

Science A
Twenty First Century Science

General Certificate of Secondary Education **J630**

Mark Scheme for the Units

January 2008

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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 Science A Twenty First Century (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 (1) at the end of that marking point.
- 4 Abbreviations, annotations and conventions used in the detailed Mark Scheme:

/	=	alternative and acceptable answers for the same marking point
(1)	=	separates marking points
not	=	answers which are not worthy of credit
reject	=	answers which are not worthy of credit
ignore	=	statements which are irrelevant
allow	=	answers that can be accepted
()	=	words which are not essential to gain credit
—	=	underlined words must be present in answer to score a mark
ecf	=	error carried forward
AW / owtte	=	alternative wording
ora	=	or reverse argument

E.g. mark scheme shows 'work done in lifting / (change in) gravitational potential energy'
 work done = 0 marks
 work done lifting = 1 mark
 change in potential energy = 0 marks
 gravitational potential energy = 1 mark

- 5 Annotations: the following annotations are available on SCORIS.

✓	=	correct response
✗	=	incorrect response
bod	=	benefit of the doubt
nbod	=	benefit of the doubt not given
ECF	=	error carried forward
^	=	information omitted
I	=	ignore
R	=	reject

- 6 If a candidate alters his/her response, examiners should accept the alteration.
- 7 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.

8 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.

Eg If a question requires candidates to identify a city in England, then in the boxes

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out). 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	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

Mark Scheme A211/01 Modules B1, C1, P1 Foundation

Question		Expected Answers	Marks	Rationale
1	a	made of several layers middle is called the mantle outside layer is called the crust made of tectonic plates T F T T (1) (1) (1) (1)	4	allow ✓ for T and x for F second box blank does not count as F
	b	mountains occur where plates meet seafloor spreading volcanoes and earthquakes ✓ ✓ ✓	2	if all 5 boxes are ticked, award no marks. if 4 boxes are ticked, deduct 1 mark from the score all three correct: 2 marks two correct: 1 mark one correct does not get a mark. allow T for ✓, F for blank. NB Two correct ticks = 1 mark, not two!
Total			6	

2	a	Shapley Curtis both ✓ (1) (1) (1) (1)	4	one mark for each correct row do not give a mark for any row with more than one tick
	b	supports Curtis ✓ (1)	1	no extra ticks allowed.
	c	galaxies (1) away (from us) (1)	2	allow any clear indication of choice.
	d	14 000 million (1)	1	allow any clear indication of choice.
Total			8	

Question			Expected Answers	Marks	Rationale
3	a		ECBADF C before B (1) B before A (1) A before D (1)	3	if any letter appears more than once, treat that letter as a blank in each occurrence. If lower case b and d (for example) cannot be distinguished, treat them as the same
	b	i	increase chance of cancer ☒ reach the age of thirty ☒	1	both correct (plus two blanks) for the one mark
		ii	80% with breast cancer genes ☒ (1)	1	no extra ticks allowed.
		iii	Andy (1)	1	allow any clear indication of choice cannot have two (or more) names
			Total	6	

4	a		one copy (1) two copies (1) DNA (1)	3	allow '1 copy', 'one' or other clear indication of correct choice allow '2 copies', 'two' or other clear indication of correct choice
	b		XY / X and Y (1)	1	either order not 'X or Y'
	c		because she donated the egg ☒ (1)	1	no extra ticks allowed
	d		Jayne Sean Alison ☒ ☒ ☒ (1) (1) (1)	3	if all 5 boxes are ticked, award no marks if 4 boxes are ticked, deduct 1 mark from the score one mark for each correct choice
			Total	8	

Question			Expected Answers	Marks	Rationale
5	a		below below pass	2	3 correct: 2 marks 2 correct: 1 mark 1 correct : no marks NB two correct ticks = 1 mark not two
	b		carbon dioxide and carbon monoxide (1) oxygen water (1)	2	CO ₂ and CO - either order allow O or O ₂ for oxygen, H ₂ O for water - order important both chemicals needed for each mark
	c	i	lies well outside the range ✓ (1)	1	no extra ticks allowed
		ii	0.02 to 0.04 / 0.02 – 0.04 / 0.02, 0.04 / 0.04 to 0.02 / 0.04 – 0.02/ 0.04, 0.02 (1)	1	both correct for one mark check decimal point: 0.2 to 0.4 is wrong
		iii	sensor may not work reliably ✓ (1) carbon monoxide may vary ✓ (1)	2	if 4 or 5 boxes are ticked, award no marks if 3 boxes are ticked, deduct 1 mark from the score one mark for each correct choice
			Total	8	

