OCR
RECOGNISING ACHIEVEMENT

GCSE

Additional Science A
Twenty First Century Science

General Certificate of Secondary Education **J631**

Mark Schemes for the Units

June 2008

J631/MS/R/08

Oxford Cambridge and RSA Examinations

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

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

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

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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GCSE Twenty First Century Additional Science A (J631)

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
   <u>point</u> = 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

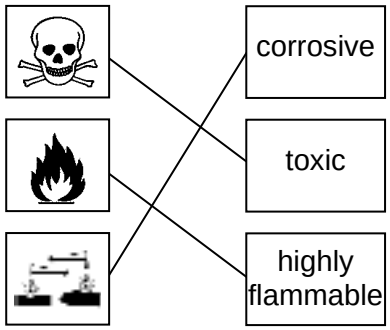
Edinburgh	
Manchester	
Paris	
Southampton	

   the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third <u>should be blank</u> (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**

A215/01 Modules B4, C4, P4 Foundation

Question			Expected Answers	Marks	Rationale
1	a			2	all lines correct (2) two or one line(s) correct (1) Ignore any box on left with more than one line coming from it unless the extra one is crossed out. If you think the candidate's lines are under the template lines, click the 'display mode' to see the original script without the template.
	b		<table><tr><td>A</td><td>solid</td></tr><tr><td>B</td><td>solid</td></tr><tr><td>C</td><td>liquid</td></tr></table>	2	all correct (2) two or one correct (1) accept any clear indication of the state, e.g. 's'
			Total	**4**	

2	**a**		C	1	**accept** clear indication of choice, e.g. 'proton number' only one answer accepted
	b		Lithium (1) Li (1) 7 (1)	3	the symbol should be a capital 'L' followed by a lower case 'i'
	c		7	1	only one should be ringed.
			Total	**5**	

Question			Expected Answers	Marks	Rationale
3			Boyle	1	Accept identification of comment, e.g. 'new elements'. Only one answer accepted.
			Total	**1**	

4	a		D	1	Only one answer accepted.
	b		(Alice) Ed Wanda Pete Ben	3	all correct (3) Ed anywhere before Wanda (1) Wanda anywhere before Pete (1) Pete anywhere before Ben (1)
			Total	**4**	

5	a		18 m/s	1	only one answer accepted
	b	i	False True False False False True	2	all correct = 2 one or two incorrect = 1 three or more incorrect = 0 blank boxes count as incorrect **accept** 'F' and 'T', and ticks and crosses
		ii	B	1	only one answer accepted
			Total	**4**	

Question			Expected Answers	Marks	Rationale
6	a			1	4th arrow only
	b		100 x 0.25	1	only one answer accepted
	c	i	gravitational	1	**accept** clear indication of choice - ignore spelling errors
		ii	weight	1	**accept** clear indication of choice - ignore spelling errors
		iii	kinetic	1	**accept** clear indication of choice - ignore spelling errors
			Total	**5**	

7	a		direction of force from the ground / name of force vertical / reaction (1) horizontal / friction (1)	2	
	b		backwards (1) friction (1) forwards (1)	3	
			Total	**5**	

Question			Expected Answers	Marks	Rationale
8	a		increases	1	only one answer accepted.
	b		maintenance of a constant internal environment ✓ (1)	1	only one tick allowed.
	c		skin brain brain	2	all correct = 2 one or two correct = 1
	d		breathing excreting	1	must have **both** correct to get the mark
			Total	**5**	

Question			Expected Answers	Marks	Rationale
9	a		proteins ✓ (1)	1	only one tick allowed
	b		enzymes work more slowly ✓ (1)	1	only one tick allowed
	c		Jane (1) Mike (1)	2	either order, and need not be written one on each dotted line apply list principle (the other names are all incorrect) if more than two names given, e.g. 'Sarah Jane Mike' would get one mark, 'Jane Sarah Ed' gets no marks
			Total	**4**	

10	a		length increases	1	only one answer accepted
	b		osmosis	1	only one answer accepted
			Total	**2**	

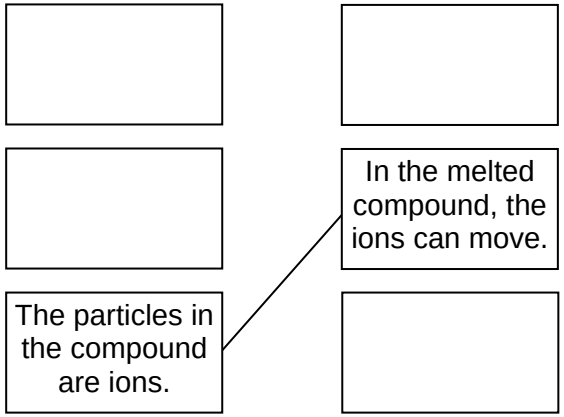
<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Rationale</th></tr>
<tr><td>11</td><td>a</td><td></td><td>urea</td><td>1</td><td>only one answer accepted</td></tr>
<tr><td></td><td>b</td><td></td><td><table><tr><th>more dilute urine</th><th>more concentrated urine</th></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></td><td>2</td><td>all or three rows correct = 2
two or one rows correct = 1</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>3</td><td></td></tr>
</table>

A215/02 Modules B4, C4, P4 Higher

Question			Expected Answers	Marks	Rationale
1	a		D	1	
	b		<table><tr><td>(Alice)</td><td>Ed</td><td>Wanda</td><td>Pete</td><td>Ben</td></tr></table>	3	all correct (3) Ed anywhere before Wanda (1) Wanda anywhere before Pete (1) Pete anywhere before Ben (1)
			Total	**4**	

