



**GCSE**

**Science A  
Twenty First Century Science**

General Certificate of Secondary Education **J630**

**Mark Scheme for the Components**

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**June 2008**

**J630/MS/R/08**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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### GCSE Twenty First Century Science A (J630)

#### MARK SCHEMES FOR THE UNITS

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# Guidance for Examiners

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. Each separate marking point is indicated by a (1) at the end of that marking point.
4. Abbreviations, annotations and conventions used in the detailed Mark Scheme:

ORA = or reverse argument

NOT = point that is not given credit

AW/owtte = alternative wording/or words to that effect: allow any expression that is clearly equivalent

/ = Alternative and acceptable answers for the same marking point

point = point must be present to gain the mark

(description) = description which need not be present to gain the mark

E.g. mark scheme shows 'work done in lifting / (change in) gravitational potential energy'

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. The list principle: if a list of responses greater than the number requested is given, you 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, i.e. 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.
7. Marking method for tick boxes:  
If there is a set of boxes, some of which should be ticked and others left empty, then you need to judge the entire set of boxes.

E.g. If a question requires candidates to identify a city in England, then in the boxes

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out). For a two-mark question, the rationale would be:

All boxes are indicated scores 0 marks.

All boxes blank scores 0 marks.

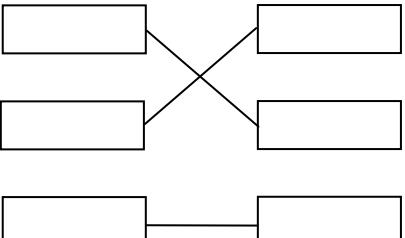
All four boxes correct scores 2 marks.

Three boxes correct scores 1 mark.

Two boxes correct scores 1 mark.

Edinburgh			✓			✓		✓	✓	✓	
Manchester	✓	✗	✓	✓	✓					✓	
Paris				✓	✓		✓	✓	✓		
Southampton	✓	✗		✓		✓	✓			✓	
Score:	2	2	1	1	1	1	0	0	0	NR	

# A211/01 Modules B1, C1, P1 Foundation

Question			Expected Answers		Marks	Rationale										
1	a	i			2	<p>all links correct = 2 marks      1 or 2 links correct = 1 mark      more than one line from a left hand box does not score that link</p>										
		ii	Z (1)		1	<b>allow</b> mantle										
	b		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 5px;">supports Wegener</td> <td style="padding: 5px;">supports Willis</td> </tr> <tr> <td style="padding: 5px;">✓</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;">✓</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;"></td> <td style="padding: 5px;">✓</td> </tr> <tr> <td style="padding: 5px;">✓</td> <td style="padding: 5px;"></td> </tr> </table>		supports Wegener	supports Willis	✓		✓			✓	✓		3	<p>count correct rows      all correct = 3 marks      one mistake = 2 marks      two mistakes = 1 mark      more than two mistakes = 0 marks      a mistake is:</p> <ul style="list-style-type: none"> <li>• a tick in the wrong column of a row</li> <li>• no tick or two ticks in a row</li> </ul> <p><b>accept</b> any clear and unambiguous response</p>
supports Wegener	supports Willis															
✓																
✓																
	✓															
✓																
			<b>Total</b>		<b>6</b>											

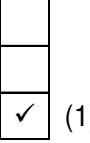
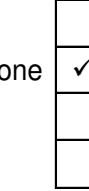
Question		Expected Answers	Marks	Rationale								
2	a	i parallax (1)	1	<b>allow</b> answer clearly marked on list above (circle/underline etc.) <b>allow</b> incorrect spelling if answer unambiguous								
		ii star A is further from Earth than B <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 15px; height: 15px;"></td><td style="width: 15px; height: 15px; text-align: center;">✓</td></tr><tr><td style="width: 15px; height: 15px;"></td><td style="width: 15px; height: 15px;"></td></tr></table> (1)		✓			1	<b>accept</b> any clear and unambiguous response more than 1 response = 0				
	✓											
	b	radiation (1) light pollution (1) planets (1)	3	correct response must be in appropriate sentence								
3	c	i <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 15px; height: 15px; text-align: center;">Bev</td><td style="width: 15px; height: 15px; text-align: center;">✓</td></tr><tr><td style="width: 15px; height: 15px; text-align: center;">Matt</td><td style="width: 15px; height: 15px;"></td></tr><tr><td style="width: 15px; height: 15px; text-align: center;">Sahid</td><td style="width: 15px; height: 15px; text-align: center;">✓</td></tr><tr><td style="width: 15px; height: 15px; text-align: center;">Tracy</td><td style="width: 15px; height: 15px;"></td></tr></table> (1)	Bev	✓	Matt		Sahid	✓	Tracy		2	1 mark for each correct answer if 3 boxes ticked deduct 1 mark 4 ticks = 0 marks  <b>accept</b> any clear and unambiguous response
Bev	✓											
Matt												
Sahid	✓											
Tracy												
	ii <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 15px; height: 15px; text-align: center;">Bev</td><td style="width: 15px; height: 15px;"></td></tr><tr><td style="width: 15px; height: 15px; text-align: center;">Matt</td><td style="width: 15px; height: 15px; text-align: center;">✓</td></tr><tr><td style="width: 15px; height: 15px; text-align: center;">Sahid</td><td style="width: 15px; height: 15px; text-align: center;">✓</td></tr><tr><td style="width: 15px; height: 15px; text-align: center;">Tracy</td><td style="width: 15px; height: 15px;"></td></tr></table> (1)	Bev		Matt	✓	Sahid	✓	Tracy		2	1 mark for each correct answer if 3 boxes ticked deduct 1 mark 4 ticks = 0 marks  <b>accept</b> any clear and unambiguous response	
Bev												
Matt	✓											
Sahid	✓											
Tracy												
		<b>Total</b>	<b>9</b>									

Question		Expected Answers	Marks	Rationale
3	a	i close roads in the city centre <input checked="" type="checkbox"/> (1)  use electric trams instead of cars <input checked="" type="checkbox"/> (1)	2	1 mark for each correct answer if 3 boxes ticked deduct 1 mark 4 ticks = 0 marks  <b>accept</b> any clear and unambiguous response
		ii ... affects people with asthma <input checked="" type="checkbox"/> (1) ... damages the environment <input checked="" type="checkbox"/> (1)	2	1 mark for each correct answer if 3 boxes ticked deduct 1 mark 4 ticks = 0 marks  <b>accept</b> any clear and unambiguous response
►		iii ...are not driving their cars into town <input checked="" type="checkbox"/> (1)  trams run on electricity <input checked="" type="checkbox"/> (1)	2	1 mark for each correct answer if 3 boxes ticked deduct 1 mark 4 ticks = 0 marks  <b>accept</b> any clear and unambiguous response
	b		4	mark each side independently  on each side: 3 correct links = 2 marks 2 or 1 correct links = 1 mark  2 lines from left box in link does not score that link
		<b>Total</b>	10	

Question		Expected Answers	Marks	Rationale
4	a	64 (1)	1	accept any clear and unambiguous response
	b	i 25 (1)	1	accept any clear and unambiguous response
		ii from 23 to 27 (1)	1	both values required - can be in either order
		iii  ... heating boiler changed slightly	1	accept any clear and unambiguous response
		<b>Total</b>	<b>4</b>	