Question			Expected Answers	Marks	Rationale
6	a		1% argon (smallest segment) 20% oxygen (medium segment) 79% nitrogen (largest segment)	2	argon correct (1) oxygen and nitrogen correct (1)
	b		highest in morning and evening ☐ ☒ (1) ☐ ☒ (1) decreases overnight	2	if all 4 boxes are ticked, award no marks. if 3 boxes are ticked, deduct 1 mark from the score one mark for each correct choice
	c		CO ----- NO ----- N₂ ----- CO₂ -----	2	ignore any link going to or coming from a box with more than one link 3 links correct (2) 1 or 2 links correct (1)
			Total	6	
			Paper Total	42	

Mark Scheme A211/02 Modules B1, C1, P1 Higher

Question			Expected Answers	Marks	Rationale
1	a		made of tectonic plates mantle is liquid plates are on top of the mantle tectonic plates move about volcanoes and earthquakes mountains build up T F T T T F	4	6 correct (4) 5 correct (3) 4 correct (2) 3 correct (1) note 1 or 2 correct = 0 T or F must be clearly a T or an F rather than a combination or one overwritten on the other without clear decision if overwrite is clearly bolder then allow
	b		ridges of solidified magma volcanoes and earthquakes ✓ ✓	1	both correct for one mark allow any clear indication of choice.
			Total	5	

Question			Gd	Expected Answers	Marks	Rationale																								
3	a		D	XY / X and Y	1	either order not X or Y																								
	b		D	because she donated the egg ✓	1	no extra ticks allowed.																								
	c		AA*	<table><tr><td>A</td><td></td><td></td></tr><tr><td>B</td><td></td><td></td></tr><tr><td>C</td><td>yes</td><td>yes</td></tr><tr><td>D</td><td>no</td><td>no</td></tr><tr><td>E</td><td>yes</td><td>no</td></tr><tr><td>F</td><td>no</td><td>no</td></tr><tr><td>G</td><td>yes</td><td>no</td></tr><tr><td>H</td><td>yes</td><td>no</td></tr></table>	A			B			C	yes	yes	D	no	no	E	yes	no	F	no	no	G	yes	no	H	yes	no	2	one mark for each correct column if any overwriting, allow if correct response is clearly bolder
A																														
B																														
C	yes	yes																												
D	no	no																												
E	yes	no																												
F	no	no																												
G	yes	no																												
H	yes	no																												
	d		BA	are clones not exactly same DNA mutations occur during development embryo split into two groups of cells	2	one mark for each correct link if either left-hand box has more than one link, ignore that box																								
				Total	6																									

Question			Gd	Expected Answers	Marks	Rationale
4	a		C	increase chance of cancer	1	both correct (plus two blanks) for the one mark
				☒		
				reach the age of thirty		
				☒		
	b		C	Andy (1)	1	allow any clear indication of choice cannot have two (or more) names
				Total	2	

5	a	i	D	fact (1)	1	
		ii	C	prediction (1)	1	
	b		BA	no nuclear replacement stem cells are from the patient	2	one mark for each correct ✓ see guidance 8 regarding marking for tick boxes
				☒		
				☒		
				☐		
				☐		
	c	i	B	1 and 3 (1)	1	either order
		ii	A	2, 5 and 6 (1)	1	any order
				Total	6	