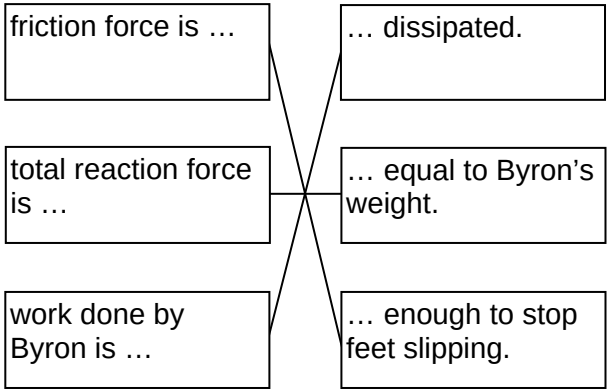
2	a		C	1	
	b		$+273^{o}C$	1	
	c		D	1	
	d		Group 1	1	
	e		LiN_3	1	
			Total	**5**	

Question			Expected Answers	Marks	Rationale
3			<table><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td>… each line is a different colour … come in different places</td><td>✓</td></tr></table> (1)	1	
			Total	**1**	

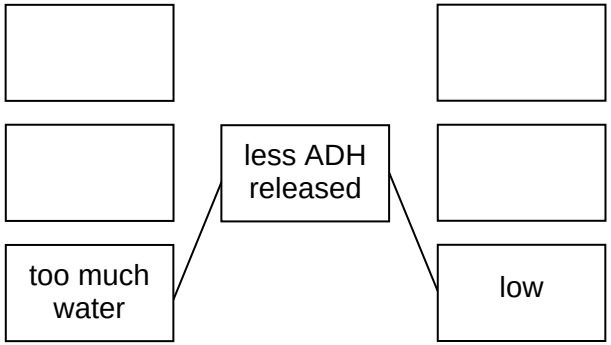
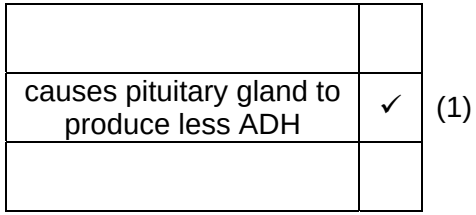
Question			Expected Answers	Marks	Rationale
4	a		A [s] B [s] C [l] D [g]	2	all correct = 2 three or two correct = 1 brackets are not essential
	b			2	one mark per correct box selected
			Total	**4**	

Question			Expected Answers	Marks	Rationale
5	a		18 m/s	1	
	b	i	<table><tr><td></td><td>False</td></tr><tr><td>...less than</td><td>True</td></tr><tr><td></td><td>False</td></tr><tr><td></td><td>False</td></tr><tr><td></td><td>False</td></tr><tr><td>...opposite direction</td><td>True</td></tr></table>	2	all correct = 2 if not all correct, count the mistakes one or two incorrect = 1 three or more incorrect = 0 blank boxes count as incorrect **accept** 'F' and 'T', or ticks and crosses.
		ii	B	1	
			Total	**4**	

6	**a**		$\frac{50}{100}$	1	
	b		<table><tr><td></td><td>False</td></tr><tr><td></td><td>False</td></tr><tr><td></td><td>False</td></tr><tr><td>... increasing kinetic energy</td><td>True</td></tr><tr><td>...same size as reaction force</td><td>True</td></tr><tr><td></td><td>False</td></tr></table>	3	all correct = 3 if not all correct, count the mistakes one or two incorrect = 2 three or four incorrect = 1 blank boxes count as incorrect **accept** 'F' and 'T', or ticks and crosses
	c		A	1	
			Total	**5**	

Question			Expected Answers	Marks	Rationale
7	a	i		1	1st arrow
		ii	weight	1	
	b			2	two or one correct line(s) (1)
	c		5N	1	
			Total	**5**	

Question			Expected Answers	Marks	Rationale
8	a		<table><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td>maintenance of a constant internal environment</td><td>✓</td></tr><tr><td></td><td></td></tr></table> (1)	1	
	b		skin brain brain	2	all correct = 2 one or two correct = 1
	c		breathing excreting	1	
			Total	**4**	

Question			Expected Answers	Marks	Rationale
9	a		sugar	1	
	b			2	left hand line correct = 1 right hand line correct = 1
	c			1	
	d		Doug	1	
			Total	**5**	

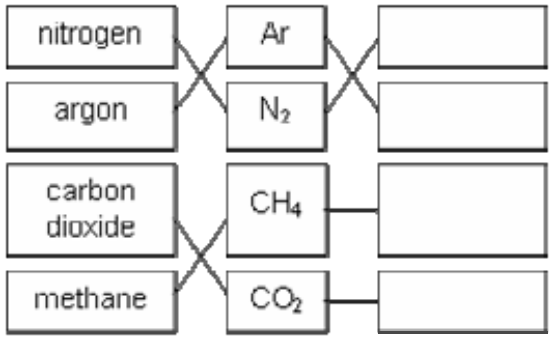
<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Rationale</th></tr>
<tr><td>10</td><td>a</td><td></td><td>
<table>
<tr><th>dilute sugar solution</th><th>highly concentrated sugar solution</th><th>pure water</th></tr>
<tr><td></td><td>✓</td><td></td></tr>
<tr><td></td><td></td><td>✓</td></tr>
<tr><td>✓</td><td></td><td></td></tr>
</table>
</td><td>2</td><td>all rows correct = 2
two or one correct = 1</td></tr>
<tr><td></td><td>b</td><td></td><td>put potato pieces into more concentrated sugar solution ✓ (1)</td><td>1</td><td>do not apply ecf</td></tr>
<tr><td></td><td>c</td><td></td><td>Gill (1)
Jon (1)</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>5</td><td></td></tr>
</table>

