

Science A (Twenty First Century Science)

General Certificate of Secondary Education **GCSE J630**

Mark Schemes on the Units

January 2007

J630/MS/R/07J

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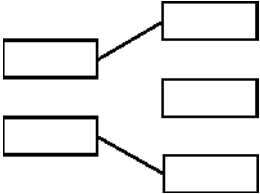
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General Certificate of Secondary Education GCSE Science A (Twenty First Century Science) J630

MARK SCHEMES FOR THE UNITS

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**Mark Scheme A211/01
January 2007**

Question		Expected Answers	Mks	Rationale								
1	a	<p style="text-align: center;">X</p> <p>sperm</p> <p style="text-align: center;">XY / YX</p>	3	Accept lower case letters x and y								
	b	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="height: 20px;"></td><td style="width: 20px;"></td></tr> <tr><td style="height: 20px;"></td><td style="width: 20px;"></td></tr> <tr><td style="height: 20px; text-align: center;">one from each pair</td><td style="width: 20px; text-align: center;">✓</td></tr> <tr><td style="height: 20px;"></td><td style="width: 20px;"></td></tr> </table>					one from each pair	✓			1	Need three empty boxes (possibly with crossed out ticks) and a tick in the THIRD box to gain this mark. Accept any clear mark in the box to indicate choice.
one from each pair	✓											
Total			4									
2	a	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="height: 20px;"></td><td style="width: 20px;"></td></tr> <tr><td style="height: 20px;"></td><td style="width: 20px;"></td></tr> <tr><td style="height: 20px;"></td><td style="width: 20px;"></td></tr> <tr><td style="height: 20px; text-align: center;">divides after fertilisation</td><td style="width: 20px; text-align: center;">✓</td></tr> </table>							divides after fertilisation	✓	1	Need three empty boxes (possibly with crossed out ticks) and a tick in the FOURTH box to gain this mark. Accept any clear mark in the box to indicate choice.
divides after fertilisation	✓											
	b	<p>genes</p> <p>environment</p> <p>asexual</p>	3	One mark per correct word in the correct place. Ignore misspellings so long as the meaning is clear. Look out particularly for the wrong response 'sexual' in the third space.								
Total			4									
3	a	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="height: 20px; text-align: center;">check for genetic disorders</td><td style="width: 20px; text-align: center;">✓</td></tr> <tr><td style="height: 20px;"></td><td style="width: 20px;"></td></tr> <tr><td style="height: 20px;"></td><td style="width: 20px;"></td></tr> </table>	check for genetic disorders	✓					1	Need two empty boxes (possibly with crossed out ticks) and a tick in the FIRST box to gain this mark. Accept any clear mark in the box to indicate choice.		
check for genetic disorders	✓											
	b		2	Look at the links as they leave the left-hand boxes. One mark for each correct link as shown. If any left-hand box has two links, that box does not score a mark.								
Total			3									

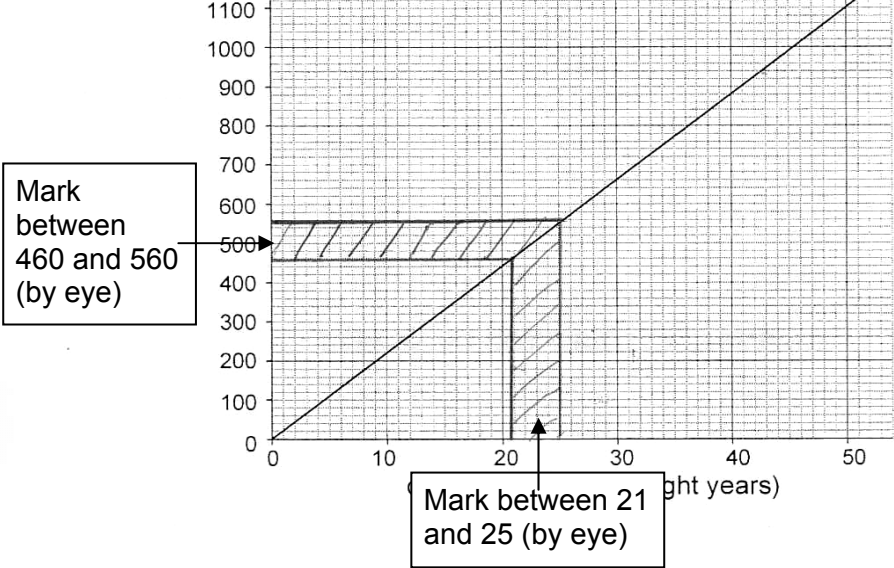
Question			Expected Answers	Mks	Rationale								
4	a		<table border="1"> <tr> <td>inherited from parents</td> <td>✓</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table>	inherited from parents	✓							1	Need three empty boxes (possibly with crossed out ticks) and a tick in the FIRST to gain this mark. Accept any clear mark in the box to indicate choice.
inherited from parents	✓												
	b	i	<table border="1"> <tr> <td>0%</td> <td></td> </tr> <tr> <td>33%</td> <td></td> </tr> <tr> <td>50%</td> <td>✓</td> </tr> <tr> <td>100%</td> <td></td> </tr> </table>	0%		33%		50%	✓	100%		1	Need three empty boxes (possibly with crossed out ticks) and a tick in the THIRD to gain this mark. Accept any clear mark in the box to indicate choice. Allow 50% written alongside if all boxes are blank
0%													
33%													
50%	✓												
100%													
		ii	<table border="1"> <tr> <td></td> <td></td> </tr> <tr> <td>C</td> <td>✓</td> </tr> <tr> <td></td> <td></td> </tr> </table> <p>_____</p>			C	✓			1	Need two empty boxes (possibly with crossed out ticks) and a tick in the SECOND to gain this mark. Accept any clear mark in the box to indicate choice. If all boxes are blank, look at the family tree (whole script view) and credit mark if there is C in Neil's box in family tree.		
C	✓												
			Total	3									