Question			Expected Answers				Marks	Rationale																
6	a		limits have been set ✓ engine speed is a factor percentages of pollutant gases ✓ ✓				2	3 correct (2) 2 correct (1) 1 correct = 0 marks see guidance 8 regarding marking for tick boxes																
	b		<table><tr><td></td><td>in fuel</td><td>in air</td><td>in both</td></tr><tr><td>carbon monoxide</td><td></td><td></td><td>✓</td></tr><tr><td>sulphur dioxide</td><td></td><td></td><td>✓</td></tr><tr><td>nitrogen oxides</td><td></td><td>✓</td><td></td></tr></table>					in fuel	in air	in both	carbon monoxide			✓	sulphur dioxide			✓	nitrogen oxides		✓		2	mark each row separately, more than 1 tick in the row = 0 for that row 3 correct rows (2) 2 or 1 correct row(s)(1)
	in fuel	in air	in both																					
carbon monoxide			✓																					
sulphur dioxide			✓																					
nitrogen oxides		✓																						
	c	i	lies well outside the range ✓				1	no extra ticks allowed																
		ii	0.02 to 0.04 / 0.02 – 0.04 / 0.02, 0.04 / 0.04 to 0.02 / 0.04 – 0.02/ 0.04, 0.02 (1)				1	both correct for one mark check decimal point: 0.2 to 0.4 is wrong																
		iii	sensor may not work reliably ✓ carbon monoxide may vary ✓				2	if 4 or 5 boxes are ticked, award no marks if 3 boxes are ticked, deduct 1 mark from the score one mark for each correct choice																
			Total				8																	

Question			Expected Answers	Marks	Rationale
7	a		nitrogen monoxide/ NO (1) nitrogen/ N/N ₂ (1)	2	must be in correct order formula must be capital letters e.g. N 2 should be subscript e.g. N ₂ not N2
	b		CO₂ NO	2	one mark for CO ₂ and one for NO formula must be capital letters e.g. N 2 should be subscript e.g. CO ₂ not CO2 or CO ²
	c		Australia has highest population F Australia produces more nitrogen dioxide F UK produces less nitrogen dioxide F Hungary produces less nitrogen dioxide T	2	4 correct (2) 2 or 3 correct (1) 1 correct (0) if any overwriting, allow if correct response is clearly bolder.
			Total	6	
			Paper Total	42	

Mark Scheme A212/01 Modules B2, C2, P2 Foundation

Question			Expected Answers	Marks	Rationale										
1	a		<table><tr><td>True</td><td>False</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>	True	False		✓	✓			✓	✓		2	any row with more than one tick or other indication of choice is wrong a blank row is wrong 4 rows correct (2) 2 or 3 rows correct (1) 1 row correct (0)
True	False														
	✓														
✓															
	✓														
✓															
	b		film (card B) cup (card C) advantages 1, 4, 6 (1) 1, 5 (1) disadvantages 3 6 (1 for both)	3	advantages - 2 marks in total disadvantages - 1 mark in total										
	c	i	751 (1)	1											
		ii	710 (1)	1	if wrong outlier identified in I, allow ecf as below <table><tr><td>outlier chosen</td><td>acceptable response</td></tr><tr><td>705</td><td>721.5 / 722 / 721</td></tr><tr><td>710</td><td>720.25 / 720</td></tr><tr><td>715</td><td>719</td></tr></table>	outlier chosen	acceptable response	705	721.5 / 722 / 721	710	720.25 / 720	715	719		
outlier chosen	acceptable response														
705	721.5 / 722 / 721														
710	720.25 / 720														
715	719														
		iii	<table><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td>more results, better estimate</td><td>✓ (1)</td></tr><tr><td></td><td></td></tr><tr><td>repeating to check for reliability</td><td>✓ (1)</td></tr></table>					more results, better estimate	✓ (1)			repeating to check for reliability	✓ (1)	2	one mark for each correct tick deduct one mark for each incorrect tick if more than two ticks used all 5 boxes ticked gets no marks.
more results, better estimate	✓ (1)														
repeating to check for reliability	✓ (1)														
			Total	9											

Question			Expected Answers	Marks	Rationale
2	a		2 (1)	1	allow any indication of choice
	b		small molecule (1) polymer (1) cross-link (1)	3	
	c		less flexible higher temperature a mixture of chemicals	2	allow any clear indication of choice 3 correct (2) 1 or 2 correct (1)
			Total	6	

Question			Expected Answers		Marks	Rationale
3	a		infrared (1) photosynthesis (1) atmosphere (1) warmer (1)		4	allow incorrect spelling
	b	i	Melanie	✓ (1)	2	one mark for each correct tick deduct one mark for each incorrect tick if more than two ticks used
		Mary	✓ (1)			
		ii	Sunil	✓ (1)	1	no extra ticks allowed
			Total		7	

