr><td>soft</td><td>harder</td><td></td></tr> <tr><td>threads</td><td>different shapes</td><td></td></tr> <tr><td>biodegradable</td><td>non-biodegradeable</td><td>✓</td></tr> </table>	cotton	nylon		plants	crude oil	✓	over 500 years	1950s		2 years	10 years	✓	soft	harder		threads	different shapes		biodegradable	non-biodegradeable	✓	2	3 correct boxes ticked = 2 marks 1 or 2 correct boxes ticked = 1 mark If 4 boxes ticked deduct 1 mark 5 boxes ticked = 0 marks
cotton	nylon																									
plants	crude oil	✓																								
over 500 years	1950s																									
2 years	10 years	✓																								
soft	harder																									
threads	different shapes																									
biodegradable	non-biodegradeable	✓																								
Total				6																						

2	a		A (1)	1	allow heptane allow C_7H_{16}
	b		B \longrightarrow D (1)	1	both letters in correct order for 1 mark do not accept more than one letter on each side of the arrow. allow either or both as lower case letters
	c		products (1) unchanged (1)	2	1 mark for each must be in correct order
Total				4	

Question		Expected Answers	Mark	Rationale
3	a	Larger forces between particles <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1	1 mark for correct tick more than 1 tick = 0 marks
	b	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Crosslinks hold the polymer chains ... <input checked="" type="checkbox"/> <input type="checkbox"/> Polymer chains cannot break away ... <input checked="" type="checkbox"/>	1	both ticks correct for 1 mark more than 2 ticks = 0 marks
	i	Ben Usha (1)	1	both names in either order required for 1 mark
	ii	Josh (1)	1	more than 1 name given = 0 marks
		Total	4	

Question		Expected Answers	Mark	Rationale
4	a	Ionising radiation can damage ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Ultraviolet radiation is ionising ... <input checked="" type="checkbox"/> (1)	2	1 mark for each correct tick if 3 ticks deduct 1 mark 4 ticks=0 marks
	b	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Shaun <input checked="" type="checkbox"/> (1)	1	1 mark for correct tick more than 1 tick = 0 marks
	ii	<input type="checkbox"/> <input type="checkbox"/> Omar <input checked="" type="checkbox"/> (1) Robert <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	2	1 mark for each correct tick if 3 ticks deduct 1 mark 4 or 5 ticks = 0 marks

Question			Expected Answers		Mark	Rationale
4	b	iii		<input type="checkbox"/> <input type="checkbox"/> Omar <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>	1	1 mark for correct tick more than 1 tick = 0 marks
		iv		Iris <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Shaun <input checked="" type="checkbox"/>	1	both ticks in correct boxes for 1 mark more than 2 ticks = 0 marks
			Total		7	

Question		Expected Answers					Mark	Rationale
5	a	statement	Prof. Mor	Prof. Rank	both	neither	3	<p>all four rows correct = 3 marks three rows correct = 2 marks two rows correct = 1 mark one row correct = 0 marks more than 1 tick in any row is incorrect</p>
		Global ...				✓		
		The wet ...				✓		
		The flood ...			✓			
		There is ...		✓				
	b	evidence	supports M	proves M wrong	neither		2	<p>one mark for each correct row more than 1 tick in any row is incorrect</p>
		A positive ...	✓					
	c			<input type="checkbox"/>			2	<p>1 mark for each correct tick if 3 ticks deduct 1 mark 4 or 5 ticks = 0 marks</p>
				<input type="checkbox"/>				
		more water evaporates ...	✓	(1)				
				<input type="checkbox"/>				
		rotting plants increase ...	✓	(1)				
		Total				8		