Question			Expected Answers	Mks	Rationale						
5	a	i ii iii	petrol } diesel } (any order) coal }	3	If multiple answers in one line, or continuously over 3 lines, mark first three named chemicals only. Ignore any chemicals (even if correct) after the first three named.						
	b			3	Look at the links as they leave the left-hand boxes. All four links correct scores 3 marks. Three links correct scores 2 marks. Two links correct scores 2 marks. One link correct scores 1 mark.						
	c		sulfur	1	Allow S, or sulphur, or misspelling so long as it clearly means sulfur. NOT sulfate or sulphate or sulfide or sulphide.						
	d		Kate	1	Allow quotation from Kate, eg 'Particles settle'.						
	e		<table border="1"> <tbody> <tr> <td>uses less fuel</td> <td>false</td> </tr> <tr> <td>less fuel per passenger</td> <td>true</td> </tr> <tr> <td>less pollution than a car</td> <td>false</td> </tr> </tbody> </table>	uses less fuel	false	less fuel per passenger	true	less pollution than a car	false	2	Allow F T F (upper or lower case) or ×✓×. Blank boxes are NOT counted as false. All boxes correct scores 2 marks. Two boxes correct scores 1 mark. One box correct does NOT score a mark.
uses less fuel	false										
less fuel per passenger	true										
less pollution than a car	false										
Total				10							

Question		Expected Answers	Mks	Rationale
6	a	21% oxygen 1% argon 78% nitrogen	3	1 mark for each correct name in the correct place. Ignore misspelling if meaning is clear. Allow symbols if Ar, O ₂ , N ₂ (including the subscript 2s in the case of oxygen and nitrogen) for argon, oxygen and nitrogen respectively. If carbon dioxide appears in any box disallow mark for that box. Watch for correct words in wrong places!
	b	photosynthesis	1	Allow incorrect spelling of photosynthesis. Allow ring around word or underlining.
Total			4	
7	a		3	Look at the links as they leave the left-hand boxes. NB asteroid link is given, so ignore that line. All four links correct scores 3 marks. Three links correct scores 2 marks. Two links correct scores 2 marks. One link correct scores 1 mark.
	b	5000 million years (the middle figure)	1	Allow underline or any unambiguous choice, eg tick.
Total			4	

Question		Expected Answers	Mks	Rationale																																																															
8	a	<table border="1"> <tr><td></td><td></td></tr> <tr><td>fit together</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td>fossils of similar animals</td><td>✓</td></tr> </table>			fit together	✓			fossils of similar animals	✓	2	<p>Judge entire set of four boxes: second and fourth should have ticks (or other clear indication of choice) and first and third should be blank. A box is correct if it has a tick (✓) in it and there is meant to be a tick (✓). A box is correct if it is blank and it is meant to be blank. All four correct scores two marks. Three boxes correct scores one mark. Two boxes correct scores one mark. No mark is scored if all boxes are indicated, or if all boxes are blank (mark this NR). eg</p> <table border="1"> <tr><td></td><td></td><td></td><td>✓</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr> <tr><td>fit together</td><td>✓</td><td>x</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td>✓</td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td></tr> <tr><td>fossils of similar animals</td><td>✓</td><td>x</td><td></td><td>✓</td><td></td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td></tr> <tr><td>Score:</td><td>2</td><td>2</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>NR</td></tr> </table>				✓			✓	✓	✓	✓		fit together	✓	x	✓	✓	✓				✓						✓	✓		✓	✓	✓		fossils of similar animals	✓	x		✓		✓	✓		✓		Score:	2	2	1	1	1	1	0	0	0	NR
fit together	✓																																																																		
fossils of similar animals	✓																																																																		
			✓			✓	✓	✓	✓																																																										
fit together	✓	x	✓	✓	✓				✓																																																										
				✓	✓		✓	✓	✓																																																										
fossils of similar animals	✓	x		✓		✓	✓		✓																																																										
Score:	2	2	1	1	1	1	0	0	0	NR																																																									
	b	<table border="1"> <tr><td>Could not measure movement</td><td>✓</td></tr> <tr><td>Wegener not trained</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>	Could not measure movement	✓	Wegener not trained	✓					2	<p>Judge entire set of four boxes as in 8a, but first and second should have ticks (or other clear indication of choice) and third and fourth should be blank. A box is correct if it has a tick (✓) in it and there is meant to be a tick (✓). A box is correct if it is blank and it is meant to be blank. All four correct scores two marks. Three boxes correct scores one mark. Two boxes correct scores one mark. If three or more boxes are wrong, there is no mark.</p>																																																							
Could not measure movement	✓																																																																		
Wegener not trained	✓																																																																		
Total			4																																																																