A216/01 Modules B5, C5, P5 Foundation

Question			Expected Answers	Marks	Rationale
1	a		<table><tr><th></th><th>part of cell</th></tr><tr><td>where DNA is held</td><td>nucleus</td></tr><tr><td>where protein is produced</td><td>cytoplasm</td></tr></table> (1) (1)	2	**accept** any clear and unambiguous response
	b		double helix (1) bases (1)	2	**accept** any clear and unambiguous response answers must be in this order
	c		Ruth (1) Joe (1)	2	**allow** any order
			Total	**6**	
2	a		C	1	**accept** any clear and unambiguous response
	b		23	1	**accept** any clear and unambiguous response
	c		stays the same	1	**accept** any clear and unambiguous response
	d		<table><tr><th>true</th><th>false</th></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><tr><td></td><td>✓</td></tr></table>	2	correct pattern = 2 one mistake for = 2 two or three mistakes for = 1 a mistake is: • a tick in the wrong column of a row • no tick or two ticks in a row **accept** any clear and unambiguous response
			Total	**5**	

Question			Expected Answers	Marks	Rationale
3	a	i	phototropism	1	**accept** any clear and unambiguous response
		ii	light	1	**accept** any clear and unambiguous response if light is selected from the list, but the word 'energy' is written in the answer space, award 1 mark
	b		overhead source of light ☑ (1) ☐ ☐	1	**accept** any clear and unambiguous response
			Total	**3**	

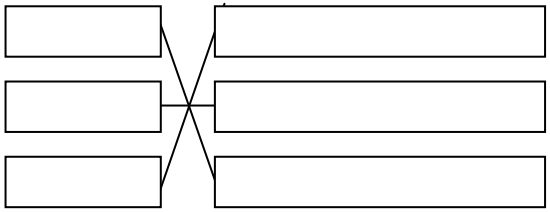
4	a		B	1	**accept** any clear and unambiguous response
	b		aluminium (1) silicon (1) oxygen (1)	3	**accept** any clear and unambiguous response 1 for each correct answer if more than 3 answers selected, each incorrect answer negates a correct response minimum = 0 marks
			Total	**4**	

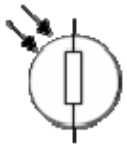
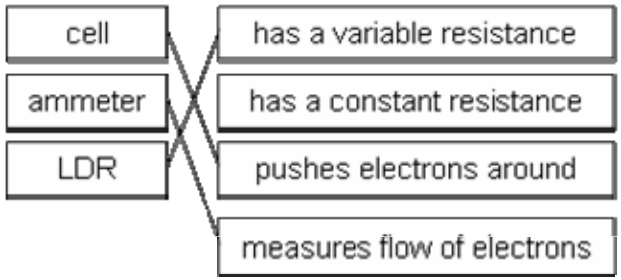
Question			Expected Answers	Marks	Rationale
5	a			3	mark each side independently **left hand side**: one mark for all links correct **right hand side**: two marks for all links correct one mark for 2 or 3 links correct any additional lines from a box will cancel the mark for the correct line
	b	**i**	E	1	**accept** any clear and unambiguous response
		ii	EITHER B then A OR C then A	1	**accept** B and C then A for 1
			Total	**5**	

6	**a**		A	1	**accept** any clear and unambiguous response
	b		ring around the small, unshaded circle	1	**accept** any clear and unambiguous response
	c		$C_4H_8O_4$	1	**allow** numbers which are not subscripts eg C4H8O4 **reject** any clear superscripts eg $C^4H^8O^4$
			Total	**3**	

Question			Expected Answers	Marks	Rationale
7			aluminium oxide (1) sodium chloride (1)	2	each correct response for 1 NOT silicon dioxide **accept** any clear and unambiguous response
			Total	**2**	

8	a		0.075W	1	**accept** any clear and unambiguous response
	b		charge (1) temperature (1)	2	each correct response for 1 **accept** resistance or voltage instead of temperature
	c		D	1	**accept** A instead of D
			Total	**4**	

9	a			2	mark lines from left hand boxes all correct = 2 1 or 2 correct = 1 if two or more lines from a left hand box, no mark
	b		a.c. (1) generators (1) transformers (1)	3	answers must be in the correct order
			Total	**5**	

Question			Expected Answers	Marks	Rationale
10	a			1	**accept** any clear and unambiguous response
	b			3	mark lines from left hand boxes 1 mark for each correct line if two or more lines from a left hand box, no mark
	c		the same as	1	**accept** any clear and unambiguous response
			Total	**5**	

A216/02 Modules B5, C5, P5 Higher

<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Rationale</th></tr>
<tr><td>1</td><td>a</td><td></td><td>C</td><td>1</td><td>accept any clear and unambiguous response</td></tr>
<tr><td></td><td>b</td><td></td><td>23</td><td>1</td><td>accept any clear and unambiguous response</td></tr>
<tr><td></td><td>c</td><td></td><td>stays the same</td><td>1</td><td>accept any clear and unambiguous response</td></tr>
<tr><td></td><td>d</td><td></td><td><table><tr><th>true</th><th>false</th></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><tr><td></td><td>✓</td></tr></table></td><td>2</td><td>correct pattern = 2
one mistake = 2
two or three mistakes = 1

a mistake is:
• a tick in the wrong column of a row
• no tick or two ticks in a row

accept any clear and unambiguous response</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>5</td><td></td></tr>
</table>

Question			Expected Answers	Marks	Rationale
2	a		bases (1) amino acids (1)	2	**accept** just amino, but not just acid
	b		some genes are not active ☐☐✓☐ (1)	1	correct pattern = 1 **accept** any clear and unambiguous response
	c		true ✓ ✓ ✓ / false ✓	2	correct pattern = 2 one or two mistakes = 1 a mistake is: • a tick in the wrong column of a row • no tick or two ticks in a row
			Total	**5**	

