

**Additional Science A  
Twenty First Century Science**

General Certificate of Secondary Education **J631**

**Mark Schemes for the Units**

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**January 2008**

**J631/MS/R/08J**

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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 Additional Science A Twenty First Century (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 (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 <b>not</b> 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

# A215/01 Modules B4, C4, P4 Foundation

Question			Expected Answers	Marks	Rationale
1	a		elements change colour of flame <input type="checkbox"/> (1)	2	one mark per correct tick <b>deduct</b> one mark for each incorrect tick if more than two ticks used
			<input checked="" type="checkbox"/>		
			<input type="checkbox"/>		
			element turns flame same colour <input checked="" type="checkbox"/> (1)		
			<input type="checkbox"/>		
	b		line spectrum (1)	1	
			<b>Total</b>	<b>3</b>	

2	a	i	B (1)	1	
		ii	A (1)	1	
	b		G (1) H (1)	2	
			<b>Total</b>	<b>4</b>	

3	a		between 80 and 160 (1) [predicted = 122, actual = 98]	1	
	b		between 300 and 800 (1) [predicted = 424, actual = 760]	1	
	c		difficult to measure high boiling point <input type="checkbox"/> (1)	1	two ticks = 0
			<input checked="" type="checkbox"/>		
			<input type="checkbox"/>		
	d		KCl (1)	1	the 'K' and 'C' must be upper case, the 'l' in Cl must be lower case answers such as K + Cl = KCl, mark the answer to the right of the equals sign only.
			<b>Total</b>	<b>4</b>	

A215/01

Mark Scheme

January 2008

Question			Expected Answers		Marks	Rationale
4			chlorine bromine iodine	state	colour	3  6 correct (3) 4 or 5 correct (2) 2 or 3 correct (1) for red/brown <b>allow</b> one or both from the pair
				gas	green	
				liquid	red/brown	
				solid	grey	
			Total		3	

5	a		forwards (1)	1	
	b		1 kN (1)	1	
	c		<div><div>momentum</div><div>kinetic energy</div></div> <div><div></div><div></div><div>✓ (1)</div><div>✓ (1)</div><div></div></div>	2	
			Total	4	

6	a		$\frac{3000}{400}$ (1)	1							
	b		stopped at traffic lights steady top speed slowing down at the end <table><tr><td>D</td></tr><tr><td>C</td></tr><tr><td>F</td></tr></table>	D	C	F	2	3 correct (2) 1 or 2 correct (1)			
D											
C											
F											
	c		<table><tr><td>brakes</td><td>applies a counter force</td></tr><tr><td>seatbelt</td><td>transfers kinetic energy</td></tr><tr><td>momentum</td><td>reduced by friction</td></tr></table>	brakes	applies a counter force	seatbelt	transfers kinetic energy	momentum	reduced by friction	2	3 correct (2) 1 or 2 correct (1)
brakes	applies a counter force										
seatbelt	transfers kinetic energy										
momentum	reduced by friction										
			<b>Total</b>	<b>5</b>							

A215/01

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale
7	a		weight (1) gravitational potential energy (1) kinetic energy (1)	3	allow GPE for gravitational potential energy
	b		<div><div><math>\frac{20}{4}</math></div><div><math>20 \times 4</math></div><div><math>\frac{4}{20}</math></div></div>	1	
	c		<div>transfers energy from the brick</div> <div><div><div></div><div></div><div>✓</div></div><div>(1)</div></div>	1	
			Total	5	

8	a		a dilute solution	<table><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr></table>		✓		(1)	1		
✓											
	b		stop glucose molecules passing	<table><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr></table>		✓		(1)	1		
✓											
	c		move mostly from side B to side A	<table><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr></table>		✓			(1)	1	
✓											
	d		equally between side A and side B	<table><tr><td></td></tr><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr></table>			✓		(1)	1	
✓											
			Total			4					