Question			Expected Answers	Marks	Rationale
4	a		infrared radio waves ultraviolet X-rays B A C D	3	4 correct (3) 3 correct (2) 1 or 2 correct (1)
	b		radiation leak food radioactive ionising radiation more energy than light can't break molecules into bits the metal keeps microwaves inside different from nuclear radiation less energy than light photons	3	one mark for each correct link as shown
			Total	6	

Question			Expected Answers	Marks	Rationale
5	a	i	<pre> graph LR A[stomach lining] --- B[produces acid] C[skin] --- D[contains chemicals] E[sweat and tears] --- F[physical barrier] C --- B E --- D </pre>	2	3 correct (2) 1 or 2 correct (1)
		ii	reproduce (1) symptoms (1) poisons (1)	3	
	b	i	15% (1)	1	allow any indication of choice
		ii	bacteria (1) fungi (1)	2	allow any indication of choice one mark for each correct choice deduct one mark for each incorrect choice if more than two are chosen
	c		in UK, TB in children is rare ☐ ☒ ☐ ☐ ☐ (1) most never encounter a case ☒ ☐ ☐ ☐ ☐ (1)	2	one mark for each correct tick deduct one mark for each incorrect tick if more than two ticks used all 5 boxes ticked gets no marks
			Total	10	

Question			Expected Answers	Marks	Rationale
6	a		B A C	2	3 correct (2) 1 or 2 correct (1) allow the names
	b	i	Sean (1)	1	ignore spelling
		ii	Jayne (1)	1	ignore spelling
			Total	4	
			Paper Total	42	

Mark Scheme A212/02 Modules B2, C2, P2 Higher

Question			Expected Answers		Marks	Rationale										
1	a		<table><tr><td>True</td><td>False</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>		True	False		✓	✓			✓	✓		2	any row with more than one tick or other indication of choice is wrong a blank row is wrong 4 rows correct (2) 2 or 3 rows correct (1) 1 row correct (0)
True	False															
	✓															
✓																
	✓															
✓																
	b		film (card B) advantages 1, 4, 6 (1) disadvantages 3	cup (card C) 1, 5 (1) 6 (1 for both)	3	advantages - 2 marks in total disadvantages - 1 mark in total										
	c	i	695 (2) or 670 / 669.8 (1)		2											
		ii	<table><tr><td>True</td><td>False</td></tr><tr><td></td><td>✓</td></tr><tr><td>✓</td><td></td></tr><tr><td></td><td>✓</td></tr></table>		True	False		✓	✓			✓	1			
True	False															
	✓															
✓																
	✓															
		iii	more results, better estimate repeating to check for reliability		1											
			Total		9											

Question			Expected Answers	Marks	Rationale
2	a		small molecules from crude oil small molecules polymerise sulfur is used oils and resins are used	2	if any box has more than one link drawn to it, ignore all those links 4 correct links (2) 2 or 3 correct links (1)
	b	i	energy is put to good use shredded car tyre surface putting tyres in landfill ☒ ☐ ☒ ☒ ☐	2	3 correct ticks and two blanks : 2 marks 3 correct ticks, one extra tick and one blank: 1 mark 2 correct ticks and at least 2 blanks: 1 mark no other combination gets any marks
		ii	raw materials used methods of disposal average time tyres used ☒ ☐ ☒ ☒ ☐	2	3 correct ticks and two blanks : 2 marks 3 correct ticks, one extra tick and one blank: 1 mark 2 correct ticks and at least 2 blanks: 1 mark no other combination gets any marks
			Total	6	