3	a		production of cells ✓☐☐☐ (1)	1	correct pattern = 1 **accept** any clear and unambiguous response
	b		A: equal ✓ (1) B: away ✓ (1)	2	each correct row = 1 **accept** any clear and unambiguous response
	c		hormone unspecialised	1	both correct = 1
			Total	**4**	

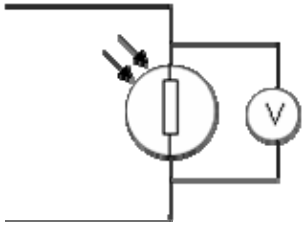
Question			Expected Answers	Marks	Rationale
4	a		E	1	**accept** any clear and unambiguous response
	b		EITHER B then A OR C then A	1	**accept** B and C then A for mark
	c		44g	1	
	d		$CH_4 + \boxed{2}\ O_2 \rightarrow \boxed{2}\ H_2O + CO_2$	1	2 in both boxes = 1 **accept** any clear and unambiguous response
			Total	**4**	

5	a		lithosphere	1	**accept** any clear and unambiguous response
	b		aluminium oxide (1) sodium chloride (1)	2	correct pattern for = 2 one mistake = 1 a mistake is: • each extra ring above two • a missing ring around a correct response
	c		metal compound is reduced ✓ carbon is oxidised ✓	1	correct pattern = 1 **accept** any clear and unambiguous response
	d		B	1	**accept** any clear and unambiguous response
	e		copper zinc	1	both required for mark
	f		$Fe_3O_4 + \boxed{2}\ C \rightarrow \boxed{3}\ Fe + \boxed{2}\ CO_2$	1	all three numbers correct for mark
			Total	**7**	

Question			Expected Answers	Marks	Rationale
6	a		C	1	
	b		$(CH_2O)_n$ (1) $C_nH_{2n}O_n$ (1)	2	correct set of responses for [2] one mistake for [1] a mistake is: • a ring around a wrong response • a ring missing around a correct response
			Total	**3**	

7	a		0.075W	1	**accept** any clear and unambiguous response
	b		charge (1) temperature (1)	2	each correct response = 1 **accept** resistance or voltage instead of temperature
	c		D	1	**accept** A instead of D
			Total	**4**	

8	a		collisions ☐ ☐ ✓ (1)	1	correct pattern = 1 **accept** any clear and unambiguous response
	b		230 x 5	1	**accept** any clear and unambiguous response
	c		conductors (1) electrons (1) resistance (1)	3	each correct response = 1
			Total	**5**	

Question			Expected Answers	Marks	Rationale
9	a			1	voltmeter symbol is circle with V inside, any way round opposite ends of symbol connected to opposite ends of LDR (as shown) voltmeter can be to right or left of LDR
	b		C B A	2	C anywhere before B (1) B anywhere before A (1) ABC = 0
	c		1.0 V	1	**accept** any clear and unambiguous response
	d		the same as	1	**accept** any clear and unambiguous response
			Total	**5**	

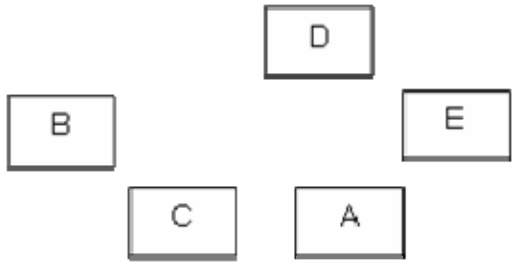
A217/01 Modules B6, C6, P6 Foundation

Question			Expected Answers	Marks	Rationale
1	a		speed	1	more than one response = 0 marks **accept** any other clear response eg word underlined, other words crossed out or word highlighted
	b		A	1	more than one response = 0 marks **accept** any other clear response E.g. diagram underlined or other diagrams crossed out
	c		F T F F	2	**accept** true for T and false for F 4 correct = 2 marks 3 or 2 correct = 1 mark 1 correct = 0 marks **accept** ✓ for true and X for false
	d		C	1	mark response on dotted line if no response on dotted line look at the diagram and accept the correct response if indicated E.g. tick or circle round diagram C
			Total	**5**	

Question			Expected Answers	Marks	Rationale
2	a		not absorbed by atmosphere ✓ (1) able to travel through empty space ✓ (1)	2	one mark for each correct response if more than two responses then minus 1 mark for each additional response candidate cannot score less than zero **accept** any other clear correct response in the first and second rows e.g. a cross, only if the third, fourth and fifth rows are blank
	b		amplitude frequency (1) modulation (1)	2	**allow** either order for amplitude and frequency **accept** any other clear correct response e.g. lines linking the correct terms to each dotted line
			Total	**4**	

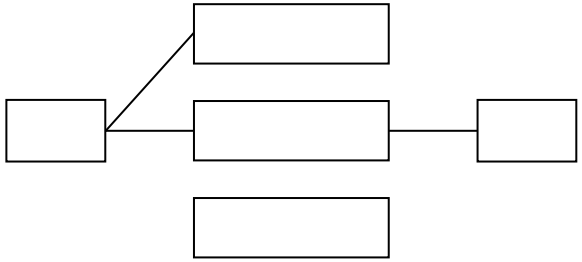
3	a		1 0	1	both required for 1 mark if more than two responses then scores 0 marks candidate cannot score less than zero
	b		analogue (1) pulses (1) receiver (1)	3	one mark for each correct response **accept** any other clear correct response e.g. lines linking the correct terms to each dotted line
	c		decrease in intensity as they travel ✓ (1)	1	if more than one response then score = 0 marks **accept** any other clear correct answer E.g. X
			Total	**5**	