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5	a	<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">alleles</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">chromosomes</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">genes</div> </div> <div style="flex: 2;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">long threads of DNA</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">instructions for protein</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">different versions</div> </div> </div>	3	each correct link scores 1 mark more than one line from the same name (left box) does not score for that link
	b	<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1;"> <p>one set comes from each parent</p> </div> <div style="flex: 1; text-align: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;"></div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;"></div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">✓</div> </div> </div>	1	accept any clear and unambiguous response more than 1 response = 0
		<b>Total</b>	<b>4</b>	

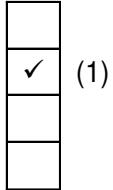
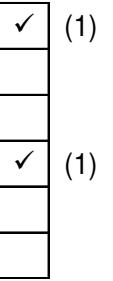
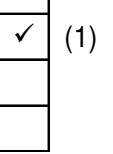
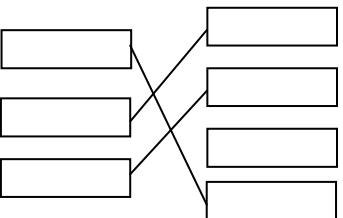
Question		Expected Answers	Marks	Rationale
6	a	i Passed on to him from parents 	1	<b>accept</b> any clear and unambiguous response more than 1 response = 0
		ii being clumsy (1) forgetting things (1)	2	1 mark for each correct answer if 3 answers given deduct 1 mark 4/5 answers = 0 marks  <b>accept</b> any clear and unambiguous response
		iii one 	1	<b>accept</b> any clear and unambiguous response more than 1 response = 0
6	b	... whether or not to have children make plans to help him in the future 	1	both correct ticks required for 1 mark one or three ticks = 0  <b>accept</b> any clear and unambiguous response
	c	i Nikki (1)	1	<b>accept</b> any clear and unambiguous response
		ii Tony (1)	1	<b>accept</b> any clear and unambiguous response
		iii Mark (1)	1	<b>accept</b> any clear and unambiguous response
		iv William and Tony (1)	1	both required - either order <b>accept</b> any clear and unambiguous response
		<b>Total</b>	<b>9</b>	

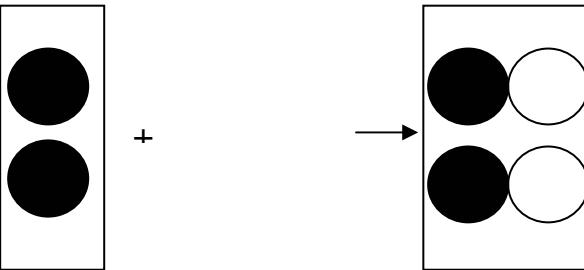
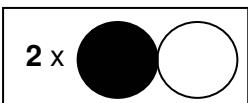


## A211/02 Modules B1, C1, P1 Higher

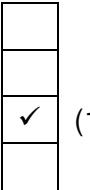
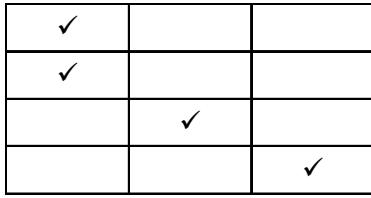
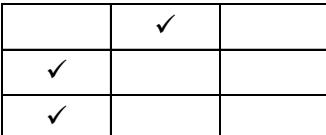
Question		Expected Answers		Marks	Rationale										
1	a		<table border="1"> <tr> <td>supports Wenger</td><td>supports Willis</td></tr> <tr> <td>✓</td><td></td></tr> <tr> <td>✓</td><td></td></tr> <tr> <td></td><td>✓</td></tr> <tr> <td>✓</td><td></td></tr> </table>	supports Wenger	supports Willis	✓		✓			✓	✓		3	<p>count correct rows          all correct = 3          one mistake = 2          two mistakes = 1          more than two mistakes = 0          a mistake is:</p> <ul style="list-style-type: none"> <li>• a tick in the wrong column of a row</li> <li>• no tick or two ticks in a row</li> </ul> <p><b>accept</b> any clear and unambiguous response</p>
supports Wenger	supports Willis														
✓															
✓															
	✓														
✓															
b		i	100 mm (1)	1	<b>accept</b> any clear and unambiguous response										
ii			<table border="1"> <tr> <td>(C)</td><td>A</td><td>B</td><td>E</td><td>D</td></tr> </table>	(C)	A	B	E	D	3	A before B (1) B before E (1) E before D (1)					
(C)	A	B	E	D											
		Total		7											

Question		Expected Answers				Marks	Rationale																									
2	a	<table border="1"> <tr><td>Bev</td><td>✓</td><td>(1)</td><td></td></tr> <tr><td>Matt</td><td></td><td></td><td></td></tr> <tr><td>Sahid</td><td>✓</td><td>(1)</td><td></td></tr> <tr><td>Tracy</td><td></td><td></td><td></td></tr> </table>				Bev	✓	(1)		Matt				Sahid	✓	(1)		Tracy				2	<p>1 mark for each correct answer  If 3 boxes ticked deduct 1 mark  4 ticks = 0 marks</p> <p><b>accept</b> any clear and unambiguous response</p>									
Bev	✓	(1)																														
Matt																																
Sahid	✓	(1)																														
Tracy																																
	b	<table border="1"> <tr><td>Bev</td><td></td><td>(1)</td><td></td></tr> <tr><td>Matt</td><td>✓</td><td>(1)</td><td></td></tr> <tr><td>Sahid</td><td>✓</td><td>(1)</td><td></td></tr> <tr><td>Tracy</td><td></td><td></td><td></td></tr> </table>				Bev		(1)		Matt	✓	(1)		Sahid	✓	(1)		Tracy				2	<p>1 mark for each correct answer  if 3 boxes ticked deduct 1 mark  4 ticks = 0 marks</p> <p><b>accept</b> any clear and unambiguous response</p>									
Bev		(1)																														
Matt	✓	(1)																														
Sahid	✓	(1)																														
Tracy																																
6	c	<table border="1"> <thead> <tr> <th></th> <th>can be done</th> <th>cannot be done</th> <th>should be done</th> <th>should not be done</th> </tr> </thead> <tbody> <tr><td>Bev</td><td>✓</td><td></td><td></td><td></td></tr> <tr><td>Matt</td><td></td><td></td><td></td><td>✓</td></tr> <tr><td>Sahid</td><td></td><td>✓</td><td></td><td></td></tr> <tr><td>Tracy</td><td>(✓)</td><td></td><td>✓</td><td></td></tr> </tbody> </table>					can be done	cannot be done	should be done	should not be done	Bev	✓				Matt				✓	Sahid		✓			Tracy	(✓)		✓		4	<p>one mark for each correct row  if more than 1 tick in a row, that row scores 0 marks</p> <p>BUT if the row for Tracey has an extra tick (as shown in brackets on the mark scheme) the mark for that row may still be awarded as this is treated as neutral</p>
	can be done	cannot be done	should be done	should not be done																												
Bev	✓																															
Matt				✓																												
Sahid		✓																														
Tracy	(✓)		✓																													
		<b>Total</b>				8																										

Question		Expected Answers	Marks	Rationale
3	a	... levels and hospital admissions 	1	<b>accept</b> any clear and unambiguous response
	b	each tram can carry eighty people  trams run on electricity 	2	<b>accept</b> any clear and unambiguous response  1 mark for each correct answer if 3 boxes ticked deduct 1 mark 4 ticks = 0 marks
10	c		2	<b>accept</b> any clear and unambiguous response  mark lines from left hand boxes all lines correct for 2 marks 2 correct lines = 1 mark 1 correct = 0 marks if two or more lines from a left hand box, treat that box as incorrect
		<b>Total</b>	5	