Question		Expected Answers	Mark	Rationale
6	a	i (coronary) artery / arteries (1)	1	any other named artery is wrong, e.g. pulmonary artery, aorta
		ii Peru (1)	1	if answer line is blank allow Peru indicated on graph more than one country named = 0
		iii The more fat ... <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>	1	1 mark for correct tick more than 1 tick = 0 marks
		iv Some other factor ... <input type="checkbox"/> <input checked="" type="checkbox"/> ... how eating animal fat ... <input checked="" type="checkbox"/> <input type="checkbox"/>	1	both ticks correct for 1 mark more than 2 ticks = 0 marks
	v	statement 2 in 1st box (1) statement 3 in 2nd box (1)	2	1 mark for each correct answer allow number circled or any other clear indication of choice more than one indication of choice in any box = 0 for that box

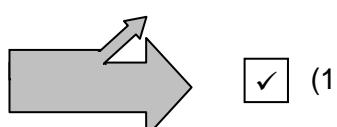
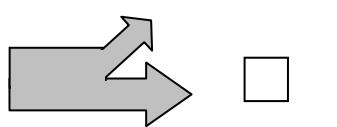
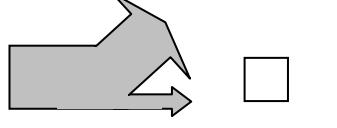
Question			Expected Answers		Mark	Rationale
6	b		... large numbers of people	<input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>		
			... peer reviewed	<input type="checkbox"/> (1) <input type="checkbox"/>		
			Total		8	

7	a	i	mutations (1)	1	accept mutate
		ii	<input type="text"/> <input type="text"/> Only use ... <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> Resistant ...	1	more than one line drawn = 0 marks
	b		140 (1)	1	
			Total		3

Question		Expected Answers	Mark	Rationale
8	a	<p>Since ... <input type="checkbox"/></p> <p>a high percentage ... <input checked="" type="checkbox"/> <input type="checkbox"/></p> <p>this ... <input type="checkbox"/></p> <p>reduces susceptible <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p>	1	both ticks in correct boxes for 1 mark more than 2 ticks = 0 marks
8	b	<p>Influenza viruses change ... <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>A different antibody ... <input checked="" type="checkbox"/> <input type="checkbox"/></p>	1	both ticks in correct boxes for 1 mark more than 2 ticks = 0 marks

Question		Expected Answers	Mark	Rationale
8	c	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Give a placebo ... <input checked="" type="checkbox"/> Don't let the scientists ... <input checked="" type="checkbox"/> Don't tell the volunteers ... <input checked="" type="checkbox"/>	1	all three ticks in the correct boxes for 1 mark more than 3 ticks = 0 marks
		Total	3	

A213/01 Modules B3, C3, P3 Foundation Tier

Question		Expected Answers	Marks	Rationale
1	a	60% (1)	1	allow tick, underline or other unambiguous choice
	b	 <input checked="" type="checkbox"/> (1)  <input type="checkbox"/>  <input type="checkbox"/>	1	allow any unambiguous choice of the top diagram more than one tick loses the mark
	c	i  Milan <input checked="" type="checkbox"/> (1)  	1	one tick only allow any unambiguous indication of Milan, eg. X more than one tick loses the mark
		ii   Penny <input checked="" type="checkbox"/> (1) 	1	one tick only allow any unambiguous indication of Penny, eg. X more than one tick loses the mark

Question			Expected Answers	Marks	Rationale
1	c	iii	<p>Milan <input type="checkbox"/></p> <p><input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p>Richard <input checked="" type="checkbox"/> (1)</p>	2	two correct ticks = 2 marks deduct one mark for each additional tick above two candidate cannot score less than 0 marks
Total			6		

2	a		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>C</td><td>B</td><td>D</td><td>A</td></tr> </table>	C	B	D	A	1	all correct required for the mark
C	B	D	A						
	b	i	<p>Katy <input checked="" type="checkbox"/></p> <p>Jon <input checked="" type="checkbox"/> (1)</p> <p>Liz <input type="checkbox"/></p>	1	row must be completely correct for the mark				
		ii	<p>Katy <input type="checkbox"/></p> <p>Jon <input checked="" type="checkbox"/> (1)</p> <p>Liz <input checked="" type="checkbox"/></p>	1	row must be completely correct for the mark				
		iii	<p>Katy <input type="checkbox"/></p> <p>Jon <input checked="" type="checkbox"/> (1)</p> <p>Liz <input type="checkbox"/></p>	1	row must be completely correct for the mark				
Total			4						