A215/01

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale
9	a		proteins (1)	1	
	b		<div>can make reactions go faster</div> <div>will only work in test tubes</div> <div>stop working at very high temp</div> <div>work best at one particular temp</div> <div> <div>true</div> <div>false</div> <div>true</div> <div>true</div> </div>	2	4 correct (2) 3 correct (1)
	c		<div> <div>C</div> <div>D</div> <div>B</div> <div>A</div> </div> <div>D before B (1)</div> <div>B before A (1)</div>	2	
			<b>Total</b>	<b>5</b>	

10	a		<div> <div>water into</div> <div>drinks</div> <div>food</div> <div>respiration</div> </div> <div> <div>water out of</div> <div>breathing</div> <div>faeces</div> <div>sweating</div> </div>	3	6 correct (3) 4 or 5 correct (2) 3 correct (1) 1 or 2 correct (0) any word which appears in both columns cancels itself out.
	b		<div>kidneys produce more urine</div> <div> <div>✓</div> </div> <div>(1)</div>	1	
	c		<div> <div></div> <div>smaller</div> <div></div> </div> <div> <div>less dilute</div> <div></div> <div></div> </div>	1	more than one line = 0
			<b>Total</b>	<b>5</b>	

			<b>Paper Total</b>	<b>42</b>	
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## A215/02 Modules B4, C4, P4 Higher

Question			Expected Answers	Marks	Rationale
1	a		any value from 80 to 160 for [1]	1	no units (°C) required
	b		any value from 300 to 800 for [1]	1	no units (°C) required
	c		difficult to measure high point <div><div><div></div><div></div><div>✓</div><div></div></div>(1)</div>	1	any clear indication of correct response for (1) e.g. cross in box, circling correct statement ...
	d		KCl (1)	1	K and C must appear to be uppercase and the 'l' must appear to be lower case for [1] K + Cl → KCl for [1] - <b>ignore</b> anything to the left of → or =.
			Total	4	

2	a		D (1)	1					
	b		molten lithium chloride conducts <table border="1"><tr><td></td></tr><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr></table> (1)			✓		1	any clear indication of correct response for (1) e.g. cross in box, circling correct statement ...
✓									
	c		<table border="1"><tr><td>2</td></tr></table> <table border="1"><tr><td>2</td></tr></table> (2)	2	2	2	each correct box for (1)		
2									
2									
	d		g, s, s (1)	1	must <b>all</b> appear to be lower case, so G, s, s for (0)]				
			<b>Total</b>	<b>5</b>					

A215/02

Mark Scheme

January 2008

Question	Expected Answers			Marks	Rationale
3			different places, different colours <div style="display: inline-block; vertical-align: middle; text-align: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div>  <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto; text-align: center;">✓</div>  <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div>  <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> </div> (1)	1	any clear indication of correct response for (1) e.g. cross in box, circling correct statement ...
			<b>Total</b>	<b>1</b>	

4			$\text{PO}_4^{3-}$ (1)	1	any clear indication of correct response for (1)] e.g. underlining ...
			<b>Total</b>	<b>1</b>	

5	a		B (1)	1	
	b		E (1)	1	
	c		B, A, D (1)	1	in any order, all three for [1]
			<b>Total</b>	<b>3</b>	

6	a		forwards (1)	1	
	b		1 kN (1)	1	no error carried forward from 6 (a).
	c		<div style="display: inline-block; vertical-align: middle; text-align: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div>  <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto; text-align: center;">✓</div>  <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto; text-align: center;">✓</div>  <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> </div> momentum (1) kinetic energy (1)	2	correct pattern of responses for (2)] one mistake for (1) e.g. a third tick, second tick in the wrong place, missing tick ...
			<b>Total</b>	<b>4</b>	