Question		Expected Answers	Marks	Rationale
4	a	carbon		1 accept 'C' for carbon
	b			1 atoms must be in correct order E.g. white-black-white white circles must be touching the black circle white circles must not touch each other <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <b>accept</b>   instead of black circle  and  instead of white circle </div>
11	c			2 mark left box and right box independently. <b>accept</b> <b>left box:</b> 2 black circles, not touching each other = 1 mark <b>accept</b>  to represent 2 copies  <b>right box:</b> 2 copies of a black circle and a white circle joined (one copy must not touch the other) = 1 mark <b>accept</b>  to represent 2 copies
		<b>Total</b>		<b>4</b>

Question		Expected Answers	Marks	Rationale
5	a	64 (1)	1	accept any clear and unambiguous response if no value is chosen from the list, check the table above
	b	i 25 (1)	1	accept any clear and unambiguous response ignore any working out or units written after the number
		ii from 23 to 27 (1)	1	both values required - can be in either order
	iii	... heating boiler changed slightly  (1)	1	accept any clear and unambiguous response
12	c	range of test C does not overlap B	1	accept any clear and unambiguous response
		<b>Total</b>	<b>5</b>	

Question		Expected Answers	Marks	Rationale
6	a	only one dominant allele is needed  	1  (1)	accept any clear and unambiguous response
	b	50%	1	accept any clear and unambiguous response
	c		4  (1) (1) (1) (1)	one mark for each correct row if more than 1 tick in a row, that row scores 0 marks
	d i	Nikki (1)	1	accept any clear and unambiguous response
	ii	Tony (1)	1	accept any clear and unambiguous response
	iii	Mark (1)	1	accept any clear and unambiguous response
	iv	William and Tony (1)	1	both required - either order accept any clear and unambiguous response
	e		3  (1) (1) (1)	one mark for each correct row if more than 1 tick in a row, that row scores 0 marks
		Total	13	

## A212/01 Modules B2, C2, P2 Foundation

Question			Expected Answers	Marks	Rationale
1	a	i	cotton (1)	1	accept any clear indication of correct answer.
		ii	made from renewable sources	1	accept any clear indication of correct answer more than 1 tick scores 0
	b	i	kevlar (1)	1	accept any clear indication of correct answer.
14		ii	nylon sails absorb most water sail that absorbs water will be heavier sails that are strong absorb less water	2	3 correct = 2 1 or 2 correct = 1 F and T written on top of each other does not score for that box
		iii	resistance to stretch	1	accept any clear indication of correct answer more than 1 tick = 0
			<b>Total</b>	<b>6</b>	

Question		Expected Answers		Marks	Rationale
2	a	i	Peter (1)	1	
		ii	Kate (1) Jane (1)	2	1 mark for each correct name in any order
	b	i	3 (1)	1	allow ring around 3 in the table allow ring around stretch of 3.5 in table
		ii	2.1 (1)	1	
		iii	the samples may vary  errors reading the lengths	2	1 mark for each correct answer If 3 boxes ticked deduct 1 mark 4 ticks = 0 marks
	c		.....more flexible	1	accept any clear indication of correct answer more than 1 tick = 0
<b>Total</b>				<b>8</b>	

3					2	1 mark for each correct answer If 3 boxes ticked deduct 1 mark 4 ticks = 0 marks
			they make antibodies	✓	(1)	
			they digest microorganisms	✓	(1)	
<b>Total</b>				<b>2</b>		

Question		Expected Answers		Marks	Rationale						
4	a		<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td></td><td></td></tr> <tr><td>a safe form of the virus</td><td style="text-align: center;">✓</td></tr> <tr><td></td><td></td></tr> </table> <span style="display: inline-block; vertical-align: middle; margin-left: 10px;">(1)</span>			a safe form of the virus	✓			1	<b>accept</b> any clear indication of correct answer more than 1 tick = 0
a safe form of the virus	✓										
	b	i	Jasmine (1) Jo (1)	2	1 mark for each correct name in any order						
		ii	Saleema (1) Jo (1)	2	1 mark for each correct name in any order						
		iii	Sam (1)	1							
		<b>Total</b>		<b>6</b>							

16

5	a		increases (1) positive (1)	2	answer must correctly complete the sentence 1 mark for each correct answer																					
	b		<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td></td><td style="text-align: center;">increase</td><td style="text-align: center;">decrease</td></tr> <tr><td>poor diet</td><td style="text-align: center;">✓</td><td></td></tr> <tr><td>stress</td><td style="text-align: center;">✓</td><td></td></tr> <tr><td>alcohol</td><td style="text-align: center;">✓</td><td></td></tr> <tr><td>exercise</td><td></td><td style="text-align: center;">✓</td></tr> <tr><td>smoking</td><td style="text-align: center;">✓</td><td></td></tr> <tr><td>cholesterol drugs</td><td></td><td style="text-align: center;">✓</td></tr> </table> <span style="display: inline-block; vertical-align: middle; margin-left: 10px;">(1)</span>		increase	decrease	poor diet	✓		stress	✓		alcohol	✓		exercise		✓	smoking	✓		cholesterol drugs		✓	4	<b>accept</b> any clear indication of correct answer if <b>both</b> ticks and crosses used then ignore crosses  6 correct = 4 4 or 5 correct = 3 2 or 3 correct = 2 1 correct = 1
	increase	decrease																								
poor diet	✓																									
stress	✓																									
alcohol	✓																									
exercise		✓																								
smoking	✓																									
cholesterol drugs		✓																								
			<b>Total</b>	<b>6</b>																						

Question	Expected Answers			Marks	Rationale
6	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 150px; margin: 10px;">           signal from TV station to TV aerial            cooking food quickly            signal from remote control to the TV            Mike watching his TV         </div> <div style="border: 1px solid black; padding: 5px; width: 150px; height: 150px; margin: 10px;">           light            infrared            microwaves            radio waves         </div> </div>			3	3 or 4 correct = 3 2 correct = 2 1 correct = 1  look for job correctly linked to type of radiation more than one line from a <b>left hand</b> box is incorrect
	<b>Total</b>			3	

Question	Expected Answers			Marks	Rationale								
7	a		<table border="1"> <tr><td>headaches</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td>loss of concentration</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table>	headaches	✓			loss of concentration	✓			(1) (1)	2 1 mark for each correct answer If 3 boxes ticked deduct 1 mark 4 ticks = 0 marks
headaches	✓												
loss of concentration	✓												
	b		<table border="1"> <tr><td></td><td></td></tr> <tr><td>students can benefit</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>			students can benefit	✓					(1)	1 more than 1 tick = 0
students can benefit	✓												
18	c		<p>... photons have more energy ...  ... photons are ionising radiation.  Ionising radiation can cause cancer.  ... radiation is used by mobile</p> <table border="1"> <tr><td>F</td></tr> <tr><td>F</td></tr> <tr><td>T</td></tr> <tr><td>T</td></tr> </table>	F	F	T	T		3 all 4 correct = 3 3 correct = 2 2 correct = 1 1 correct = 0 F and T written on top of each other does not score for that box				
F													
F													
T													
T													
			<b>Total</b>	<b>6</b>									

Question		Expected Answers			Marks	Rationale
8	a	light radiated from the sun	B	(1)	4	mark each box independently
		does not reach Earth's surface	A	(1)		
		the Earth's atmosphere	D	(1)		
		warms the Earth's atmosphere	E	(1)		
	b	carbon dioxide	✓	(1)	1	more than 1 tick = 0
		Total			5	