Question		Expected Answers	Marks	Rationale
3	a	alpha; gamma; beta;	2	all three correct: = 2 marks one or two correct = 1 mark no credit given for any word if it is used more than once
	b	<p>Following official regulations ... <input checked="" type="checkbox"/> (1)</p> <p>The benefits from the use ... <input checked="" type="checkbox"/> (1)</p>	2	one mark per tick (or clear unambiguous indication of choice) deduct one mark for each additional tick above two candidate cannot score less than 0 marks
		Total	4	

Question		Expected Answers	Marks	Rationale															
4	a	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 100px; margin-right: 10px;"></div> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 100px; margin-right: 10px;"></div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 100px; margin-right: 10px;"></div> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 100px; margin-right: 10px;"></div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 100px; margin-right: 10px;"></div> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 100px; margin-right: 10px;"></div> </div>	2	<p>all three lines correct = 2 marks 1 or 2 lines correct = 1 mark more than one line from one left hand box, maximum 1 mark more than one line from two or more left hand boxes = 0 marks</p>															
	b	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">carbohydrates</td> <td style="padding: 5px;">proteins</td> <td style="padding: 5px;">neither</td> </tr> <tr> <td style="padding: 5px; text-align: center;">✓</td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;"></td> <td style="padding: 5px; text-align: center;">✓</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;"></td> <td style="padding: 5px; text-align: center;">✓</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px; text-align: center;">✓</td> </tr> </table>	carbohydrates	proteins	neither	✓				✓			✓				✓	3	<p>all four rows correct = 3 marks 3 rows correct = 2 marks 1 or 2 rows correct = 1 mark</p>
carbohydrates	proteins	neither																	
✓																			
	✓																		
	✓																		
		✓																	
		Total	5																

Question			Expected Answers	Marks	Rationale
5	a	i	5% (1)	1	allow tick, underline or other unambiguous choice
		ii	any two from: fat; salt; sugar;	1	any order – two required for the mark ignore mis-spelling if meaning is clear accept glucose but not fructose for sugar
	b		People who do not exercise ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> Obesity is a risk factor ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	2	1 mark for each correct answer deduct one mark for each additional tick above two candidate cannot score less than 0 marks
	c		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> The cells do not respond to insulin. <input checked="" type="checkbox"/> (1)	1	1 mark for each correct answer deduct one mark for each additional tick above two candidate cannot score less than 0 marks
			Total	5	

Question			Expected Answers	Marks	Rationale
6	a	i	<p><input type="checkbox"/></p> <p>It may cause cancer in humans. <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p>	1	allow underline or other unambiguous choice
		ii	<p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p>Eat a balanced diet <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p>	1	allow underline or other unambiguous choice
	b		<p>aflatoxins ...</p> <p>pesticides ...</p> <p>toxins ...</p> <p>acrylamides ...</p> <p>... crop is farmed</p> <p>... crop is stored</p> <p>starch is ...</p> <p>the crop plant ...</p>	2	<p>all three links correct = 2 marks</p> <p>one or two links correct = 1 mark</p> <p>ignore any box on the left hand side with more than one line coming from it</p>
			Total	4	