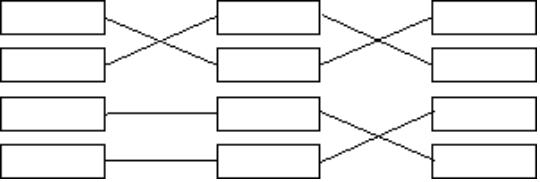
Question		Expected Answers	Mks	Rationale								
9	a	<table border="1"> <tr><td> </td><td> </td></tr> <tr><td>At edge of tectonic plate</td><td>✓</td></tr> <tr><td> </td><td> </td></tr> </table>			At edge of tectonic plate	✓			1	Need two empty boxes (possibly with crossed out ticks) and a tick in the SECOND to gain this mark. Accept any clear mark in the box to indicate choice.		
At edge of tectonic plate	✓											
	b	<table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td>more new houses at Sacramento</td><td>✓</td></tr> <tr><td>stop building on San Andreas</td><td>✓</td></tr> </table>					more new houses at Sacramento	✓	stop building on San Andreas	✓	2	<p>Judge entire set of four boxes as in 8a, but third and fourth should have ticks (or other clear indication of choice) and first and second should be blank.</p> <p>A box is correct if it has a tick (✓) in it and there is meant to be a tick (✓).</p> <p>A box is correct if it is blank and it is meant to be blank.</p> <p>All four correct scores two marks. Three boxes correct scores one mark. Two boxes correct scores one mark. If three or more boxes are wrong, there is no mark.</p>
more new houses at Sacramento	✓											
stop building on San Andreas	✓											
Total			3									

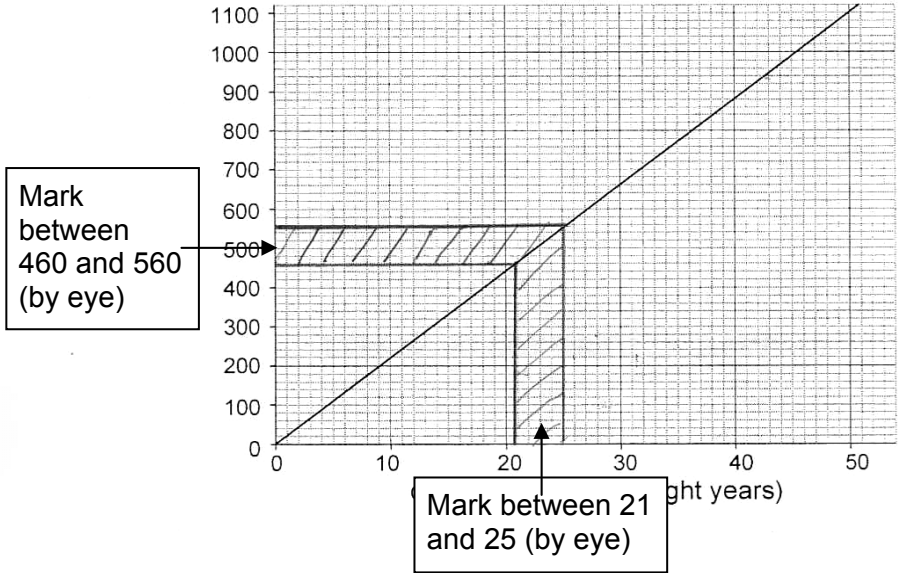
Question		Expected Answers	Mks	Rationale								
10	a	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td>moving away</td><td>✓</td></tr> <tr><td> </td><td> </td></tr> </table>					moving away	✓			1	Need three empty boxes (possibly with crossed out ticks) and a tick in the THIRD box to gain this mark. Accept any clear mark in the box to indicate choice.
moving away	✓											
	b	<p>Any unambiguous indication within the shaded region shows that the correct galaxy has been identified.</p> <p>B / (one moving at) 480-520 (km/s)</p>	2	 <p>Mark between 460 and 560 (by eye)</p> <p>Mark between 21 and 25 (by eye)</p> <p>If letter/galaxy chosen is wrong but correctly follows from construction on the graph, allow one mark as error carried forward.</p>								
Total			3									