## A212/02 Modules B2, C2, P2 Higher

Question			Expected Answers		Marks	Rationale								
1			<table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td>strength and resistance to stretch</td><td>✓</td></tr> </table>								strength and resistance to stretch	✓	1 (1)	more than one tick = 0
strength and resistance to stretch	✓													
			<b>Total</b>		<b>1</b>									

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2	a	i	Sajid (1)	1									
		ii	Jess (1)	1									
	b	i	3 (1)	1	<b>allow</b> ring around 3 in the table <b>allow</b> ring around stretch of 3.5 in table								
		ii	2.1 (1)	1									
		iii	<table border="1"> <tr><td>The samples may vary.</td><td>✓</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td>... errors reading the lengths.</td><td>✓</td></tr> </table>	The samples may vary.	✓					... errors reading the lengths.	✓	2 (1) (1)	1 mark for each correct answer If three boxes ticked deduct 1 mark four ticks = 0 mark
The samples may vary.	✓												
... errors reading the lengths.	✓												
			<b>Total</b>		<b>6</b>								

Question		Expected Answers			Marks	Rationale												
3	a	A (1) D (1)			2	Answers in any order.												
	b	<table border="1"> <tr><td>smaller more reactive molecules</td><td>✓</td></tr> <tr><td>join together to make long chains</td><td>✓</td></tr> </table>			smaller more reactive molecules	✓	join together to make long chains	✓	1	<b>both</b> correct for one mark a tick in any other box = 0 marks								
smaller more reactive molecules	✓																	
join together to make long chains	✓																	
	c	<table border="1"> <tr><td></td><td>dec</td><td>inc</td><td>stays same</td></tr> <tr><td>increased crystallinity</td><td></td><td>✓(1)</td><td></td></tr> <tr><td>plasticizer added</td><td>✓(1)</td><td></td><td></td></tr> </table>				dec	inc	stays same	increased crystallinity		✓(1)		plasticizer added	✓(1)			2	mark each row separately <b>one</b> tick in correct place = 1 mark
	dec	inc	stays same															
increased crystallinity		✓(1)																
plasticizer added	✓(1)																	
	d	<table border="1"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>gases put into the atmosphere</td><td>✓</td></tr> <tr><td>may harm living things</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table>							gases put into the atmosphere	✓	may harm living things	✓			2	1 mark for each correct answer if three ticks deduct 1 mark four or five ticks = 0 marks		
gases put into the atmosphere	✓																	
may harm living things	✓																	
		<b>Total</b>			7													

Question		Expected Answers		Marks	Rationale												
4	a		<table border="1"> <tr><td></td><td></td></tr> <tr><td>safe form of a virus</td><td>✓</td></tr> <tr><td>immune system</td><td>✓</td></tr> <tr><td>prevent epidemics</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>			safe form of a virus	✓	immune system	✓	prevent epidemics	✓					3 (1) (1) (1)	1 mark for each correct answer if four ticks deduct 1 mark if five ticks deduct 2 marks six ticks = 0 marks
safe form of a virus	✓																
immune system	✓																
prevent epidemics	✓																
	b	i	Jasmine (1) Jo (1)	2	1 mark for each correct name in any order												
		ii	Jo (1) Saleema (1)	2	1 mark for each correct name in any order												
		iii	Sam (1)	1													
	c		<table border="1"> <tr><td></td><td></td></tr> <tr><td>damages the immune system</td><td>✓</td></tr> <tr><td>has a high mutation rate</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>			damages the immune system	✓	has a high mutation rate	✓					2 (1) (1)	1 mark for each correct answer if three boxes ticked deduct 1 mark four ticks = 0 marks		
damages the immune system	✓																
has a high mutation rate	✓																
			<b>Total</b>	<b>10</b>													

Question		Expected Answers	Marks	Rationale						
5	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>positive correlation</td><td style="text-align: center;">✓</td></tr> </table> <span style="margin-left: 100px;">(1)</span>					positive correlation	✓	1	more than one tick scores 0
positive correlation	✓									
	b	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>(E)</td><td style="text-align: center;">F</td><td style="text-align: center;">D</td><td style="text-align: center;">C</td><td style="text-align: center;">A</td><td style="text-align: center;">(B)</td></tr> </table>	(E)	F	D	C	A	(B)	3	F before D (1) D before C (1) C before A (1)
(E)	F	D	C	A	(B)					
<b>Total</b>			<b>4</b>							

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6		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>signal from TV station</td><td>radio waves</td></tr> <tr><td>cooking food quickly</td><td>microwaves</td></tr> <tr><td>signal from remote control</td><td>infrared/IR</td></tr> <tr><td>Mike watching his TV</td><td>(visible) light</td></tr> </table>	signal from TV station	radio waves	cooking food quickly	microwaves	signal from remote control	infrared/IR	Mike watching his TV	(visible) light	2	<b>accept</b> radio - do not accept waves <b>accept</b> micro - do not accept waves <b>accept</b> reasonable variation of spellings of infra <b>accept</b> visible on its own  4 correct =2 2 or 3 correct =1 1 or 0 correct = 0
signal from TV station	radio waves											
cooking food quickly	microwaves											
signal from remote control	infrared/IR											
Mike watching his TV	(visible) light											
<b>Total</b>			<b>2</b>									

Question			Expected Answers		Marks	Rationale										
7	a		photons (1)		1											
	b		infrared radiation from the Earth (1) ... is absorbed by carbon dioxide in the atmosphere... (1) ... causing the Earth to be warmer (1)		3	1 mark for correct box in <b>each</b> column more than one box indicated in a column = 0 mark for that column										
	c		<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td></td><td></td></tr> <tr><td>increase in amount of flooding</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td>difficulty in growing crops</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table> <span style="display: inline-block; vertical-align: middle; margin-left: 10px;">(1)</span> <span style="display: inline-block; vertical-align: middle; margin-left: 10px;">(1)</span>				increase in amount of flooding	✓			difficulty in growing crops	✓			2	1 mark for each correct answer if three boxes ticked deduct 1 mark four or five ticks = 0 marks
increase in amount of flooding	✓															
difficulty in growing crops	✓															
			<b>Total</b>		6											

Question		Expected Answers		Marks	Rationale								
8	a		<p>... photons have more energy ...</p> <p>... photons are ionising radiation.</p> <p>Ionising radiation can cause cancer.</p> <p>... radiation is used by mobile phones.</p>	<input type="checkbox"/> F <input type="checkbox"/> F <input type="checkbox"/> T <input type="checkbox"/> T	<p>3</p> <p>all 4 correct = 3 3 correct = 2 2 correct = 1 1 correct = 0</p> <p>F and T written on top of each other does not score for that box</p>								
	b		<table border="1"> <tr><td></td><td></td></tr> <tr><td>students can benefit</td><td><input checked="" type="checkbox"/></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>			students can benefit	<input checked="" type="checkbox"/>					(1)	1 more than one tick scores 0
students can benefit	<input checked="" type="checkbox"/>												
25	c	i	Mark (1)	1									
		ii	Veronica (1)	1									
			<b>Total</b>	<b>6</b>									