Question		Expected Answers	Marks	Rationale
7	a	3500 (1) copy (1) simple (1)	3	
	b	<p style="text-align: center;">DNA <input type="checkbox"/> (1)</p> <p style="text-align: center;">fossils <input checked="" type="checkbox"/> (1)</p> <p style="text-align: center;"> <input type="checkbox"/></p> <p style="text-align: center;"> <input type="checkbox"/></p>	2	1 mark for each correct answer allow underline or other unambiguous choice deduct one mark for each additional tick above two candidate cannot score less than 0 marks
	c	<p>variable selection</p> <p>... pigeon</p> <p>... finch</p> <p>natural selection</p> <p>individuals better suited ...</p> <p>individuals with certain ...</p> <p>selective breeding</p> <p>individuals are chosen ...</p>	2	one mark for left hand lines correct one mark for right hand lines correct ignore any line from variable selection to a description
		Total	7	

Question		Expected Answers	Marks	Rationale
8	a	competition (1)	1	Ignore misspelling if meaning is clear. Allow 'compete' or any word derived from compete
	b	i parasitic wasp linked to British ladybird only; arrow pointing towards the parasitic wasp;	1	both points needed for mark allow "wasp" or "parasitic" for parasitic wasp
		ii decrease (1)	1	
		iii increase (1)	1	
		Total	4	

9	a	2 and 3 (1)	1	both required any order no other numbers present
	b	4 (1) 6 (1)	2	one mark for each correct response, any order deduct one mark for each additional number above two candidate cannot score less than 0 marks
		Total	3	

A213/02 Modules B3, C3, P3 Higher Tier

Question			Expected Answers		Marks	Rationale
1	a	i			3	B correct in both lower boxes = 1 mark. AF in first two boxes = 1 mark EDC in next 3 boxes = 1 mark
		ii	<p>... more than 50% efficient. <input checked="" type="checkbox"/></p> <p>... the environment warmer. <input checked="" type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p>... produces electrical energy. <input checked="" type="checkbox"/></p>		2	3 correct = 2 marks 2 correct = 1 mark 0 or 1 correct = 0 marks deduct one mark for each additional tick above three candidate cannot score less than 0 marks
b	i	95% (1)			1	
	ii		<p><input type="checkbox"/></p> <p>Milan <input checked="" type="checkbox"/></p> <p>Penny <input checked="" type="checkbox"/></p> <p><input type="checkbox"/></p>		1	both correct and no other choices for mark
			Total		7	

Question			Expected Answers	Marks	Rationale								
2	a		<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>C</td> <td>B</td> <td>D</td> <td>A</td> </tr> </table>			C	B	D	A	1	all correct required for the mark		
C	B	D	A										
	b	i	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>Katy</td> <td>Jon</td> <td>Liz</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>			Katy	Jon	Liz	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	row must be completely correct for the mark
Katy	Jon	Liz											
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>											
		ii	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>Katy</td> <td>Jon</td> <td>Liz</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table>			Katy	Jon	Liz	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1	row must be completely correct for the mark
Katy	Jon	Liz											
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											
		iii	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>Katy</td> <td>Jon</td> <td>Liz</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>			Katy	Jon	Liz	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	row must be completely correct for the mark
Katy	Jon	Liz											
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>											
			Total	4									

3	a		alpha gamma beta	1	all three words correct for the mark
	b	i	D (1)	1	
		ii	C and E (1)	1	both, in either order, for the mark
			Total	3	

Question		Expected Answers	Marks	Rationale
4	a	People who do not exercise ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> Obesity is a risk factor ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	2	1 mark for each correct answer deduct one mark for each additional tick above two candidate cannot score less than 0 marks
	b	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> The cells do not respond to insulin. <input checked="" type="checkbox"/> (1) The pancreas does not make ... <input checked="" type="checkbox"/> (1)	2	1 mark for each correct answer deduct one mark for each additional tick above two candidate cannot score less than 0 marks
	c	true false They are more likely ... <input checked="" type="checkbox"/> <input type="checkbox"/> They are certain ... <input type="checkbox"/> <input checked="" type="checkbox"/> They can reduce ... <input checked="" type="checkbox"/> <input type="checkbox"/> They are more likely ... <input checked="" type="checkbox"/> <input type="checkbox"/>	1	all correct required for the mark
		Total	5	