Question			Expected Answers		Marks	Rationale									
3	a		weaker further from source ionising radiation non-ionising radiation X-rays	<table><tr><td>F</td><td>(1)</td></tr><tr><td>T</td><td>(1)</td></tr><tr><td>F</td><td>(1)</td></tr><tr><td>F</td><td>(1)</td></tr></table>	F	(1)	T	(1)	F	(1)	F	(1)	4	one mark for each correct letter allow the full 'true' or ✓ for T and 'false' or x for F blank boxes are wrong.	
F	(1)														
T	(1)														
F	(1)														
F	(1)														
	b	i	<table><tr><td>Melanie</td><td><table><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr></table></td><td>(1)</td></tr><tr><td>Mary</td><td><table><tr><td>✓</td></tr></table></td><td>(1)</td></tr></table>	Melanie	<table><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr></table>	✓			(1)	Mary	<table><tr><td>✓</td></tr></table>	✓	(1)	2	one mark for each correct tick deduct one mark for each incorrect tick if more than two ticks used
Melanie	<table><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr></table>	✓			(1)										
✓															
Mary	<table><tr><td>✓</td></tr></table>	✓	(1)												
✓															
		ii	<table><tr><td>Sunil</td><td><table><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr></table></td><td>(1)</td></tr></table>	Sunil	<table><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr></table>		✓			(1)	1	no extra ticks allowed			
Sunil	<table><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr></table>		✓			(1)									
✓															
			Total		7										

Question			Expected Answers	Marks	Rationale
4	a	i	gamma (rays) / γ (1)	1	ignore spelling errors. if more than one term written, list principle applies treat any subsequent variety of the correct answer as neutral
		ii	gamma (rays) / γ , ultraviolet / UV, X-rays / X	1	all three needed for the mark - order and spelling are not important if more than three terms written, list principle applies treat any subsequent variety of a correct answer as neutral
		iii	ultraviolet / UV(1)	1	ignore spelling errors. if more than one term written, list principle applies treat any subsequent variety of the correct answer as neutral
	b			3	if any box has more than one link drawn to it, ignore all those links 4 correct links (3) 2 or 3 correct links (2) 1 correct link (1)
			Total	6	

Question			Expected Answers	Marks	Rationale
5	a		✓ acid in stomach (1)	1	no extra ticks allowed
	b	i	symptoms (1)	1	ignore spelling errors.
		ii	B (1)	1	
	c	i	15% (1)	1	allow any indication of choice
		ii	Slows spread of disease F TB microorganisms become resistant F Result of mutations T Increase spread of disease T	1	all correct for one mark blank boxes are wrong allow the full 'true' or ✓ for T and 'false' or × for F
		iii	fungus/ fungi/fungal (1)	1	ignore spelling errors if more than one term written, list principle applies treat any subsequent variety of the correct answer as neutral
	d		✓ in UK, TB in children is rare (1) ✓ most never encounter a case (1)	2	one mark for each correct tick deduct one mark for each incorrect tick if more than two ticks used all 5 boxes ticked gets no marks
			Total	8	

Question			Expected Answers	Marks	Rationale
6	a	i	C (1)	1	look at the letter on the dotted line, not the diagram, for this part
		ii	X on the bulge in diagram A (1)	1	centre of X must be on the actual bulge in diagram A (the bulge is what diagram A has extra to diagram B)
	b		oxygen / O ₂ / O(1)	1	
	c	i	✓ ✓ (1) (1) may have other factors in common no mechanism has been suggested	2	one mark for each correct tick deduct one mark for each incorrect tick if more than two ticks used all 5 boxes ticked gets no marks
		ii	B (1)	1	
			Total	6	
			Paper Total	42	

Mark Scheme A213/01 Modules B3, C3, P3 Foundation

Question			Expected Answers	Marks	Rationale					
1	a		receptor stimuli nervous	3	one mark for each correct response allow incorrect spelling if intention clear more than one response from the list in any space =0 ignore words not from list					
	b		<table border="1"><tr><td>(E)</td><td>D</td><td>B</td><td>A</td><td>C</td></tr></table> D before B (1) B before A (1) A before C (1)	(E)	D	B	A	C	3	
(E)	D	B	A	C						
			Total	6						

2	a		herring	1	one mark for correct response allow incorrect spelling if intention clear more than one response from the list =0 ignore words not from list
	b		Fran	1	one mark for correct response allow incorrect spelling if intention clear more than one response from the list =0 ignore words not from list
	c	i	food chains always start with plants ✓	1	one mark for correct response more than one response = 0
		ii	fewer mackerel ✓	1	one mark for correct response more than one response = 0
			Total	4	