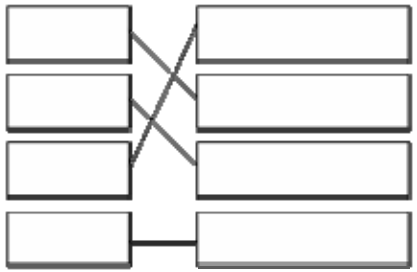
Question			Expected Answers	Marks	Rationale
4	a		cerebral cortex	1	if more than one response then score = 0 **accept** any other clear correct answer e.g. word underlined or highlighted or other words crossed out
	b		A C B D	2	4 correct = 2 3 or 2 correct = 1 1 correct = 0 **accept** correct labelling of letters in diagram
	c		remember her childhood ✓ remember her mother's name ✓	1	both correct = 1 mark if more than two responses then scores zero **accept** any other clearly correct response e.g. a cross in the middle box if the other two boxes have been ticked
			Total	**4**	

Question			Expected Answers	Marks	Rationale
5	a		axon synapse fatty sheath	2	all 3 correct = 2 two or one correct = 1 **accept** any other clear correct response e.g. lines linking the correct terms to each dotted line
	b		insulates neuron from other neurons ☐ ☐ ☐ ✓ (1)	1	if more than one response then score = 0 **accept** any other clear correct answer e.g. X
	c			2	all or four correct = 2 three or two correct = 1 one or zero correct = 0 **accept** correct text in place of letters
			Total	**5**	

<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Rationale</th></tr>
<tr><td>6</td><td>a</td><td></td><td>spinal cord</td><td>1</td><td>accept any other clearly correct answer e.g. other words crossed out, correct word underlined or highlighted</td></tr>
<tr><td></td><td>b</td><td></td><td>reflexes
complex
involuntary</td><td>2</td><td>3 correct = 2
2 correct = 1
1or 0 correct = 0</td></tr>
<tr><td></td><td>c</td><td></td><td><table><tr><th>effectors</th><th>receptors</th><th>neither</th></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><tr><td></td><td>✓</td><td></td></tr></table></td><td>2</td><td>3 or 4 correct = 2 marks
2 correct = 1 mark
1 or 0 correct = 0 mark

accept any other clearly correct response e.g. an X in correct box but reject combinations of Xs and ✓s</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>5</td><td></td></tr>
<tr><td>7</td><td></td><td></td><td><table><tr><td>(A)</td><td>C</td><td>E</td><td>B</td><td>D</td></tr></table></td><td>3</td><td>C before E = (1)
E before B = (1)
B before D = (1)</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>3</td><td></td></tr>
</table>

Question			Expected Answers	Marks	Rationale
8	a			3	1 mark for each correct line each additional line (more than 3) loses 1 mark candidate cannot score less than zero
			Total	**3**	

9	a			3	4 lines correct = 3 3 or 2 lines correct = 2 1 line correct = 1 if more than one line from 1 box then that line does not score even if one of the lines is correct
	b		$CaCl_2$	1	
			Total	**4**	

Question			Expected Answers	Marks	Rationale
10	**a**		tartaric acid	1	more than one response = 0 **accept** any other clear correct response e.g. underlined or highlighted or others crossed out
	b		Brenda	1	mark response on dotted line if more than 1 response score = 0 if no response on dotted line look at the diagram and accept the correct response if indicated e.g. tick or circle next to Brenda
	c		H^+	1	more than one response = 0 marks **accept** any other clear response e.g. symbol underlined
	d		H_2	1	more than one response = 0 marks **accept** any other clear response e.g. symbol underlined
			Total	**4**	

35

A217/02 Modules B6, C6, P6 Higher

Question			Expected Answers	Marks	Rationale
1	a		not absorbed by atmosphere ✓ (1) able to travel through empty space ✓ (1)	2	one mark for each correct response if more than two responses then minus 1 mark for each additional response candidate cannot score less than zero **accept** any other clear correct response in the first and second rows e.g. a cross, only if the third, fourth and fifth rows are blank
	b		amplitude frequency (1) modulation (1)	2	**allow** either order for amplitude and frequency **accept** any other clear correct response e.g. lines linking the correct terms to each dotted line
			Total	**4**	

2	a		refraction	1	more than one response = 0 marks **accept** any other clear response e.g. underlined
	b		decreases (1) doesn't change (1) decreases (1)	3	one mark for each correct response **accept** any other clear correct response e.g. lines linking the correct terms to each dotted line
	c		angle of refraction greater than 90^{o} ✓ (1)	1	more than one response = 0 marks **accept** any other clear correct response in the fourth row e.g. a cross, only if the remaining three rows are blank
			Total	**5**	

Question			Expected Answers	Marks	Rationale
3	a		<table><tr><td>B</td><td>D</td><td>A</td><td>(C)</td></tr></table>	2	B before D = 1 mark D before A = 1 mark if no response in the boxes – look at the list provided and accept a clear response e.g. each sentence given the correct number in the sequence
	b		D	1	more than one response = 0 marks **accept** any other clear response e.g. underlined or correct letter circled on the graph or within the question.
	c		digital signal can be separated from noise in radio signal ✓ (1) radio signals pick up noise as they pass from transmitter to receiver ✓ (1)	2	more than two responses – minus one mark for each additional response candidates cannot score less than zero **accept** any other clear correct response in the first and fourth row e.g. a cross, only if the remaining rows are blank
			Total	**5**	