A215/02

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale
7	a		<div> <div>speed</div> <div>friction</div> <div>velocity</div> </div> <div> <div></div> <div>distance moved by an object in each second</div> <div>how fast and what direction</div> <div>counter force arising</div> </div>	1	correct pattern of three lines for (1) any additional lines for (0)]
	b		<u>50 000</u> (1) 3600	1	any clear indication of correct response for (1) e.g. underlining ...
	c	i	graph A (1)	1	
		ii	300 N (1)	1	NOT to be confused with 900 N from 8(b)
	d		<div>increases the time to slow down</div> <div> <div></div> <div>✓</div> <div></div> </div> <div>(1)</div>	1	any clear indication of correct response for (1) e.g. cross in box, circling correct statement ...
			<b>Total</b>	<b>5</b>	

A215/02

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale
8	a		weight (1) kinetic energy (1)	2	has to be in this order
	b		900 J (1)	1	
	c		$\sqrt{\frac{1000}{\frac{1}{2} \times 2}}$	1	any clear indication of correct response for (1) e.g. underlining ...
	d		air resistance dissipates energy <div><div></div><div>✓</div><div></div><div></div></div> (1)	1	any clear indication of correct response for (1) e.g. cross in box, circling correct statement ...
			Total	5	

A215/02

Mark Scheme

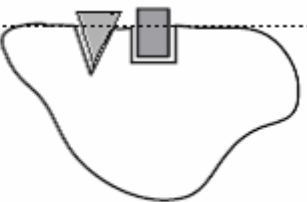
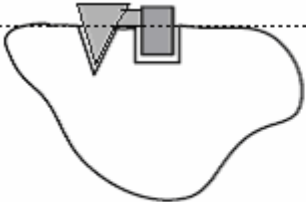
January 2008

Question			Expected Answers	Marks	Rationale				
9	a		a dilute solution <table><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr></table> (1)		✓		1	any clear indication of correct response for (1) e.g. cross in box, circling correct statement ...	
✓									
	b		stop glucose molecules passing <table><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr></table> (1)		✓		1	any clear indication of correct response for (1) e.g. cross in box, circling correct statement ...	
✓									
	c		move mostly from side B to side A <table><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr></table> (1)		✓			1	any clear indication of correct response for (1) e.g. cross in box, circling correct statement ...
✓									
	d		equally between side A and side B <table><tr><td></td></tr><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr></table> (1)			✓		1	any clear indication of correct response for (1) e.g. cross in box, circling correct statement ...
✓									
			Total	4					

A215/02

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale
10	a		<div><div><b>B</b><b>C</b></div></div>	2	B: some part of the molecule below the dotted line and the bond is intact for [1]  C: some part of the molecule below the dotted line and the bond is broken for [1]
	b		lock and key model (1)	1	
	c		Tony Aminah	2	each correct name, in any order for (1)
	d		<div>pH of mixture</div> <div><div><div></div><div></div><div>✓</div><div></div></div>(1)</div>	1	any clear indication of correct response for (1) e.g. cross in box, circling correct statement ...
			<b>Total</b>	<b>6</b>	

A215/02

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale
11	a		pituitary gland (1)	1	any clear indication of correct response for (1) e.g. underlining ...
	b		<div> <div></div> <div></div> <div></div> <div>blood</div> </div> <div> <div>control of urine concentration</div> <div></div> <div></div> <div></div> </div>	2	correct start box for (1) correct end box for (1)  more than one line for (0)
	c		<div> <div></div> <div>smaller</div> <div></div> </div> <div> <div>less dilute</div> <div></div> <div></div> </div>	1	correct start and end box for (1)  more than one line for (0)
			<b>Total</b>	<b>4</b>	
			<b>Paper Total</b>	<b>42</b>	



A216/01

Mark Scheme

January 2008

# A216/01 Modules B5, C5, P5 Foundation

Question			Expected Answers	Marks	Rationale
1	a		<div> <div></div> <div></div> <div>✓</div> </div> number had stayed the same	1	if more than one response = 0 marks
	b		increases	1	if more than one response = 0 marks
	c		new cells produced are gametes <div>false</div> new cells produced are identical <div>true</div> four new cells produced <div>false</div> identical to the parent cell <div>true</div>	2	<b>allow</b> F and T in this case, accept ✓ = true and X = false  4 correct (2) 3 / 2 correct (1) 1 correct (0)
<b>Total</b>				<b>4</b>	