**Mark Scheme A211/02
January 2007**

1	a	<table border="1"> <tr> <td>A gene has only one allele.</td> <td>X</td> </tr> <tr> <td>A gene is part of a DNA...</td> <td>✓</td> </tr> <tr> <td>DNA is a long molecule...</td> <td>✓</td> </tr> <tr> <td>DNA is found in the...</td> <td>✓</td> </tr> <tr> <td>Genes code for making...</td> <td>✓</td> </tr> <tr> <td>The Y chromosome does...</td> <td>X</td> </tr> </table>	A gene has only one allele.	X	A gene is part of a DNA...	✓	DNA is a long molecule...	✓	DNA is found in the...	✓	Genes code for making...	✓	The Y chromosome does...	X	3	<p>all 6 correct = 3 5 or 4 correct = 2 3 or 2 correct = 1 Treat blank boxes as X responses If <u>all</u> boxes blank then mark as NR Must be clear positive (✓) or clear negative (x) response.</p>
A gene has only one allele.	X															
A gene is part of a DNA...	✓															
DNA is a long molecule...	✓															
DNA is found in the...	✓															
Genes code for making...	✓															
The Y chromosome does...	X															
	b	B - one from mother and one from father	1	Allow underlining or ring around the correct response.												
Total			4													
2	a	<table border="1"> <tr> <td>inherited from parents</td> <td>✓</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table>	inherited from parents	✓							1	Need three empty boxes (possibly with crossed out ticks) and a tick in the FIRST to gain this mark. Accept any clear mark in the box to indicate choice.				
inherited from parents	✓															
	b	i	1	Need three empty boxes (possibly with crossed out ticks) and a tick in the THIRD to gain this mark. Accept any clear mark in the box to indicate choice. Allow 50% written alongside if all boxes are blank												
		ii	1	Need two empty boxes (possibly with crossed out ticks) and a tick in the SECOND to gain this mark. Accept any clear mark in the box to indicate choice. If all boxes are blank, look at the family tree (whole script view) and credit mark if there is C in Neil's box in family tree.												
Total			3													

Question		Expected Answers	Mks	Rationale								
3	a	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center; width: 50%;"><u>Advantage</u></td> <td style="text-align: center; width: 50%;"><u>Disadvantage</u></td> </tr> <tr> <td style="text-align: center;">Brenda</td> <td style="text-align: center;">Mary</td> </tr> <tr> <td style="text-align: center;">Ranjit</td> <td style="text-align: center;">Jo</td> </tr> <tr> <td style="text-align: center;">Dave</td> <td></td> </tr> </table>	<u>Advantage</u>	<u>Disadvantage</u>	Brenda	Mary	Ranjit	Jo	Dave		3	5 correct = 3 marks 3 or 4 correct = 2 marks 2 or 1 correct = 1 mark Any name appearing in both columns scores 0 Allow any order.
<u>Advantage</u>	<u>Disadvantage</u>											
Brenda	Mary											
Ranjit	Jo											
Dave												
	b	<table border="1" style="border-collapse: collapse; margin: auto;"> <tr> <td style="padding: 2px 5px;">C</td> <td style="padding: 2px 5px;">E</td> <td style="padding: 2px 5px;">A</td> <td style="padding: 2px 5px;">F</td> <td style="padding: 2px 5px;">D</td> <td style="padding: 2px 5px;">B</td> </tr> </table>	C	E	A	F	D	B	4	E anywhere before A = 1 mark A anywhere before F = 1 mark F anywhere before D = 1 mark D anywhere before B = 1 mark		
C	E	A	F	D	B							
Total			7									
4	a	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;">21% oxygen</td> <td style="width: 50%; vertical-align: top;">1% argon</td> </tr> <tr> <td></td> <td style="vertical-align: bottom;">78% nitrogen</td> </tr> </table>	21% oxygen	1% argon		78% nitrogen	3	1 mark for each correct name in the correct place. Ignore misspelling if meaning is clear. Allow symbols if Ar, O ₂ , N ₂ (including the subscript 2s in the case of oxygen and nitrogen) for argon, oxygen and nitrogen respectively. If carbon dioxide appears in any box disallow mark for that box. Watch for correct words in wrong places!				
21% oxygen	1% argon											
	78% nitrogen											
	b	photosynthesis	1	Allow incorrect spelling of photosynthesis. Allow ring around word or underlining.								
Total			4									