Question		Expected Answers	Marks	Rationale
5	a	<p>The benefit of a balanced ... <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p>	1	no extra ticks allowed
	b	<p>aflatoxins ... <input type="checkbox"/> ... crop is farmed</p> <p>pesticides ... <input type="checkbox"/> ... crop is stored</p> <p>toxins ... <input type="checkbox"/> starch is ...</p> <p>acrylamides ... <input type="checkbox"/> the crop plant ...</p>	2	<p>all three links correct = 2 marks</p> <p>one or two links correct = 1 mark</p> <p>ignore any box on the left with more than one line coming from it</p>
Total			3	

Question			Expected Answers	Marks	Rationale
6	a	i	<p>He puts manure on the fields. <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p>He grows different crops ... <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p>	2	1 mark for each correct answer deduct one mark for each additional tick above two candidate cannot score less than 0 marks
		ii	<p>... water</p> <p>... crops</p> <p>Crops that ...</p> <p>... oxygen</p> <p>... bacteria</p> <p>... infertile.</p> <p>... nitrogen</p> <p>... lost when dead ...</p>	2	links in and out of bottom box in 2nd column = 1 mark links in and out of top box in 3rd column = 1 mark

Question			Expected Answers	Marks	Rationale
6	b		<input type="checkbox"/> There may be food shortages ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> Artificial fertilizers give higher ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	2	1 mark for each correct answer deduct one mark for each additional tick above two candidate cannot score less than 0 marks
			Total	6	

7	a	competition (1)	1	ignore mis-spelling if meaning is clear allow 'compete' or any word derived from 'compete'
	b	i parasitic wasp linked to British ladybird only; arrow pointing towards the parasitic wasp;	1	both points needed for mark allow "wasp" or "parasitic" for parasitic wasp
		ii decrease (1)	1	
		iii increase (1)	1	
		Total	4	

8	a	2, 3, 5 (1)	1	any order and no other numbers present
	b	i 2,4,6 or any two from these	1	any order no other numbers present any two of the correct numbers, or all 3, will gain this mark
		ii 4 (1)	1	
		Total	3	

Question		Expected Answers	Marks	Rationale
9	a	<p>The percentage of males ... <input checked="" type="checkbox"/> (1)</p>	1	no extra ticks allowed
	b	<p>Life on Earth started ... <input checked="" type="checkbox"/></p> <p>Fossils provide evidence ... <input checked="" type="checkbox"/></p> <p>Over a long period of time ... <input checked="" type="checkbox"/></p>	2	<p>all three correct plus two blanks = 2 marks two correct and at least two blanks = 1 mark four ticks, three correct, one incorrect =1 mark no other combination gets any marks</p> <p>N.B. if there are two correct ticks and a third (correct) choice has been crossed out, you do not count the third tick, because the candidate has made a final choice of two ticks only you would only mark crossed-out tick(s) if there are no other ticks present (point 6 in the Guidance for Examiners)</p>
		Total	3	

Question		Expected Answers	Marks	Rationale												
10	a	homeostasis (1)	1	ignore mis-spelling if meaning is clear												
	b	<p style="text-align: center;">stimulus effector response</p> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td>an increase in blood temperature</td><td>sweat glands</td><td>sweating</td></tr> <tr><td></td><td></td><td></td></tr> </table> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ... rapid does not last ... <input checked="" type="checkbox"/> (1) 							an increase in blood temperature	sweat glands	sweating				1	no extra ticks allowed.
an increase in blood temperature	sweat glands	sweating														
	c	sensor / receptor (1)	1	ignore mis-spelling if meaning is clear do not allow sensory neurons												
	d		1	no extra ticks allowed												
		Total	4													