2	a		<div> <div>(A) D C B</div> <div>D anywhere before C (1)</div> <div>C anywhere before B (1)</div> </div>	2	i.e. DBC = (1) BDC = (1) CDB = (1) CBD = (1)
	b		Jenny (1) Anna (1)	2	apply list principle (see item 7 in Guidance for Examiners above)
	c		pair up in same way three different types of bases in different gametes always same identical in new cells double helix structure <div> <div>T F</div> <div>✓</div> <div></div> <div></div> <div>✓</div> <div></div> <div>✓</div> <div></div> </div>	3	4 or 5 correct (3) 2 or 3 correct (2) 1 correct (1)
<b>Total</b>				<b>7</b>	

A216/01

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale			
3	a		towards the light <table border="1"><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr></table>		✓		1	if more than one response = 0 marks
✓								
	b	i	hormones	1	if more than one response = 0 marks			
		ii	root (1) unspecialised (1)	2	must be in correct order			
			Total	4				

4	a		iron - 5% section aluminium - 10% section  silicon - 25% section	2	3 correct (2) 1 / 2 correct (1)
	b		oxygen	1	
			<b>Total</b>	<b>3</b>	

5			small percentage of copper demand for large amounts	<div><div>✓</div><div>✓</div><div></div><div></div><div></div></div>	2	more than 2 ticks, use list principle
			Total		2	

6	a		3	1	if more than one response = 0 marks
	b		carbon hydrogen oxygen	2	3 correct (2) 2 correct (1)  more than 3 answers, use list principle
	c		C <sub>3</sub> H <sub>6</sub> O <sub>3</sub> (1)	1	If more than one response = 0 marks
			<b>Total</b>	<b>4</b>	

A216/01

Mark Scheme

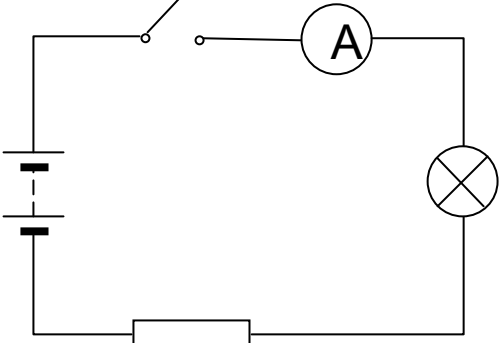
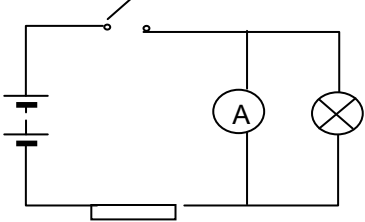
January 2008

Question			Expected Answers	Marks	Rationale																		
7	a	i	8	1	if more than one response = 0 marks																		
		ii	<table><tr><td></td><td>first stage</td><td>second stage</td></tr><tr><td>route A</td><td>3</td><td>2</td></tr><tr><td>route B</td><td>6</td><td>9</td></tr></table> <p style="text-align: center;"><b>OR</b></p> <table><tr><td></td><td>first stage</td><td>second stage</td></tr><tr><td>route A</td><td>6</td><td>9</td></tr><tr><td>route B</td><td>3</td><td>2</td></tr></table>		first stage	second stage	route A	3	2	route B	6	9		first stage	second stage	route A	6	9	route B	3	2	1	<b>all</b> correct for one mark
	first stage	second stage																					
route A	3	2																					
route B	6	9																					
	first stage	second stage																					
route A	6	9																					
route B	3	2																					
	b	i	fat <b>and</b> carbohydrate	1	<b>allow</b> any order  'hydrocarbon' is incorrect																		
		ii	carbon hydrogen oxygen nitrogen	1	all four needed for (1) <b>allow</b> any order <b>allow</b> correct symbols: C H O and N																		
			<b>Total</b>	<b>4</b>																			