Question			Expected Answers	Mks	Rationale
5	a	i	oxygen	1	Allow symbol O ₂ (2 must be smaller than O.) if more than one gas is given mark is zero.
		ii	nitrogen oxygen	1	Any order. Allow N ₂ and O ₂ . Both required for 1 mark.
	b		C	1	Allow underlining or ring around correct response.
	c		Brian	1	Clear indication of Brian as correct response.
	d			6	<p>Mark each side separately</p> <p><u>Lines between left hand boxes and middle boxes;</u> 4 lines correct = 3 marks 2 or 3 correct = 2 marks 1 correct = 1 mark</p> <p>When a candidate draws more than 4 lines, then each extra wrong line cancels out one correct line. eg 6 lines drawn with 4 correct and 2 wrong counts as 2 correct which equals 2 marks.</p> <p><u>Lines between middle and right hand boxes;</u> 4 lines correct = 3 marks 2 or 3 correct = 2 marks 1 correct = 1 mark more than 4 lines each extra line cancels out a correct box</p> <p>When a candidate draws more than 4 lines, then each extra wrong line cancels out one correct line. eg 6 lines drawn with 4 correct and 2 wrong counts as 2 correct which equals 2 marks</p>
			Total	10	

Question		Expected Answers	Mks	Rationale						
6	a	3 rd box (Distance galaxies are moving away from our galaxy)	1	One box only clearly indicated						
	b	Any unambiguous indication within the shaded region shows that the correct galaxy has been identified. B / (one moving at) 480-520 (km/s)	2	 <p>Mark between 460 and 560 (by eye)</p> <p>Mark between 21 (light years) and 25 (by eye)</p> <p>If letter/galaxy chosen is wrong but correctly follows from construction on the graph, allow one mark as error carried forward.</p>						
Total			3							
7		<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>B</td> <td>C</td> <td>D</td> <td>A</td> <td>F</td> <td>E</td> </tr> </table>	B	C	D	A	F	E	3	D anywhere before A = 1 mark A anywhere before F = 1 mark F anywhere before E = 1 mark
B	C	D	A	F	E					
Total			3							

Question		Expected Answers	Mks	Rationale										
8	a	ring around the 2 nd figure (5000 million years)	1	Clear indication of correct response.										
	b	i <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td></td><td></td></tr> <tr><td>Milan</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td>Daniel</td><td>✓</td></tr> <tr><td>Heather</td><td>✓</td></tr> </table> Milan, Daniel, Heather			Milan	✓			Daniel	✓	Heather	✓	2	Mark all 5 boxes. All 5 correct = 2 marks 4 or 3 correct = 1 mark 2 or 1 correct = 0 marks
Milan	✓													
Daniel	✓													
Heather	✓													
		ii <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>Sarah</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>Daniel</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table> Sarah and Daniel	Sarah	✓					Daniel	✓			2	Mark all 5 boxes. All 5 correct = 2 marks 4 or 3 correct = 1 mark 2 or 1 correct = 0 marks
Sarah	✓													
Daniel	✓													
		iii <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>Mike</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table> Mike only					Mike	✓					1	All 5 boxes correct =1 mark
Mike	✓													
Total			6											

Question		Expected Answers	Mks	Rationale								
9	a	<table border="1"> <tr><td></td><td></td></tr> <tr><td>no geological theory</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>			no geological theory	✓					1	Any clear indication of correct response.
no geological theory	✓											
	b	<table border="1"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>sea floor spreading</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table>					sea floor spreading	✓			1	Any clear indication of correct response.
sea floor spreading	✓											
Total			2									