A214/01 Ideas in Context Foundation Tier

Question		Expected Answers	Marks	Rationale
1	a	an illness is treated with a substance that causes similar symptoms to the illness (1)	1	ignore use the substance/illness that causes the illness
	b i	5 (1)	1	
	ii	some of the 10 molecules may be in there / they have to go somewhere/ all doses are not the same/ may not be a typical dose (1)	1	ignore reference to not diluted / wrong dilution / doses wrong
	c i	(solvent) retains the memory of the original substance (1) stimulates the body's own healing powers (1)	2	must be explanation and not a description
	ii	placebo effect or description (1) immune system or description (1)	2	placebo effect, eg. they think they will get better so they do ignore dummy pills accept any reference to immune system, eg. 'people get better anyway', 'natural processes'
	d i	Stella (1)	1	
	ii	Ranjit (1)	1	
	iii	Jane (1)	1	
	e	to check for safety (1) to check for effectiveness / effective dose (1)	2	stage 3 mark is for checking for harm/side effects ignore to check if it will affect the patient stage 4 mark is for checking that it does actually work ignore any comments on side effects
	f	false hope / not getting treatment to tackle their illness / believe homeopathic medicine doesn't work / incorrect dilution could be toxic (1)	1	ignore there is no scientific evidence to support homeopathy / not scientifically proven
		Total	13	

Question			Expected Answers	Marks	Rationale
2	a	i	it is toxic/poisonous / it combines with haemoglobin / less oxygen taken in (1)	1	allow because we cannot see it, smell it, taste it
		ii	30 minutes (1)	1	
	b		more cars/houses (producing CO in city) (1) buildings trap it / stop wind blowing it away (1) QWC: no more than one mis-spelling per 10 words (1)	3	accept reverse argument accept idea of more sources of CO in city minimum number of words for QWC mark is ten
	c	i	as the use of catalytic converters increased the carbon monoxide emissions decreased (1)	1	must be clear that as one goes up, other goes down ignore positive or negative correlation
		ii	any two from: the use of oil and gas for heating homes increased; burning oil or gas produces less CO than burning coal; the use of coal for heating homes decreased; greater use of electricity; use of alternative energy sources eg. solar panels, windmills; more <u>gas</u> fires are serviced regularly;	2	
	d			2	one mark for N_2 molecule one mark for second CO_2 molecule accept separated atoms for nitrogen reject wrong order for carbon dioxide molecule
	e	i	the risk (to health) is small/not realised by people (1) the benefit of using cars is large/easily recognised by people (1)	2	accept examples of (small) risk and (significant) benefit benefit outweighs risk = 2 marks

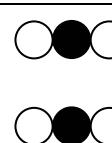
Question			Expected Answers	Marks	Rationale
2	e	ii	any two from: people are not aware of the risk / people think that the risk is small / don't need to do it / forget to do it / don't care; servicing is expensive / people do not like to spend the money; they cannot see or smell the gas / have carbon monoxide alarm (1)	2	ignore do not use fire very often
			Total	14	

3	a		loss of concentration / headaches / fatigue / feel sick / memory problems / cancer / ill (1)	1	
	b	i	0.2 W × 10 (1) answer = 2 W (1)	2	2 = 2 marks
		ii	positive point about mobile phones eg. can be switched off / only affect the user / communicate with home or friends / other uses of mobile phones such as camera, games, internet access etc (1) negative point about school network eg. continuous exposure / lack of choice about it being switched on / affects everyone / limited access to games etc (1)	2	
	c	i	answers should show that anecdotal evidence is not enough ie. more than just opinion (1)	1	eg. 'only one person', 'only him saying it'
		ii	any appropriate method of scientific enquiry, eg. balanced groups, (double-) blind tests, large samples	1	example of one of these is acceptable eg. have hidden wireless unit for large samples, must state or imply large numbers, not just 'more'