<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Rationale</th></tr>
<tr><td>4</td><td>a</td><td></td><td>reflexes
complex
involuntary</td><td>2</td><td>3 correct = 2 marks
2 correct = 1 mark
1 or 0 correct = 0 marks</td></tr>
<tr><td></td><td>b</td><td></td><td><table><tr><th>effectors</th><th>receptors</th><th>neither</th></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><tr><td></td><td>✓</td><td></td></tr></table></td><td>2</td><td>3 or 4 correct = 2 marks
2 correct = 1 mark
1 or 0 correct = 0 mark

accept any other clearly correct response e.g. a cross in correct box but reject combinations of Xs and ✓s</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>4</td><td></td></tr>
<tr><td>5</td><td>a</td><td></td><td><table><tr><td>A</td></tr><tr><td>C</td></tr><tr><td>F</td></tr><tr><td>B</td></tr><tr><td>E</td></tr><tr><td>D</td></tr></table></td><td>2</td><td>5 or 6 correct = 2 marks
3 or 4 correct = 1 mark
0, 1 or 2 correct = 0 marks</td></tr>
<tr><td></td><td>b</td><td></td><td>pattern (1)
smell (1)
repetition (1)</td><td>3</td><td>one mark for each correct response

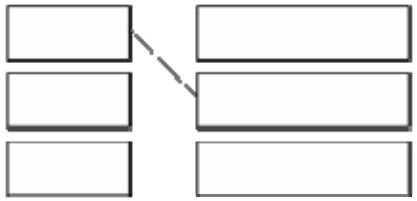
accept any other clear correct response e.g. lines linking the correct terms to each dotted line</td></tr>
<tr><td></td><td>c</td><td></td><td>cerebral cortex</td><td>1</td><td>more than one response = 0 marks

accept any other clear response e.g. underlined.</td></tr>
<tr><td></td><td>d</td><td></td><td>Xena</td><td>1</td><td>more than one response = 0 marks

if no response on dotted line look at the diagram and accept the correct response if indicated e.g. tick or circle next to Xena</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>7</td><td></td></tr>
</table>

Question			Expected Answers	Marks	Rationale
6	a		synapses slow down transmission of impulses ✓ (1) synapses only allow impulses to travel in one direction ✓ (1)	2	one mark for each correct response **accept** any other clear correct response in the second and fourth rows e.g. a cross, only if the remaining rows are blank
	b		serotonin increases ✓ (1)	1	more than one response = 0 **accept** any other clear correct response in the third row e.g. a cross, only if the remaining rows are blank
			Total	**3**	

Question			Expected Answers	Marks	Rationale
7	a		tartaric acid	1	more than one response = 0 **accept** any other clear correct response e.g. underlined or highlighted or others crossed out
	b		Brenda	1	mark response on dotted line more than one response = 0 if no response on dotted line look at the diagram and accept the correct response if indicated e.g. tick or circle next to Brenda
	c		H^+	1	more than one response = 0 **accept** any other clear response e.g. symbol underlined
	d		H_2	1	more than one response = 0 **accept** any other clear response e.g. symbol underlined
			Total	**4**	

8	a		D	1	more than one response = 0 marks **accept** any other clear response e.g. underlined or correct letter circled on the graph
	b			1	more than one response = 0 marks look at the correct left hand box – if more than one line leaves this box = 0 marks
			Total	**2**	

9			Doug	1	mark response on dotted line more than one response = 0 marks if no response on dotted line look at the diagram and accept the correct response if indicated e.g. tick or circle next to Doug
			Total	**1**	

Question			Expected Answers	Marks	Rationale
10	**a**		B	1	more than one response = 0 marks **accept** any other clear response e.g. underlined If no response on dotted line look at the list of equations and accept the correct response if indicated e.g. tick or circle around the correct equation
	b		B	1	more than one response = 0 marks **accept** any other clear response e.g. underlined if no response on dotted line - look at the list of equations and accept the correct response if indicated e.g. tick or circle around the correct equation OR accept the correct response indicated (letter B) within the question
	c		→ $CaCl_2$[aq] + H2O[l] + CO_2[g]	1	all three correct responses = 1 mark **must be lower case**
			Total	**3**	

<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Rationale</th></tr>
<tr><td>11</td><td>a</td><td></td><td>D</td><td>1</td><td>more than one response = 0 marks

accept any other clear response e.g. underlined

if no response on dotted line - look at the list and accept the correct response if indicated e.g. tick or circle around the correct response</td></tr>
<tr><td></td><td>b</td><td></td><td><table>
<tr><td>C</td><td>+</td><td>2FeO</td><td>→</td><td>2Fe</td><td>+</td><td>CO_2</td></tr>
<tr><td>12g</td><td></td><td>144(g)</td><td></td><td>112(g)</td><td></td><td>44(g)</td></tr>
</table></td><td>3</td><td>one mark for each correct response</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>4</td><td></td></tr>
</table>

A218/01 Unit 4 Ideas in Context - Foundation

<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Rationale</th></tr>
<tr><td>1</td><td>a</td><td>i</td><td>heat/sun (1)
evaporates (1)</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td>ii</td><td>sun/temperature argument (1)
more/less rainfall (1)</td><td>2</td><td>if sun or rainfall not mentioned 1 maximum for
’weather / winter / summer’</td></tr>
<tr><td></td><td></td><td>iii</td><td>any one from:
<table>
<tr><th></th><th>chloride</th><th>sulfate</th><th>carbonate</th></tr>
<tr><td>sodium</td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>potassium</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>magnesium</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>calcium</td><td></td><td></td><td>✓</td></tr>
</table></td><td>1</td><td>ignore sodium chloride</td></tr>
<tr><td></td><td>b</td><td></td><td>+ carbonate (ions) → calcium carbonate</td><td>1</td><td>both required
not CaCO3 ions</td></tr>
<tr><td></td><td>c</td><td></td><td>movement –
(ions) do not <u>move</u> (freely) / less <u>movement</u> / less space <u>to move</u> / (only) vibrate / are at a fixed point

arrangement –
regular / pattern / lattice / orderly / rows / columns / lines / crystalline</td><td>2</td><td>ignore close together

look for idea of regularity
allow example of pattern e.g. square
ignore ‘set’ or ‘fixed’ or ‘structured’ arrangement – no evidence of regularity
ignore chains</td></tr>
</table>