## A213/01 Modules B3, C3, P3 Foundation

Question			Expected Answers		Marks	Rationale												
1	a		receptor (1) response (1) brain (1)		3	accept any other unambiguous positive indication on list												
	b		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>nervous</td> <td>hormonal</td> </tr> <tr> <td>hearing the horn</td> <td>✓</td> <td></td> </tr> <tr> <td>face goes pale</td> <td></td> <td>✓</td> </tr> <tr> <td>jumping back</td> <td>✓</td> <td></td> </tr> </table>			nervous	hormonal	hearing the horn	✓		face goes pale		✓	jumping back	✓		2	<p><b>check</b> line by line; if more than one ✓ per line, no credit</p> <p>3 correct = 2 2 correct = 1 1 correct = 0</p> <p>accept a clear response e.g. X or shading etc</p> <p>ignore X if combination of ✓ and X used</p>
	nervous	hormonal																
hearing the horn	✓																	
face goes pale		✓																
jumping back	✓																	
			<b>Total</b>		5													

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2	a		extinct (1)	1	accept any other positive unambiguous response e.g. underline										
	b		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td></td><td></td></tr> <tr><td>less food for the birds this year</td><td>✓</td></tr> <tr><td>fewer chicks survived the winter</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>			less food for the birds this year	✓	fewer chicks survived the winter	✓					(1)	<p>one mark for <b>each</b> correct tick</p> <p><b>deduct</b> one mark for each incorrect tick if more than two ticks used - minimum mark = 0</p> <p>accept a clear response e.g. X or shading etc</p> <p>ignore X if combination of ✓ and X used</p>
less food for the birds this year	✓														
fewer chicks survived the winter	✓														
	c		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td></td><td></td></tr> <tr><td>population of fish will increase</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table>			population of fish will increase	✓			(1)	<p><b>deduct</b> one mark for each incorrect tick if more than one tick used - minimum mark = 0</p> <p>accept a clear response e.g. X or shading etc</p> <p>ignore X if combination of ✓ and X used</p>				
population of fish will increase	✓														
			<b>Total</b>		4										

Question		Expected Answers			Marks	Rationale																				
3	a	A (1) B (1)			2	<p>either order is acceptable</p> <p><b>accept</b> other unambiguous indications e.g. circle A and B</p> <p><b>accept</b> lower case</p> <p>mark answers on lines <b>first</b></p>																				
	b	<table border="1"> <tr> <td></td> <td>selective breeding</td> <td>natural selection</td> <td>both</td> </tr> <tr> <td>useful features</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>variation</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>better adapted</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>passed on</td> <td></td> <td></td> <td>✓</td> </tr> </table>				selective breeding	natural selection	both	useful features	✓			variation			✓	better adapted		✓		passed on			✓	3	<p><b>check</b> line by line; if more than one ✓ per line, no credit for that line</p> <p>4 correct = 3 3 correct = 2 2 correct = 1 1 correct = 0</p> <p><b>accept</b> a clear response e.g. X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>
	selective breeding	natural selection	both																							
useful features	✓																									
variation			✓																							
better adapted		✓																								
passed on			✓																							
		<b>Total</b>			5																					
4	a	i	amber (1)			1 <b>accept</b> any other positive unambiguous response e.g. underline																				
		ii	sugar (1)			1 <b>accept</b> any other positive unambiguous response e.g. underline																				
	b		<table border="1"> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td>choose a healthy diet</td><td>✓</td><td>(1)</td></tr> </table>												choose a healthy diet	✓	(1)	1 <b>deduct</b> one mark for each incorrect tick if more than one tick used - minimum mark 0  <b>accept</b> a clear response e.g. X or shading etc  <b>ignore</b> X if combination of ✓ and X used								
choose a healthy diet	✓	(1)																								
	c	i	Anna (1) Rajid (1)			2 either order is acceptable  <b>accept</b> R for Rajid etc																				
		ii	Danny (1)			1 <b>accept</b> D for Danny; more than one name = 0																				
			<b>Total</b>			6																				

Question		Expected Answers		Marks	Rationale								
5	a	nitrogen (1) fertile (1) disease (1)		3	<b>accept</b> any other unambiguous positive indication on list  <b>accept</b> N for nitrogen								
	b	i	<table border="1"> <tr><td>pesticides are used</td><td>✓</td></tr> <tr><td>chemical weed killers are used</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>	pesticides are used	✓	chemical weed killers are used	✓					(1) (1)	<p>one mark for <b>each</b> correct tick</p> <p><b>deduct</b> one mark for each incorrect tick if more than two ticks used - minimum mark 0</p> <p><b>accept</b> a clear response e.g. X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>
pesticides are used	✓												
chemical weed killers are used	✓												
		ii	<table border="1"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>meet the UK national standards</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table>						meet the UK national standards	✓			<p>more than one response = 0 marks</p> <p><b>accept</b> a clear response e.g. ✓ or X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>
meet the UK national standards	✓												
	c		<table border="1"> <tr><td>his crop yield is lower</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td>he spends less on pesticides</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table>	his crop yield is lower	✓			he spends less on pesticides	✓			(1) (1)	<p>one mark for <b>each</b> correct tick</p> <p><b>deduct</b> one mark for each incorrect tick if more than two ticks used - minimum mark 0</p> <p><b>accept</b> a clear response e.g. X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>
his crop yield is lower	✓												
he spends less on pesticides	✓												
			<b>Total</b>		8								

Question		Expected Answers				Marks	Rationale
6	a		for	against	neither	both	
		Andy				✓	<p>mark line by line; if more than one ✓ per line, no credit</p> <p><b>accept</b> a clear response e.g. X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>
		Betty	✓				
		Chris			✓		
		Dan	✓				

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7	a		North America (1)	1	<b>accept</b> any other positive unambiguous response e.g. underline  if more than one response no mark
	b		5.9 (1)	1	<b>accept</b> any other positive unambiguous response e.g. underline  if more than one response no mark
			<b>Total</b>	2	

Question			Expected Answers		Marks	Rationale										
8	a	i	D (1)		1	<p><b>accept</b> lead (Pb)</p> <p><b>accept</b> other unambiguous indications e.g. circle D</p>										
		ii	A (1)		1	<p><b>accept</b> open window</p> <p><b>accept</b> other unambiguous indications e.g. circle A</p>										
	b		<table border="1"> <tr><td></td><td></td></tr> <tr><td>cannot penetrate paper</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td>stopped by dead skin cells</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table>				cannot penetrate paper	✓			stopped by dead skin cells	✓			2	<p>one mark for <b>each</b> correct tick</p> <p><b>deduct</b> one mark for each incorrect tick if more than two ticks used. Minimum mark 0.</p> <p><b>accept</b> a clear response e.g. X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>
cannot penetrate paper	✓															
stopped by dead skin cells	✓															
03	c		<table border="1"> <tr><td>amount of radiation</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>type of radiation</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table>		amount of radiation	✓					type of radiation	✓			2	<p>one mark for <b>each</b> correct tick</p> <p><b>deduct</b> one mark for each incorrect tick if more than two ticks used - minimum mark 0</p> <p><b>accept</b> a clear response eg. X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>
amount of radiation	✓															
type of radiation	✓															
			Total		6											