**Mark Scheme A212/01
January 2007**

Question		Expected Answer	Mks	Rationale										
1	a	<table border="1"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>colds are caused by viruses</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td>antibiotics do not work against viruses</td><td>✓</td></tr> </table>					colds are caused by viruses	✓			antibiotics do not work against viruses	✓	2	Each tick in a correct box = 1 mark. For more than two ticks, each extra tick loses a mark (but not below zero). Candidates may leave the remaining boxes blank or put in a symbol which is interpreted as a negative response.
colds are caused by viruses	✓													
antibiotics do not work against viruses	✓													
	b	<table border="1"> <tr><td></td><td></td></tr> <tr><td>bacteria can develop resistance...</td><td>✓</td></tr> <tr><td>only by completing the course...</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table>			bacteria can develop resistance...	✓	only by completing the course...	✓			2	Each tick in a correct box = 1 mark. For more than two ticks, each extra tick loses a mark (but not below zero). Candidates may leave the remaining boxes blank or put in a symbol which is interpreted as a negative response.		
bacteria can develop resistance...	✓													
only by completing the course...	✓													
Total			4											
2	a		3	If any box, on either side, has two lines and neither has been crossed out, those lines must be ignored. NB sticky mucus link is given, so ignore that line. All four links correct scores 3 marks. Three links correct scores 2 marks. Two links correct scores 2 marks. One link correct scores 1 mark.										
	b	<table border="1"> <thead> <tr> <th>support</th> <th>do not support</th> </tr> </thead> <tbody> <tr> <td>Brenda</td> <td>Jo</td> </tr> <tr> <td>Dave</td> <td></td> </tr> <tr> <td>Mary</td> <td></td> </tr> <tr> <td>Ranjit</td> <td></td> </tr> </tbody> </table>	support	do not support	Brenda	Jo	Dave		Mary		Ranjit		3	Do not count any name appearing in both columns. Allow misspellings if identity is clear. Names can appear in any order. All 5 correct =3 marks 3 or 4 correct = 2 marks 1 or 2 correct = 1 mark
support	do not support													
Brenda	Jo													
Dave														
Mary														
Ranjit														
Total			6											

Question		Expected Answers	Mks	Rationale								
3	a	<table border="1"> <tr> <td>There is a correlation...</td> <td>✓</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>More men than women...</td> <td>✓</td> </tr> </table>	There is a correlation...	✓					More men than women...	✓	2	Each tick in a correct box = 1 mark. For more than two ticks, each extra tick loses a mark (but not below zero). Candidates may leave the remaining boxes blank or put in a symbol which is interpreted as a negative response.
There is a correlation...	✓											
More men than women...	✓											
	b	C (asking other scientists to examine the evidence)	1	Allow any unambiguous choice eg ticking, ringing, underlining statement C in the list, etc. Allow all or part of the statement copied providing it is clearly statement C. More than one response = 0 marks.								
Total			3	1								
4	a		2	If any box, on either side, has two lines and neither has been crossed out, those lines must be ignored. NB silk link is given, so ignore that line. One mark for each correct link								
	b		2	If any box, on either side, has two lines and neither has been crossed out, those lines must be ignored. All 3 links correct for 2 marks. 1 or 2 links correct scores one mark.								
	c	mixture length polymer monomer	4	Allow misspelling so long as word is identifiable and unambiguous. Other clear link between word and space, eg arrow from word to the appropriate gap, is acceptable.								
Total			8									

Question			Expected Answers	Mks	Rationale			
5			<p>polymer chain to thick zig-zag line plasticizer to one of the ovals on right cross-link to any thin vertical line on left</p>	3	<p>Either side. Allow label line which falls short of or extends beyond the correct part of the diagram by not more than 2 mm. ‘Cross-link’ or ‘polymer chain’ label line is not acceptable if it indicates a junction between the cross-link and the polymer chain.</p>			
Total				3				
6	a	i	C	1	<p>Allow any unambiguous choice eg ticking, underlining. More than one response = 0 marks.</p>			
		ii	none of these	1	<p>Allow any unambiguous choice eg ticking, underlining. More than one response = 0 marks.</p>			
	b		has no clear pattern	1	<p>Allow tick, ring around or other unambiguous choice from the list. Accept shortened response ‘has no pattern’, ‘no pattern’, ‘no clear pattern’. More than one response = 0 marks.</p>			
Total				3				
7	a	i	<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 33%;">micro-waves</td> <td style="width: 33%;">ultra-violet</td> <td style="width: 33%;">gamma rays</td> </tr> </table>	micro-waves	ultra-violet	gamma rays	2	<p>all three = 2, one correct = 1 Ignore misspellings. Other clear link between word and space, eg arrow from word to the appropriate gap, is acceptable. Look for ‘P’ of part aii while marking this question</p>
micro-waves	ultra-violet	gamma rays						
		ii	In right-most box (gamma rays)	1	<p>Allow P in, above, below or to the right of the right-most box. Allow P next to gamma rays in the list for ai.</p>			
	b		microwaves (the second item)	1	<p>Allow underline or any unambiguous choice, eg tick, underline.</p>			
Total				4				