Question			Expected Answers		Marks	Rationale										
3	a		Upright man Heidelberg man Neanderthal man Modern man	<table><tr><td>extinct</td><td>not extinct</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>	extinct	not extinct	✓		✓		✓			✓	1	one mark for a correct response in BOTH columns ignore any further correct responses any incorrect response given = 0 mark allow any clear statement e.g. ✓ or x or shading etc ignore x if combination of ✓ and x used
extinct	not extinct															
✓																
✓																
✓																
	✓															
	b		Upright man	<table><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr><tr><td></td></tr></table>	✓				1	one mark for correct response more than one response = 0						
✓																
	c	i	A and C		1	both needed for one mark any order is acceptable										
		ii	B		1	allow any clear indication of correct response more than one response = 0										
			Total		4											

Question			Expected Answers	Marks	Rationale												
4	a		salt	1	allow any clear indication of correct response more than one response = 0												
	b	i	<table><tr><td>sugar</td><td>high</td><td>low</td></tr><tr><td>fat</td><td></td><td>✓</td></tr><tr><td>salt</td><td>✓</td><td></td></tr><tr><td></td><td>✓</td><td></td></tr></table>	sugar	high	low	fat		✓	salt	✓			✓		2	3 correct = 2 marks 1 or 2 correct = 1 mark allow any clear statement e.g. ✓ or x or shading etc ignore x if combination of ✓ and x used
sugar	high	low															
fat		✓															
salt	✓																
	✓																
		ii	<table><tr><td>does not know the outcomes</td><td>✓</td></tr><tr><td>amount of crisps that she eats</td><td>✓</td></tr><tr><td></td><td></td></tr></table>	does not know the outcomes	✓	amount of crisps that she eats	✓			2	one mark for each correct response if more than 2 responses given, deduct one mark for each incorrect response						
does not know the outcomes	✓																
amount of crisps that she eats	✓																
	c		<table><tr><td>correlation</td><td>✓</td></tr><tr><td></td><td></td></tr><tr><td>large numbers, not individuals</td><td>✓</td></tr></table>	correlation	✓			large numbers, not individuals	✓	2	one mark for each correct response if more than 2 responses given, deduct one mark for each incorrect response						
correlation	✓																
large numbers, not individuals	✓																
			Total	7													

Question		Gd	Expected Answers	Marks	Rationale
5	a		G		
			nitrogen compounds increases decreases ✓ fungal disease ✓ manure ✓	1	all 3 correct for one mark any extra responses = 0 allow any clear statement e.g. ✓ or x or shading etc ignore x if combination of ✓ and x used
	b		FF		
			greenfly damage for against ✓ may leave residues ✓ greenfly eaten by ladybirds ✓ market crops as 'organic' ✓	2	4 correct = 2 marks 2 or 3 correct = 1 mark 1 correct = 0 mark allow any clear statement e.g. ✓ or x or shading etc ignore x if combination of ✓ and x used
	c		EE		
			aflatoxin from mould (1) herbicide (1)	2	one mark for each correct response allow any clear indication of correct response if more than 2 responses given, deduct one mark for each incorrect response
	d		EE		
			carbohydrates carbon, hydrogen, oxygen & nitrogen proteins carbon, hydrogen and oxygen	2	one mark for each correct link 2 lines from box on left loses mark for that link
			Total	7	

Question			Expected Answers	Marks	Rationale												
6	a	i	absorbed by a sheet of paper <table><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr></table>	✓			1	one mark for correct response more than one response = 0									
✓																	
		ii	can break up molecules <table><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr></table>		✓		1	one mark for correct response more than one response = 0									
✓																	
		iii	cancer may develop <table><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr></table> cells may die <table><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr></table>	✓			✓			2	one mark for each correct response if more than 2 responses given, deduct one mark for each incorrect response						
✓																	
✓																	
	b		<table><tr><td>Cambs</td><td>Norfolk</td><td>Yorks</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></table>	Cambs	Norfolk	Yorks	✓			✓	✓			✓		4	mark each row separately 1 st row – 1mark for each correct response (2 responses =0) 2 nd row - 1mark for each correct response (3 responses =1) 3 rd row - 1mark for each correct response (2 responses =0) allow any clear statement e.g. ✓ or x or shading etc ignore x if combination of ✓ and x used
Cambs	Norfolk	Yorks															
✓																	
✓	✓																
	✓																
	c	i	Julian <table><tr><td></td></tr><tr><td></td></tr><tr><td>✓</td></tr><tr><td>✓</td></tr></table> Marion			✓	✓	2	one mark for each correct response if more than 2 responses given, deduct one mark for each incorrect response								
✓																	
✓																	
		ii	Steve <table><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr><tr><td></td></tr></table>	✓				1	one mark for correct response more than one response = 0								
✓																	
			Total	11													