## A213/02 Modules B3, C3, P3 Higher

Question	Expected Answers		Marks	Rationale										
1 a	<table border="1"> <tr><td></td><td></td></tr> <tr><td>less food for the birds this year</td><td>✓</td></tr> <tr><td>fewer chicks survived the winter</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>			less food for the birds this year	✓	fewer chicks survived the winter	✓					(1) (1)	2	<p>one mark for <b>each</b> correct tick</p> <p><b>deduct</b> one mark for each incorrect tick if more than two ticks used - minimum mark 0</p> <p><b>accept</b> a clear response e.g. X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>
less food for the birds this year	✓													
fewer chicks survived the winter	✓													
b	<table border="1"> <tr><td></td><td></td></tr> <tr><td>noise from the harbour</td><td>✓</td></tr> <tr><td>feed on the same species of fish</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table>			noise from the harbour	✓	feed on the same species of fish	✓			(1) (1)	2	<p>one mark for <b>each</b> correct tick</p> <p><b>deduct</b> one mark for each incorrect tick if more than two ticks used - minimum mark 0</p> <p><b>accept</b> a clear response e.g. X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>		
noise from the harbour	✓													
feed on the same species of fish	✓													
	<b>Total</b>		4											

Question		Expected Answers	Marks	Rationale												
2	a	A (1) B (1)	2	<p>either order is acceptable</p> <p><b>accept</b> other unambiguous indications e.g. circle A and B.</p> <p><b>accept</b> lower case</p> <p>mark answers on lines <b>first</b></p>												
	b	<table border="1"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>interpret evidence in different</td><td>✓</td></tr> <tr><td>many different ideas</td><td>✓</td></tr> <tr><td>no one knows the conditions</td><td>✓</td></tr> </table>							interpret evidence in different	✓	many different ideas	✓	no one knows the conditions	✓	3 (1) (1) (1)	<p>one mark for <b>each</b> correct tick</p> <p><b>deduct</b> one mark for each incorrect tick if more than three ticks used - minimum mark 0</p> <p><b>accept</b> a clear response e.g. X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>
interpret evidence in different	✓															
many different ideas	✓															
no one knows the conditions	✓															
		<b>Total</b>	5													

Question			Expected Answers	Marks	Rationale
3	a	i	D (1)	1	<b>accept</b> any unambiguous indication of D
		ii	A C E	2	any order is acceptable 3 correct (2) 2 correct (1) 1 or 0 correct (0)
	b		A (1) B (1)	2	one mark for each correct response either order is acceptable <b>accept</b> any unambiguous indication of A and B
<b>Total</b>			<b>5</b>		

34

4	a		<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td></td><td></td></tr> <tr><td>protect the public's health</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td>looks after consumer interests</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table> <span style="display: inline-block; vertical-align: middle; margin-left: 10px;">(1)</span> <span style="display: inline-block; vertical-align: middle; margin-left: 10px;">(1)</span>			protect the public's health	✓			looks after consumer interests	✓			2	<p>one mark for <b>each</b> correct tick</p> <p><b>deduct</b> one mark for each incorrect tick if more than two ticks used - minimum mark 0</p> <p><b>accept</b> a clear response eg. X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>
protect the public's health	✓														
looks after consumer interests	✓														
	b	i	Anna (1) Rajid (1)	2	<p>either order is acceptable</p> <p><b>accept</b> R for Rajid etc</p>										
		ii	Danny (1)	1	<p><b>accept</b> D for Danny</p> <p>more than one name = 0</p>										
		iii	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>possible consequences of</td><td>✓</td></tr> </table> <span style="display: inline-block; vertical-align: middle; margin-left: 10px;">(1)</span>					possible consequences of	✓	1	<p>more than one response = 0</p> <p><b>accept</b> a clear response e.g. X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>				
possible consequences of	✓														
<b>Total</b>			<b>6</b>												

35

Question	Expected Answers		Marks	Rationale										
5 a	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>Left</p> <p>Right</p> </div> </div>		4	<p>mark left and right hand sides independently</p> <p>(Left)</p> <p><b>two</b> correct lines from intensive = 1 one, three or four lines = 0</p> <p><b>two</b> correct lines from organic = 1 one, three or four lines = 0</p> <p>(Right)</p> <p>correct lines from manure <b>and</b> chemical = 1 any additional lines from manure or chemical = 0</p> <p>correct lines from large <b>and</b> small = 1 any additional lines from large or small = 0</p>										
b i	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 80%;"></td><td style="width: 20%;"></td></tr> <tr><td></td><td></td></tr> <tr> <td>meet the UK national standards</td><td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr><td></td><td></td></tr> </table> <p>(1)</p>					meet the UK national standards	<input checked="" type="checkbox"/>				1	<p>more than one response = 0</p> <p><b>accept</b> a clear response eg. ✓ or X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>		
meet the UK national standards	<input checked="" type="checkbox"/>													
b ii	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 80%;"></td><td style="width: 20%;"></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr> <td>nitrogen, phosphorus, potassium</td><td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr><td></td><td></td></tr> </table> <p>(1)</p>							nitrogen, phosphorus, potassium	<input checked="" type="checkbox"/>				1	<p>more than one response = 0 marks</p> <p><b>accept</b> a clear response eg. ✓ or X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>
nitrogen, phosphorus, potassium	<input checked="" type="checkbox"/>													

Question		Expected Answers		Marks	Rationale												
5	c	<table border="1"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>enough money to choose</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>believe organic food is healthier</td><td>✓</td></tr> </table>					enough money to choose	✓					believe organic food is healthier	✓	(1)	2	<p>one mark for <b>each</b> correct tick</p> <p><b>deduct</b> one mark for each incorrect tick if more than two ticks used - minimum mark 0</p> <p><b>accept</b> a clear response eg. X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>
enough money to choose	✓																
believe organic food is healthier	✓																
		<b>Total</b>		8													

93

6	a	<table border="1"> <tr><td></td><td></td></tr> <tr><td>cannot penetrate paper</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td>stopped by dead skin cells</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table>			cannot penetrate paper	✓			stopped by dead skin cells	✓			(1)	2	<p>one mark for <b>each</b> correct tick</p> <p><b>deduct</b> one mark for each incorrect tick if more than two ticks used - minimum mark 0</p> <p><b>accept</b> a clear response eg. X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>
cannot penetrate paper	✓														
stopped by dead skin cells	✓														
	b	<table border="1"> <tr><td>amount of radiation</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>type of radiation</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table>	amount of radiation	✓					type of radiation	✓			(1)	2	<p>one mark for <b>each</b> correct tick</p> <p><b>deduct</b> one mark for each incorrect tick if more than two ticks used - minimum mark 0</p> <p><b>accept</b> a clear response eg. X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>
amount of radiation	✓														
type of radiation	✓														
	c	A and B		1	<p><b>both</b> correct for one mark</p> <p><b>accept</b> A and C</p> <p><b>accept</b> either order</p>										
		<b>Total</b>		5											

Question		Expected Answers			Marks	Rationale															
7	a	<table border="1"> <thead> <tr> <th></th> <th>real risk</th> <th>perceived risk</th> </tr> </thead> <tbody> <tr> <td>Andy</td> <td></td> <td>✓</td> </tr> <tr> <td>Betty</td> <td>✓</td> <td></td> </tr> <tr> <td>Chris</td> <td>✓</td> <td></td> </tr> <tr> <td>Dan</td> <td></td> <td>✓</td> </tr> </tbody> </table>				real risk	perceived risk	Andy		✓	Betty	✓		Chris	✓		Dan		✓	3	<p><b>check</b> line by line; if more than one tick per line, no credit for that line</p> <p>4 correct = 3 3 correct = 2 1 or 2 correct = 1</p> <p><b>accept</b> a clear response e.g. X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>
	real risk	perceived risk																			
Andy		✓																			
Betty	✓																				
Chris	✓																				
Dan		✓																			
	b	<table border="1"> <tbody> <tr> <td>better safe than sorry</td> <td>✓</td> <td>(1)</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>			better safe than sorry	✓	(1)										1	<p>more than one response = 0 marks</p> <p><b>accept</b> a clear response e.g. ✓ or X or shading etc</p> <p><b>ignore</b> X if combination of ✓ and X used</p>			
better safe than sorry	✓	(1)																			
	c	<p>fuel rod (1) chain reaction (1) control rod (1)</p>			3																
		<p><b>Total</b></p>			7																