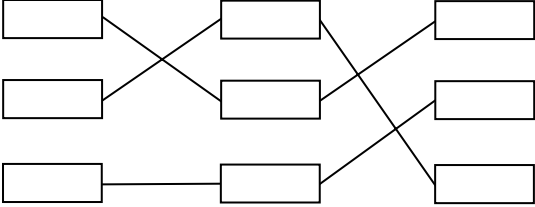
Question		Expected Answers	Mks	Rationale								
8	a	2	1	Can circle or otherwise indicate letter in list in question itself instead of writing in answer space. If there is no response, check on diagram in whole-screen view (eg labelling arrow 2 'a' or 'carbon out of atmosphere', etc).								
	b	2	1	Can circle or otherwise indicate letter in list in question itself instead of writing in answer space. If there is no response, check on diagram in whole-screen view.								
	c	3	1	Can circle or otherwise indicate letter in list in question itself instead of writing in answer space. If there is no response, check on diagram in whole-screen view.								
	d	4	1	Can circle or otherwise indicate letter in list in question itself instead of writing in answer space. If there is no response, check on diagram in whole-screen view.								
Total			4									
9	a	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Apply extra sunscreen...</td> <td style="text-align: center;">✓</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </table>	Apply extra sunscreen...	✓							1	Allow any unambiguous choice, eg tick. No extra choices allowed.
Apply extra sunscreen...	✓											
	b	ultraviolet ozone layer	2	Ignore misspellings. Other clear link between word and space, eg arrow from word to the appropriate gap, is acceptable.								
Total			3									

Question		Expected Answers	Mks	Rationale
10	a	Tracy and Paul	2	One mark each; either order. Allow misspelling so long as name is identifiable and unambiguous. If there are more than two names, each extra name loses one mark. Total mark cannot be below zero.
	b	Paul	1	Allow misspelling so long as name is identifiable and unambiguous. More than one name = 0 marks.
	c	Tracy	1	Allow misspelling so long as name is identifiable and unambiguous. More than one name = 0 marks.
Total			4	

**Mark Scheme A212/02
January 2007**

Question		Expected Answers	Mks	Rationale						
1	a	<table border="1"> <thead> <tr> <th>support</th> <th>do not support</th> </tr> </thead> <tbody> <tr> <td>Brenda Dave Mary Ranjit</td> <td>Jo</td> </tr> </tbody> </table>	support	do not support	Brenda Dave Mary Ranjit	Jo	3	Do not count any name appearing in both columns. Allow misspellings if identity is clear. Names can appear in any order. All 5 correct =3 marks 3 or 4 correct = 2 marks 1 or 2 correct = 1 mark		
support	do not support									
Brenda Dave Mary Ranjit	Jo									
	b		3	Do not count the line from top left to bottom right. One mark for each correct line. If a candidate draws more than three lines and makes no attempt to cross them out, then each extra wrong line cancels out one correct line. eg four lines drawn, three of them correct, results in two marks. Accept non-straight lines.						
Total			6							
2	a	Immune; Antibodies; Engulf; Vaccine;	4	Allow any clear indication of correct choice. Allow misspellings if identity is clear. More than one response in each space = 0 marks.						
	b	<table border="1"> <tbody> <tr> <td>antibodies</td> <td></td> </tr> <tr> <td>antibiotics</td> <td></td> </tr> <tr> <td>toxins</td> <td>✓</td> </tr> </tbody> </table>	antibodies		antibiotics		toxins	✓	1	Any clear indication of correct response = 1 mark More than one response = 0 marks
antibodies										
antibiotics										
toxins	✓									
Total			5							

Question		Expected Answers	Mks	Rationale										
3	a	<table border="1"> <tr> <td>Patients are divided...</td> <td>✓</td> </tr> <tr> <td></td> <td>x</td> </tr> <tr> <td>The doctor does not know...</td> <td>✓</td> </tr> <tr> <td></td> <td>x</td> </tr> <tr> <td></td> <td>x</td> </tr> </table>	Patients are divided...	✓		x	The doctor does not know...	✓		x		x	3	<p>If the question has been attempted, assume that blank boxes represent crosses.</p> <p>Five boxes correct = 3 marks Four boxes correct = 2 marks Three boxes correct = 1 mark Less than three correct = 0 marks</p>
Patients are divided...	✓													
	x													
The doctor does not know...	✓													
	x													
	x													
	b	C (asking other scientists to examine the evidence)	1											
Total			4											
4	a	A, D and E	2	<p>Responses in any order.</p> <p>Correct responses are A, D and E.</p> <p>Three correct responses = 2 marks Two correct responses = 2 marks One correct response = 1 mark</p> <p>If more than two responses, each incorrect response cancels out a correct one.</p>										
	b	E	1	<p>Any clear indication of correct response = 1 mark More than one response = 0 marks</p>										
Total			3											

Question		Expected Answers	Mks	Rationale
5			4	<p>Mark each side independently.</p> <p><u>Left hand side</u> Three lines correct = 2 marks One or two lines correct = 1 mark</p> <p><u>Right hand side</u> Three lines correct = 2 marks One or two lines correct = 1 mark</p> <p>If a candidate draws more than three lines on one side and makes no attempt to cross them out, then each extra wrong line cancels out one correct line on that side. eg four lines drawn, three of them correct, results in two marks</p>
		Total	4	