Question			Expected Answers	Marks	Rationale
	d	i	ions are charged / positive ions / negative ions (1) (any type of particle) moves (around) (1)	2	**accept** particles, **not** atoms/ions/electrons **accept** correct formula of any ion **reject** electrons move / water moves / salts move / ionic compounds move
		ii	pH meter/pH probe (1) universal indicator / pH paper(1)	2	i.e. one instrumental technique and one chemical technique **ignore** indicator paper, pH checker, pH scale
		iii	10	1	
		iv	gloves / goggles / don't get it on your skin / wash off splashes	1	any reasonable answer wear protective “gear” not enough
			Total	14	

Question			Expected Answers	Marks	Rationale
2	a	i	collision time is longer ✓ (1)	1	
		ii	(force) decreases (1)	1	**allow** dubious causality. 'The lower the force the longer the collision' **ignore** 'the force slows down' **accept** 'bigger at the beginning' **accept** 'negative correlation'
		iii	any **two** reasonable measures built into the car: e.g. seat belts (1) crumple zones (1) airbags (1)	2	this may include car features that protect pedestrians **ignore** brakes unless ABS
	b		(new lamp posts) bend/buckle/hinged (1) (new lamp posts) don't break/hit ground/fly off/ less likely to hit somebody/car (1)	2	must be in terms of the newer lamp post
	c	i	kinetic	1	
		ii	the same/equal/no difference	1	

Question			Expected Answers	Marks	Rationale
	d	i	momentum = mass x velocity (3) if above formula is not fully correct then:- (measure) mass (1) (measure) velocity/speed (1) QWC communication (1): has addressed all three points in continuous writing	3 1	**allow** weight x velocity (2) if more than one formula given then **ignore** change in momentum = force x time if other formulae, only QWC mark is available **ignore** weight **ignore** incorrect units **allow** 'x' for the word multiply in a sentence QWC mark independent of the rest of answer as long as candidate has addressed the question
		ii	affects the lamppost	1	e.g. lamppost bends/breaks/buckles
			Total	13	

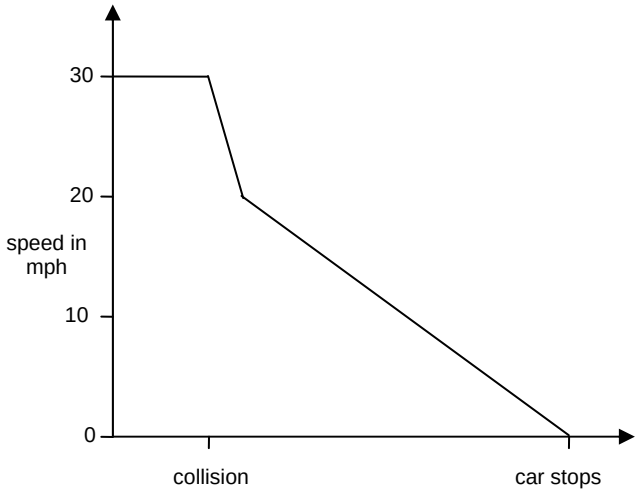
Question			Expected Answers	Marks	Rationale
3	a	i	low oxygen (in the blood)	1	**allow** level of oxygen in the blood must be oxygen, not air
		ii	gasping	1	
	b	i	automatic/don't have to think about them/faster	1	**allow** 'without knowing/unconscious'/asleep **ignore** protection from injury
		ii	**any two from:** (e.g.) finger grasping (1) not breathing under water (1) pupil reflex (1)	2	maximum 2 **allow** any reasonable suggestions e.g. cry/suck/swallow/blink/startle/sneeze/yawn/cough **ignore** breathing, kicking legs
	c		more neurons <u>and</u> fewer receptors (1) correctly linked to serotonin (1)	2	
	d	i	gap between two neurons (1)	1	this answer has two parts – the gap and the neurons/nerves **allow** 'gap between two nerves' **ignore** join/junction
		ii	electrical (1)	1	**ignore** 'electronic'
	e		any **two** from: emotions (1) intelligence (1) memory/recall/learning (1) language/speech (1) consciousness/thinking (1)	2	**ignore** movement, hearing, sensing, personality, subconscious processes
	f		any **two** from: small sample size / only 31 SID babies / only 10 non-SID babies (1) SID and non-SID babies are different sample sizes (1) not all SID brains abnormal / ora / <u>only</u> found in 55% of brains (1) all babies from same local area (1)	2	**ignore** correlation and cause i.e. compares the two numbers
			Total	13	

A218/02 Unit 4 Ideas in Context - Higher

Question			Expected Answers	Marks	Rationale
1	a	i	state symbols: (aq) (aq) (s) (1) $CaCO_3$ (1)	2	
		ii	when the spring water hits the lake water/spring water meets carbonate ions/owtte (1) calcium (ions) needed (1)	2	
	b		movement – (ions) do not move (freely) / less movement / less space to move / (only) vibrate / are at a fixed point arrangement – regular / pattern / lattice / orderly / rows / columns / lines / crystalline	2	**ignore** close together look for idea of regularity **allow** example of pattern e.g. square **ignore** 'set' or 'fixed' or 'structured' arrangement – no evidence of regularity **ignore** chains
	c		ions are charged / positive ions / negative ions (1) (any type of particle) moves (around) (1)	2	**accept** particles = ions **not** atoms, molecules or electrons **accept** correct formula of any ion **reject** electrons move / water moves / salts move / ionic compounds move
	d		Na ions have +1 charge and Mg ions have +2 charge (both required) / charges on Na and Mg ions are different / Na and Mg in different groups in the periodic table / have different numbers of electrons	1	**ignore** references to protons