Question			Expected Answers	Marks	Rationale
3	c	iii	one mark for factor and outcome (1) one mark for stating the expected correlation (1)	2	do not allow factor and outcome reversed if there is a causal link for non-causal correlation eg. ice cream sales and incidence of hay-fever, they can be either way round direction of correlation should be indicated for second mark if factor and outcome line implies correlation then 2 marks eg. 'using car' 'more pollution'
	d	i	attempts to calculate $5/114 \times 100$ (1) = 4.4% (4.386%) (1)	2	4.4 or 4.386 only = 2 marks
		ii	<u>experts</u> eg. scientists read the article (1) decide if it seems acceptable (1)	2	second mark is for understanding the word 'review'
Total			13		

A214/02 Ideas in Context Higher Tier

Question			Expected Answers	Marks	Rationale
1	a	i	Ranjit (1)	1	
		ii	Jane (1)	1	
	b		identify shortcoming: sample too small / not blind trial / uncontrolled / sample not balanced/representative/typical cross-section (1) overcoming shortcoming (must increase reliability): blind-trial / double-blind trial / control / large sample / more representative selection of variety of age/gender/regional origin etc (1)	2	first mark is for recognising the shortcoming of the data sample, second mark for how to improve the study (may not be linked) cannot infer shortcoming from suggestion, eg. 'use a larger sample' = 2 nd mark only ignore any reference to 'fair test'
	c		0 because final dilution of 0.2 is still unlikely to have any molecules in a sample / owtte (1)	1	accept 0.2 still closer to 0 than 1 so greater chance of 0 than 1 cannot have a fraction so reject 0.2 by itself explanation involving probability of 0.2 is essential for the mark reject $2 \times 0 = 0$ by itself
	d	i	to check for safety (1) to check for effectiveness/effective dose (1)	2	stage 3 mark is for checking for harm/side effects ignore 'check if it will affect the patient' as direction of effect not given stage 4 mark is for checking that it does actually work ignore any comment on side effects here
		ii	data that can be replicated/repeated/confirmed (1)	1	'If you do it again, you get similar data' must state/implly reference to data
		iii	other scientists repeat tests (1)	1	allow explanation of peer review, eg. 'more than one scientist has looked at it'
		iv	side-effects less serious than the disease (1) benefit assessed / side-effects assessed (1)	2	'benefit outweighs risk' is this first mark 'may get better', 'will cure the disease' eg. side-effects not serious/will eventually go / may take a low dose to minimise side effects / may treat side effects with other medicines second mark is additional detail on benefit or risk may give concrete example
	e		placebo cannot cure disease (1) idea of unethical/unfair to patients (1)	2	eg. gives false hope, conventional treatments could cure them
			Total	13	

Question		Expected Answers	Marks	Rationale
2	a	CO binds with <u>haemoglobin</u> which impedes <u>oxygen</u> transport (1)	1	must answer in terms of haemoglobin and oxygen transport accept O or O ₂
	b	any two from: electric cars do not release waste gas/carbon monoxide; power stations release less waste gas/carbon monoxide than cars; electricity can be produced by methods (eg. wind, nuclear) not producing CO at all;	2	
	c i	in a CAT, carbon monoxide reacts with nitrogen oxide (1) producing carbon dioxide and nitrogen (1)	2	or $2\text{CO} + 2\text{NO} \rightarrow 2\text{CO}_2 + \text{N}_2$ (1) (balancing not necessary) not 'less CO' – must have chemical mechanism
	ii	any two from: use of oil and gas for heating homes increased; burning oil or gas produces less CO than burning coal; the use of coal for heating homes decreased; greater use of electricity; use of alternative energy sources (eg. solar panels, windmills); more <u>gas</u> fires are serviced regularly;	2	
	d		2	one mark for each correct molecule: no gaps between atoms in a molecule need not be linear but two Os must not touch NOT  NOR 
	e i	the risk (to health) is small/not realised by people (1) the benefit (of using cars) is large/easily recognised by people (1)	2	'benefit outweighs risk' = 2 marks accept examples of (small) risk and (significant) benefit
	ii	the probability of this happening is low (1) the consequence is so dreadful that it must be avoided (1)	2	'would be dangerous'/ 'could kill you'
		Total	13	