Question			Expected Answers	Mks	Rationale
6	a	i	C	1	Allow any unambiguous choice eg ticking, underlining. More than one response = 0 marks.
		ii	none of these	1	Allow any unambiguous choice eg ticking, underlining. More than one response = 0 marks.
	b	i	has no clear pattern	1	Allow tick, ring around or other unambiguous choice from the list. Accept shortened response 'has no pattern', 'no pattern', 'no clear pattern'. More than one response = 0 marks.
		ii	increases	1	Allow tick, ring around or other unambiguous choice from the list. Accept shortened response 'has no pattern', 'no pattern', 'no clear pattern'. More than one response = 0 marks.
	c	i	B	1	Allow tick, ring around or other unambiguous choice from the list. Accept shortened response 'stronger ... between' More than one response = 0 marks.
		ii	A	1	Allow tick, ring around or other unambiguous choice from the list. Accept shortened response 'more energy'. More than one response = 0 marks.
Total				6	

Question		Expected Answers	Mks	Rationale
7	a	Tracy and Paul	2	One mark each; either order. Allow misspelling so long as name is identifiable and unambiguous. If there are more than two names, each extra name loses one mark. Total mark cannot be below zero.
	b	Paul	1	Allow misspelling so long as name is identifiable and unambiguous. More than one name = 0 marks.
	c	Tracy	1	Allow misspelling so long as name is identifiable and unambiguous. More than one name = 0 marks.
	d	Sunil	1	Allow misspelling so long as name is identifiable and unambiguous. More than one name = 0 marks.
Total			5	
8	a	respiration / combustion / burning	1	Allow misspellings if identity is clear. Breathing / transpiration / exhalation = 0 marks One correct and one incorrect response = 0 marks
	b	photosynthesis / autotrophic nutrition	1	Allow misspellings if identity is clear. Inspiration = 0 marks Do not penalise growth / absorption / diffusion One correct and one incorrect response = 0 marks
	c	respiration / combustion / decomposition	1	Allow misspellings if identity is clear. Accept rotting / decaying / biodegrading / breakdown/burning. One correct and one incorrect response = 0 marks Do not penalise reuse / death / destroy / recycle.
Total			3	

Question		Expected Answers		Mks	Rationale										
9			<table border="1"> <tr> <td>If the same number of X-ray...</td> <td>✓</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>The amount of heating a surface...</td> <td>✓</td> </tr> <tr> <td>The intensity depends on the...</td> <td>✓</td> </tr> <tr> <td></td> <td></td> </tr> </table>	If the same number of X-ray...	✓			The amount of heating a surface...	✓	The intensity depends on the...	✓			2	<p>Five boxes correct = 2 marks Three or four boxes correct = 1 mark Less than three correct = 0 marks Accept crosses as blank boxes.</p> <p>No boxes are marked = NR</p>
If the same number of X-ray...	✓														
The amount of heating a surface...	✓														
The intensity depends on the...	✓														
Total				2											
10	a		<table border="1"> <tr> <td></td> <td></td> </tr> <tr> <td>Skin cancer can be caused by...</td> <td>✓</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>Ultraviolet radiation is absorbed...</td> <td>✓</td> </tr> <tr> <td></td> <td></td> </tr> </table>			Skin cancer can be caused by...	✓			Ultraviolet radiation is absorbed...	✓			2	<p>Both ticks correct = 2 marks One tick correct = 1 mark</p> <p>If more than two responses, each incorrect response cancels out a correct one.</p>
Skin cancer can be caused by...	✓														
Ultraviolet radiation is absorbed...	✓														
	b		<table border="1"> <tr> <td>Feeling hot in the sun doesn't...</td> <td>✓</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>More ultraviolet reaches the...</td> <td>✓</td> </tr> <tr> <td></td> <td></td> </tr> </table>	Feeling hot in the sun doesn't...	✓					More ultraviolet reaches the...	✓			2	<p>Both ticks correct = 2 marks One tick correct = 1 mark</p> <p>If more than two responses, each incorrect response cancels out a correct one.</p>
Feeling hot in the sun doesn't...	✓														
More ultraviolet reaches the...	✓														
Total				4											

**General Certificate of Secondary Education
Twenty First Century Science (Specification Code J630)
January 2007 Assessment 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	33	28	23	19	15	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A211/02	Raw	42	39	36	32	28	23	20	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	23	n/a	n/a	n/a
A212/01	Raw	42	n/a	n/a	n/a	33	29	25	22	19	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A212/02	Raw	42	39	35	30	26	20	17	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	23	n/a	n/a	n/a

For a description of how UMS marks are calculated see;
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