Question			Expected Answers	Marks	Rationale					
7			<table><tr><td>C</td></tr><tr><td>B</td></tr><tr><td>D</td></tr><tr><td>A</td></tr><tr><td>E</td></tr></table>	C	B	D	A	E	3	shaded box is given on question paper so ignore 4 correct = 3 marks 2 or 3 correct = 2 mark 1 correct = 1 mark
C										
B										
D										
A										
E										
			Total	3						

			Paper Total	42	
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Mark Scheme A213/02 Modules B3, C3, P3 Higher

Question			Expected Answers	Marks	Rationale					
1	a		receptor / sensory (1)	1	allow – sense reject – nerve					
	b		<table border="1"><tr><td>(E)</td><td>D</td><td>B</td><td>A</td><td>C</td></tr></table>	(E)	D	B	A	C	3	D before B = 1 mark B before A = 1 mark A before C = 1 mark
(E)	D	B	A	C						
	c		4 and 5	2	ane mark for each correct response allow either order for correct responses allow – a clear indication of the correct response eg underline or circle numbers 4 and 5 in the question, if responses are not provided in the correct spaces if more than two responses - deduct one mark					
			Total	6						

2	a	i	gene / allele	1	reject – chromosome				
		ii	mutation	1	allow – mutate reject – mutant				
	b		<table><tr><td>correct</td><td>incorrect</td></tr><tr><td>Ian Fran Jim</td><td>April</td></tr></table>	correct	incorrect	Ian Fran Jim	April	2	all 4 correct = 2 marks deduct one mark for each incorrect or missing response
correct	incorrect								
Ian Fran Jim	April								
			Total	4					

Question			Expected Answers	Marks	Rationale
3	a		B	1	allow – a clear indication of the correct answer eg underline or circle letter B in the question more than 1 response = 0 marks
	b		become taller developed larger brains ✓ ✓	1	two correct responses = 1 mark more than 2 response = 0 marks allow a clear response eg. ✓ or X or shading etc. ignore X if combination of ✓ and X used
	c		C and F	2	one mark for each correct response allow either order for correct responses allow – a clear indication of the correct response eg underline or circle numbers 4 and 5 in the question, if responses are not provided in the correct spaces if more than two responses - deduct one mark
			Total	4	

Question			Expected Answers	Marks	Rationale										
4	a	i	sugar fat salt <table><tr><td>high</td><td>low</td></tr><tr><td></td><td>✓</td></tr><tr><td>✓</td><td></td></tr><tr><td>✓</td><td></td></tr></table>	high	low		✓	✓		✓		2	3 correct = 2 marks 1 or 2 correct = 1 mark accept a clear response eg ✓ or X or shading etc ignore X if combination of ✓ and X used		
high	low														
	✓														
✓															
✓															
		ii	does not know the outcome amount of crisps that she eats <table><tr><td></td></tr><tr><td>✓</td></tr><tr><td>✓</td></tr><tr><td></td></tr></table>		✓	✓		2	one mark for each correct tick accept a clear response eg. ✓ or X or shading etc. ignore X if combination of ✓ and X used if more than two responses - deduct one mark						
✓															
✓															
	b	i	carbon hydrogen oxygen nitrogen <table><tr><td>carbohydrates</td><td>proteins</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>	carbohydrates	proteins	✓	✓	✓	✓	✓	✓		✓	2	one mark for each correct column accept a clear response eg. ✓ or X or shading etc ignore X if combination of ✓ and X used
carbohydrates	proteins														
✓	✓														
✓	✓														
✓	✓														
	✓														
		ii	amino acids amino acids tendons liver urea	3	5 correct responses = 3 marks 3 or 4 correct responses = 2 marks 2 correct responses = 1 mark accept a clear response eg. underline, shading, ticks etc										
	c		proves the article wrong too much fat is only one factor heart disease in the future correlation <table><tr><td>F</td></tr><tr><td>T</td></tr><tr><td>F</td></tr><tr><td>T</td></tr></table>	F	T	F	T	2	4 correct responses = 2 marks 2 or 3 correct responses = 1 mark accept ✓ and X if used together reject ✓ or X if used alone						
F															
T															
F															
T															
			Total	11											