Question			Expected Answers	Marks	Rationale
3	a	i	anecdotal evidence is not enough, ie. need more than just an opinion (1)	1	eg. 'only one person', 'only him saying it', 'just perceived risk'
		ii	any appropriate method of scientific enquiry, eg. groups with similar composition sex/age/etc / blind tests / large samples	1	example of one of these is acceptable, eg. have hidden wireless unit for 'large samples' mark must state/implies large numbers, not just 'more'
		iii	one mark for factor and outcome (1) one mark for stating the expected correlation (1)	2	do not allow factor and outcome reversed if there is a causal link for a non-causal correlation eg. ice cream sales and incidence of hayfever, they can be either way round direction of correlation should be indicated for second mark if factor and outcome line implies the correlation then 2 marks, eg. 'using car' 'more pollution'
	b		correlation: changes in factor are associated with changes in the outcome / there is a link/pattern between factor and outcome (1) cause: the change in the outcome is due to/caused by changes in the factor / there is a clear mechanism connecting the two (1) QWC – no more than 1 mis-spelling per 10 words (1)	3	accept answers in terms of concrete examples do not award QWC if less than 10 words
	c		clearly compares the powers of the phone mast and the phone (1) explains the greater effect of mobile phone in terms of far greater proximity to user (1)	2	watch for use of wrong data – figures are 100 W and 2 W or can relate to time near phone/mast

Question		Expected Answers	Marks	Rationale
3	d	<p>correctly calculates both percentages (1)</p> <p>recognises that the percentages/fractions/ratios are very similar (1)</p>	2	<p>first mark needs $2/44 = 4.5\%$ and $5/114 = 4.4\%$ (allow 4.3%) and the conclusion 'Yes' alone = 0</p> <p>correct percentage calculations + 'Yes' = 2</p> <p>second mark is for a correct and clear comparison of percentages or ratios or fractions</p> <p>allow ecf from first part – if $5/144$ instead of $5/114$, then percentages will be 3.5% and 4.5%, in which case allow either 'yes' or 'no' for judgement of similarity</p> <p>if calculations are wrong, then allow ecf judgement – 'yes' if one number is not more than double the other</p> <p>watch out for $44/2 = 22$ and $114/5 = 22.8$ with no explanation of what they mean: this is not comparing a ratio so does not get the second mark</p>
	e	<p>any three from:</p> <p>used (double-)blind trials;</p> <p>explanation of double-blind trials;</p> <p>large samples;</p> <p>long term study;</p> <p>some funding from government;</p> <p>balanced sample (radiosensitive/non-radiosensitive);</p> <p>peer review will have taken place before publication;</p>	3	<p>can describe blind trial for first mark</p> <p>explanation of double-blind trial is needed for a second mark if a mark has been given for 'blind trial' already, eg. 'nobody knows whether the microwaves are on or not'</p>
Total		14		

Grade Thresholds

General Certificate of Secondary Education
 Science A (Specification Code J630)
 June 2009 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
A211/01	Raw	42	N/A	N/A	N/A	30	25	21	17	13	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A211/02	Raw	42	33	28	23	19	15	13	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A212/01	Raw	42	N/A	N/A	N/A	33	28	24	20	16	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A212/02	Raw	42	34	29	24	20	16	14	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A213/01	Raw	42	N/A	N/A	N/A	28	24	21	18	15	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A213/02	Raw	42	33	28	23	19	15	13	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A214/01	Raw	40	N/A	N/A	N/A	24	20	16	12	8	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A214/02	Raw	40	27	22	17	13	10	8	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A219	Raw	40	33	30	26	23	19	15	12	9	0
	UMS	100	90	80	70	60	50	40	30	20	0

A219 (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
J630	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
J630	3.7	15.4	36.8	64.2	81.5	92.1	97.6	99.7	100	107 803

108 084 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

Statistics are correct at the time of publication.

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