8	a		7mSv/year (1)	1	more than one response circled = 0 <b>accept</b> any unambiguous indication of 7mSv/year
	b		0.1 (1)	1	
			<b>Total</b>	2	

# A214/01 Ideas in Context - Foundation

83

Question			Expected Answers	Marks	Rationale
1	a	i	any <b>two</b> from: car interiors (1) water pipes (1) cling film (1) food packaging (1) electric cable insulation (1) textiles (1)	2	any two of the products in the first paragraph one mark per product - if three or more products are listed, apply the list principle
		ii	they need to be strong / stiff ORA (1) otherwise the glass would fall out / would scratch easily / would wear away / security argument (1)	2	one mark for correct property of window frames one mark for the consequence
	b	i	any <b>two</b> from: to be more reliable / trustworthy (1) to account for outliers / anomalous results (1) in case one result is wrong / could be a mistake (1) to check whether the measurements are similar (1) to allow for differences between the samples (1)	2	the question is testing the specification statement 'can explain why repeating measurements leads to a better estimate of the quantity'  any two points, for one mark per point  <b>ignore</b> fair test <b>or</b> make more accurate <b>or</b> average
		ii	$(26+23+24+25+23+23)/6; (1)$ $= 24 (1)$	2	one mark for correct method even if total is incorrect, one for answer giving 24 gets both marks without working
		iii	it is an outlier / it is different from the others / it is outside the range of the others / it is smaller than the other readings (1)	1	this is testing the understanding of the meaning of 'outlier' - the answer should either quote the term or describe its meaning

Question			Expected Answers	Marks	Rationale
1	c	i	children are at risk from phthalate toxicity / children do not break down phthalates / children put things in their mouths (more often) (1) benefit of use of items made from PVC / adults do break down phthalates (1)	2	one mark for a risk, one for relative benefit/reduced risk e.g. candidates who write 'children don't break it down but adults do', get (2) as a minimum response benefit and risk could both apply to child or to adult alone
		ii	<b>for:</b> rats or monkeys are different from humans / no data of phthalate build-up in humans / no evidence of harm from phthalates; (1) <b>against:</b> phthalates cause liver damage in rats / phthalates accumulate in monkey tissues (1) children's <u>livers</u> do not break down phthalates (1)	2	one point for and one against, each getting one mark <b>candidates may not use these words – it is conveying these ideas which is important</b>  damage liver = neutral
Total			13		

08

Question			Expected Answers	Marks	Rationale
2	a	i	no other available treatment (1)	1	<b>allow</b> 'may cure their cancer' owtte <b>allow</b> idea of 'its their only chance of survival'. <b>accept</b> 'their cancer has returned'
		ii	any <b>two</b> from: which cancers it is effective for (1) whether it will work for early cancers (1) proportion of patients for whom it will work (1)	2	any two points may be made in any order <b>allow</b> direct quotes from the article, 'what kind of cancers can be treated', 'the percentage of patients for whom it will work well' <b>ignore</b> side effects
		iii	any <b>two</b> from: compare new drug with existing treatments (1) large(r) sample/more patients (1) long(er) time (1)	2	any 2 points may be made in any order must be difference between phase 1 or 2 and phase 3 mention of 'side effects' or 'quality of life' is neutral
		iv	any <b>two</b> from: (monitor) side effects (over long time) (1) make sure it's safe / make sure side effects not serious (1) check effectiveness/how well it works / see if cancer comes back (1)	2	any 2 points may be made in any order note that the candidates are not taking material from the article, but producing their own thoughts which may be creditworthy
	b	i	Caroline (1)	1	
		ii	Dave (1) Robert (1)	2	either order
		iii	expensive (1) not licensed / not approved / not recommended (1)	2	one mark for each of the two points
	c		circle around top left X (high effectiveness, low cost) (1)	1	
			<b>Total</b>	<b>13</b>	

Question			Expected Answers	Marks	Rationale
3	a	i	10 to 30 (1)	1	both required for the mark <b>allow</b> order reversed (30 to 10) <b>not</b> just B to E – must have numbers
		ii	identifies a value from the chart (1) compares with other rocks (1)	2	'all of the values in the chart are bigger than normal' or, 'even B is many times higher than usual' are both enough for both marks (2)
		iii	ring around E not enclosing any other letters (1)	1	
		iv	idea that there is no correlation / largest value not closest (1)	1	
	b	i	use of meteor dust / consulting other scientists / ask Dad (as he won a Nobel Prize) / idea of asteroid impact / linking to big Mexican crater / possible effect of volcanoes (1)	1	there are many possibilities – remember that it must come from the article, but should be anything which is not trivial and obvious
		ii	volcanoes / Deccan Traps; (1) craters not at right time / most mass extinctions coincide with large volcanic events (1)	2	<b>allow</b> direct quotes from the Earth scientist on these points. 'asteroid hit the Earth 300,000 years before dinosaurs became extinct' = 1 mark
	c	i	asteroid planet Sun (1)	1	all three in order given <b>ignore</b> mis-spellings <b>accept</b> named planet in correct place
		ii	1. asteroid orbits Sun / moon orbits planet; (1) 2. asteroid orbit circular/ comet orbit elliptical or oval / Comets have a tail / comets appear at regular intervals; (1)	2	<b>accept</b> named planet  <b>accept</b> asteroid rocky / metallic OR comet icy/'dirty snowball'
		iii	kill us / destroy life on Earth / plants die (1) any detail e.g. dust blocks out Sun, choking dust/gas / forest fires / tsunamis / darkness / Earth gets cold / climate change (1) QWC (1)	2	first mark for effect second mark for explanation  e.g. mass extinction due to new ice age = 2 marks <b>allow</b> one spelling mistake for 1 mark
			<b>Total</b>	<b>14</b>	

## A214/02 Ideas in Context - Higher

42

Question		Expected Answers	Marks	Rationale
1	a i	children are at risk from phthalate toxicity / children do not break down phthalates / children put things in their mouths (more often) (1) benefit of use of items made from PVC / adults do break down phthalates (1)	2	one mark for a risk, one for relative benefit/reduced risk e.g. candidates who write 'Children don't break it down but adults do' get (2) as a minimum response benefit and risk could both apply to child or to adult alone
	ii	<b>for:</b> rats or monkeys are different from humans / no data of phthalate build-up in humans / no evidence of harm from phthalates (1) <b>against:</b> phthalates cause liver damage in rats / phthalates accumulate in monkey tissues / children's <u>livers</u> do not break down phthalates (1)	2	one point for and one against, each getting one mark <b>candidates may not use these words – it is conveying these ideas which is important</b>  damage liver = neutral
	b	it takes a long time to build up to toxic levels in the human body / it will take 50 years for effects to be noticeable (1) PVC has been used only since 1960s / PVC has not yet been used long enough (1)	2	first mark is for the slow build up in the human body or the long time needed to build up convincing evidence of harmful effects second mark is for the idea that not enough time has passed
	c	any <b>two</b> from: phthalates are soluble in fats (1) link between food and fat content (1) phthalates will move more into dairy foods (1)	2	any 2 points <b>allow</b> reverse argument e.g. 'tomatoes don't contain any fat' butter/cheese/foods containing fat = dairy foods third marking point is about movement of phthalates
	d	poly(ethene) cling film contains no phthalates so there is no risk / it is better to be safe than sorry / owtte (1)	1	reducing the risk is not enough - the risk has to be taken to a minimum