Question			Expected Answers	Marks	Rationale									
5	a		<table><tr><td>E220</td><td>emulsifier</td><td>stops deterioration</td></tr><tr><td>E350</td><td>antioxidant</td><td>harmful organisms</td></tr><tr><td>E410</td><td>preservative</td><td>mixes ingredients</td></tr></table>	E220	emulsifier	stops deterioration	E350	antioxidant	harmful organisms	E410	preservative	mixes ingredients	2	mark left and right hand sides separately correct responses on left hand side = 1 mark correct responses on right hand side = 1 mark any other combination on a side – deduct 1 mark
E220	emulsifier	stops deterioration												
E350	antioxidant	harmful organisms												
E410	preservative	mixes ingredients												
	b		<table><tr><td>highest risk chemicals</td><td>x</td></tr><tr><td>fresh food always safer</td><td>x</td></tr><tr><td></td><td></td></tr><tr><td>never cause health problems</td><td>x</td></tr></table>	highest risk chemicals	x	fresh food always safer	x			never cause health problems	x	1	all 3 correct responses = 1 mark accept a clear response eg ✓ or shading etc.	
highest risk chemicals	x													
fresh food always safer	x													
never cause health problems	x													
			Total	3										

Question			Expected Answers	Marks	Rationale												
6	a	i	protons neutrons	1	two correct responses in correct order = 1 mark												
		ii	quarter of its activity at start impossible to predict exact activity ✓ ✓	2	one mark for each correct tick deduct one mark for each incorrect tick if more than two ticks used allow a clear response eg. X or shading etc ignore X if combination of ✓ and X used												
	b		<table><tr><td>Cambs</td><td>Norfolk</td><td>Yorks</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></table>	Cambs	Norfolk	Yorks	✓			✓	✓			✓		4	mark each row separately first row – 1 mark for correct ✓ (2 or 3 ✓ = 0 marks) second row - 1 mark for each correct ✓ (3 ✓ = 1 mark) third row – 1 mark for correct ✓ (2 or 3 ✓ = 0 marks) allow a clear response eg. ✓ or X or shading etc ignore X if combination of ✓ and X used
Cambs	Norfolk	Yorks															
✓																	
✓	✓																
	✓																
	c	i	Steve ✓ ✓ Marion	2	one mark per correct tick deduct one mark for each incorrect tick if more than two ticks used allow a clear response eg. X or shading etc ignore X if combination of ✓ and X used												
		ii	Debbie ✓	1	more than one response = 0 marks allow a clear response eg. ✓ or X or shading etc ignore X if combination of ✓ and X used												
			Total	10													

Question			Expected Answers	Marks	Rationale
7			burnt to release heat energy steam used to turn turbines dangerous radioactive waste radioactive for thousands of years can cause cancer	4	5 correct responses = 4 marks 4 correct responses = 3 marks 3 correct responses = 2 marks 2 correct responses = 1 mark allow ✓ and X if used together reject ✓ or X if used alone
			Total	4	
			Paper Total	42	

Grade Thresholds

General Certificate of Secondary Education
Science A (Specification Code J630)
January 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	29	25	21	17	13	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A211/02	Raw	42	32	27	22	18	15	13	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A212/01	Raw	42	N/A	N/A	N/A	32	27	23	19	15	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A212/02	Raw	42	33	28	23	18	13	10	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	30	26	22	18	14	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A213/02	Raw	42	34	29	24	20	16	14	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0

Specification Aggregation Results

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

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

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

	A*	A	B	C	D	E	F	G	U	Total No. of Cands
J630	0.0	1.9	19.6	43.9	67.3	85.5	95.8	99.5	100.0	214

For a description of how UMS marks are calculated see:

http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

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