Question			Expected Answers	Marks	Rationale
1	e	i	contains same ions / any ion from: sodium / Na^+/ /magnesium/Mg^{2+}/chloride/Cl^- /carbonate/CO_3^{2-}/ sulphate/SO_4^{2-}	1	**allow** sodium chloride/magnesium sulphate/magnesium chloride **ignore** sodium carbonate / same ionic compounds
		ii	any **two** from quantities of salts may be different (1) does not contain any potassium (compounds)(1) tap water may contain other substances(1)	2	**ignore** 'More salts' (this implies the lake is bigger than the sample of fake lake water).
			Total	**12**	

Question			Expected Answers	Marks	Rationale
2	a	i	momentum = mass x velocity (3) if above formula is not fully correct then:- (measure) mass (1) (measure) velocity/speed (1) QWC communication (1): has addressed all three points in continuous writing	3 1	**allow** weight x velocity (2) if more than one formula given then **ignore** change in momentum = force x time if other formulae, only QWC mark is available **ignore** weight **ignore** incorrect units **allow** 'x' for the word multiply in a sentence QWC mark independent of the rest of answer as long as candidate has addressed the question
		ii	affects the lamppost	1	e.g. lamppost bends/breaks/buckles
	b		any **two** from: long(er) collision time (1) change in momentum constant / reduces momentum more slowly (1) hence less force(on car) (1) hence less force on passengers(1)	2	**reject** reduces injuries **ignore** takes longer to stop the car (need collision idea)- **ignore** momentum slows **ignore** 'the smaller the force the longer the collision time'.

Question			Expected Answers	Marks	Rationale
2	c		between origin and collision: horizontal at 30mph (1) at collision: sharp drop to 20mph (1) between collision and stop: slope down (gradient always negative) (1) e.g.  	3	mark independently

Question			Expected Answers	Marks	Rationale
2	d	i	v = 5.5 / 5.48 / 5.4772… (3) **OR 2 from** substitution: e.g. (1) 22 500 = 0.5 x 1500 x v^2 rearrangement: e.g. (1) v^2 = 2 x 22 500 ÷ 1500 (allow ecf) takes square root: e.g. v = √30 (1)	3	**ignore** quotation of KE = ½ mv^2 **allow** $v^2 = \frac{2KE}{m}$ or $v = \sqrt{\frac{2KE}{m}}$
		ii	friction / heat / sound / energy is used to crush car (1)	1	**allow** air resistance
			Total	**14**	

Question			Expected Answers	Marks	Rationale
3	a		any **two** from: emotions (1) intelligence (1) memory/recall/learning (1) language/speech (1) consciousness/thinking (1)	2	**ignore** movement, hearing, sensing, personality, subconscious processes
	b		any **two** from: small sample size / only 31 SID babies / only 10 non-SID babies (1) SID and non-SID babies are different sample sizes (1) not all SID brains abnormal / ora / <u>only</u> found in 55% of brains (1) all babies from same local area (1)	2	**ignore** correlation and cause
	c	i	fewer receptors	1	

Question			Expected Answers	Marks	Rationale
3	c	ii	look for idea of **mechanism of transfer** any **three** from vesicles OR sensory neurones release serotonin (1) serotonin diffuses across synapse (1) binds to/fits into receptors (1) triggers impulse/stimulates impulse (1)	3	**allow** serotonin = neurotransmitter = NTS = chemicals **ignore** absorbed by receptors **idea** of binding or fitting eg lock, attach etc **ignore** triggers or stimulates receptors
	d		look for idea of **not enough receptors available** any **two** from: fewer receptors (1) (enough) receptors are not triggered/ stimulated (1) impulse is not triggered/stimulated (1) to cause the gasping (reflex) (1)	2	 **ignore** serotonin does not bind to receptors **allow** no gasping / stops gasping
	e	i	either: (in most babies…) more gasping (reflex) (1) high level of serotonin (1) triggers/stimulates/binds to receptors / triggers impulse (1) **or**: any **3** from (in SIDS babies…) no change to gasping (reflex) (1) high level of serotonin (1) receptors already full (1) receptors cannot be triggered/stimulated/bound to / impulse not triggered (1)	3	**ignore** more serotonin made **allow** gasps more easily / gasps easiER **ignore** more serotonin made **ignore** less / no gasping (reflex)

Question			Expected Answers	Marks	Rationale
3	e	ii	enhances moods/example of mood/slows down anti diuretic hormone (ADH) production /depression/anxiety/poor attention span/poor memory	1	**idea** of direct change <u>in the brain</u> **allow** example of mood: happy, sad **ignore** dehydration **ignore** changes in behaviour **ignore** increases ADH production / changes ADH production
			Total	**14**	

Grade Thresholds

General Certificate of Secondary Education
Additional Science A (Specification Code J631)
June 2008 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
A215/01	Raw	42	N/A	N/A	N/A	26	22	18	15	12	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A215/02	Raw	42	30	26	21	17	13	11	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A216/01	Raw	42	N/A	N/A	N/A	28	24	21	18	15	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A216/02	Raw	42	34	29	23	18	14	12	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A217/01	Raw	42	N/A	N/A	N/A	26	22	18	14	10	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A217/02	Raw	42	34	30	25	20	14	11	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A218/01	Raw	40	N/A	N/A	N/A	21	17	13	9	5	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A218/02	Raw	40	23	19	14	10	6	4	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A220	Raw	40	33	30	26	23	19	16	13	10	0
	UMS	100	90	80	70	60	50	40	30	20	0

A220 (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
J631	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
J631	5.6	20.3	47.7	76.6	91.0	97.1	99.3	99.9	100	66 384

71 375 candidates were entered for aggregation this series

For a description of how UMS marks are calculated see:
http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

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