Question			Expected Answers	Marks	Rationale
1	e	i	$(26+23+24+24+23) \div 5$ / find the median (1) = 24 (1)	2	one mark for correct method, one for answer giving 24 gets both marks regardless of working candidates who include the outlier 33 will get an answer 25.5, which they may round to 25 or 26 - these would get one mark
		ii	best estimate for 0% is outside the range for 5% (1) best estimate for 5% is outside the range for 0% (1)	2	'the ranges do not overlap' / 'two ranges are non-overlapping' gains both marks 'all of the second row is bigger than any in the first row' gains both marks 'all of the second row are bigger than the mean of the top row' or 'all of the first row are smaller than the mean of the second row' would each get one mark  consideration of the range of one row of data is worth one mark, and two marks are obtained only if both ranges are considered and seen to be non-overlapping  the idea that each value in the second row is bigger than the value <b>immediately above it</b> is worth zero marks
Total			13		

Question		Expected Answers	Marks	Rationale
2	a i	any <b>two</b> from: chance that drug may be effective for their cancer / nothing to lose (1) altruistic/research may benefit other people in the future (1) they could be paid to take part (1)	2	any 2 points
	ii	any <b>two</b> from: compare new drug with existing treatments (1) large(r) sample / more patients (1) long(er) time (1)	2	any 2 points may be made in any order must be difference between phase 1 or 2 and phase 3 mention of 'side effects' or 'quality of life' is neutral
	iii	any <b>two</b> from: (monitor) side effects (over long time) (1) make sure it's safe / make sure side effects not serious (1) check effectiveness/how well it works / see if cancer comes back (1)	2	any 2 points may be made in any order note that the candidates are not taking material from the article, but producing their own thoughts which may be creditworthy
	b i	any <b>four</b> from: <b>for:</b> slows down/stops development of cancer (1) halves/reduces the risk of cancer returning (1) ethical argument based on idea that treatment should be available for all (1) <b>against:</b> expensive (1) not licensed (1) may have serious side effects (1) not tested on early stage breast cancer (1) ethical argument based on idea that money saved could treat more patients (1)	4	any 4 points maximum 3 marks for one argument alone 'for' and 'against' points may be written anywhere in the answer space as long as it is clear whether the point is 'for' or 'against' could have 'expensive' in <b>both</b> 'against' and 'for' sections provided that the 'for' bit makes it clear that the financial savings outweigh the expense. This may happen if candidates are using the answers from b(ii) here.

Question			Expected Answers		Marks	Rationale
2	b	ii	any <b>two</b> from: more patients will be cured so will not require further treatment (1) saving or earning money with justification (1) economic contribution qualified e.g. back to work quicker (1)			2 this is addressing Idea about Science 6 'Making Decisions about Science and Technology', section 6.7: <ul style="list-style-type: none"><li>can explain why different courses of action may be taken in different social and economic contexts</li></ul> the economic context needs to be clear in the answer  any two points referring to economic benefits to family/NHS/society idea that money/time saved or earned will benefit the economy in some way
		iii	need to be safe / effectiveness compared with current treatments / value for money (1)			1 any point
<b>Total</b>			<b>13</b>			

Question		Expected Answers	Marks	Rationale
3	a	i	10 to 30 (1)	1 both required for the mark <b>allow</b> order reversed (30 to 10) not just B to E – must have numbers
		ii	any <b>two</b> specific points about: different samples (from same location) will show variation e.g. uneven deposition (1) differences in instrumentation (1) variation of procedure (1) contamination of sample / layer may have been disturbed (by faults) (1)	2 any 2 marks for separate point 'it is only an average' or 'there are outliers' implies the variation mark 'faulty' is ok for one mark 'broken instruments' is neutral 'measured wrongly' is not enough
		iii	identifies a value from the chart (1) compares with other rocks (1)	2 'all of the values in the chart are bigger than normal' or, 'even B is many times higher than usual' are both enough for both marks (2)
46		iv	no correlation (between concentration and distance from Chicxulub) (1) justifications e.g. similar positions (D, F or E, A and B) have different readings / places with similar readings (B, D or C, F) are far apart (1)	2 one mark is for 'no correlation' owtte e.g. 'data does not support this' one mark is for any justification based on the data - they can still get this mark even if they have not stated that there is no correlation
	b		use of meteor dust / consulting other scientists / ask Dad (as he won a Nobel prize) / idea of asteroid impact / linking to big Mexican crater / possible effect of volcanoes (1)	1 there are many possibilities – remember that it must come from the article, but should be anything which is not trivial and obvious

47

Question		Expected Answers	Marks	Rationale
	<b>c</b>	any <b>one</b> from no other researchers had reported these findings (1) asteroid impact on this scale had never been suggested before (1) no crater found at this time (1) limited amount of data (1) previously accepted/established theories (had worked well) (1)	1	any 1 point this question is addressing the specification statements: <ul style="list-style-type: none"> <li>can identify absence of replication as a reason for questioning a scientific claim</li> <li>can suggest plausible reasons why scientists involved in a scientific event or issue disagree(d)</li> <li>can suggest reasons for scientists' reluctance to give up an accepted explanation when new data appear to conflict with it.</li> </ul> and any clear attempt to address one of these can gain the mark do not accept material lifted from the 'continuing debate' section of the insert as this was not available straight away
	<b>d</b>	any <b>four</b> from: overall comments covering both theories: both could be correct (1) not enough data available to make a definitive judgement (1) iridium can come from volcanoes/asteroids/both (1)  craters: Chicxulub crater found (1) may be other craters not yet discovered (1)  time coincidence: Chicxulub date not exact enough / Deccan traps better agreement in time (1) many extinctions in past have coincided with volcanic eruptions (1)	4	one mark for each separate point.
		QWC (1)	1	at least 10 words, no more than one spelling error in the first 2 lines
		<b>Total</b>	<b>14</b>	



# Grade Thresholds

General Certificate of Secondary Education  
 Science A (Specification Code J630)  
 June 2008 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	32	28	24	20	16	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A211/02	Raw	42	36	34	30	27	23	21	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	32	28	24	21	18	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A212/02	Raw	42	35	32	28	24	19	16	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	32	28	24	21	18	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A213/02	Raw	42	34	31	27	23	19	17	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	23	18	14	10	6	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A214/02	Raw	40	25	22	17	13	9	7	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A219	Raw	40	33	29	25	21	17	13	10	7	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 2008. The threshold marks will not necessarily be the same in subsequent awards.

## Specification Aggregation Results

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

	Maximum Mark	A*	A	B	C	D	E	F	G	U
<b>J630</b>	300	270	240	210	180	150	120	90	60	0

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

	A*	A	B	C	D	E	F	G	U	Total No. of Cands
<b>J630</b>	2.2	13.5	35.6	63.2	81.4	92.4	98.0	99.8	100	111 111

**117 993 candidates were entered for aggregation this series**

For a description of how UMS marks are calculated see:

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

Statistics are correct at the time of publication.

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