A216/01

Mark Scheme

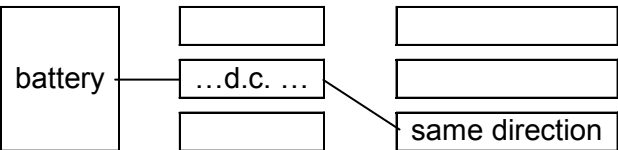
January 2008

Question			Expected Answers	Marks	Rationale
8	a	i	an insulator <div style="display: inline-block; vertical-align: middle;"> <input type="checkbox"/>  <input checked="" type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/> </div>	1	if more than one response = 0 marks
		ii	charge <div style="display: inline-block; vertical-align: middle;"> <input checked="" type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/> </div>	1	if more than one response = 0 marks
	b			1	<p>circuit must be completed with an ammeter shown as a circle containing a capital A</p> <p><b>ignore</b> line through ammeter</p> <p>any gaps in circuit = 0</p> <p>circuit must be a single path as shown (ie a series circuit)</p> <p>ammeter can go anywhere along this single path</p> <p>parallel circuits (as shown below) are <b>incorrect</b></p> 
	c		without the resistor in parallel with the lamp in series with the lamp <div style="display: inline-block; vertical-align: middle;"> <input type="checkbox"/> true  <input type="checkbox"/> true  <input type="checkbox"/> false         </div>	1	<p>all correct for (1)</p> <p><b>allow</b> F and T</p> <p>in this case, accept ✓ = true and X = false</p>
			<b>Total</b>	<b>4</b>	

A216/01

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale
9	a		generator	1	if more than one response = 0 marks
	b		0.0 (1) +0.5 (1)	2	must be in correct order must have '+' 0.5V i.e. '0.5V' is incorrect
	c			2	more than one line drawn on each side is incorrect
			<b>Total</b>	<b>5</b>	

10	a		temperature	1	if more than one response = 0 marks
	b		voltage (1) energy (1)	2	must be in correct order
	c		4V	1	if more than one response = 0 marks
	d		<div>less potential difference</div> <div><div></div><div></div><div>✓</div></div>	1	if more than one response = 0 marks
			<b>Total</b>	<b>5</b>	

			<b>Paper Total</b>	<b>42</b>	
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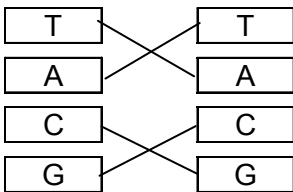
# A216/02 Modules B5, C5, P5 Higher

Question			Expected Answers	Marks	Rationale				
1	a		number had stayed the same <table><tr><td></td></tr><tr><td></td></tr><tr><td>✓</td></tr></table>			✓	1	if more than one response = 0 marks	
✓									
	b		increases	1	if more than one response = 0 marks  <b>allow</b> any other clear response eg. underline or ✓				
	c	i	new cells produced are gametes new cells produced are identical four new cells produced identical to the parent cell <table><tr><td>false</td></tr><tr><td>true</td></tr><tr><td>false</td></tr><tr><td>true</td></tr></table>	false	true	false	true	2	<b>allow</b> F and T in this case, accept ✓ = true and X = false  4 correct (2) 3 / 2 correct (1) 1 correct (0)
false									
true									
false									
true									
		ii	zygote	1	if more than one response = 0 marks  <b>allow</b> any other clear response eg. underline or ✓				
			<b>Total</b>	<b>5</b>					

A216/02

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale
2	a		2	1	if more than one response = 0 marks <b>allow</b> any other clear response eg. underline or ✓
	b		64	1	if more than one response = 0 marks <b>allow</b> any other clear response eg. underline or ✓
	c		Ruth	1	if more than one response = 0 marks <b>allow</b> any other clear response eg. underline or ✓
	d			1	<b>all</b> correct for one mark
			<b>Total</b>	<b>4</b>	

A216/02

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale								
3	a		<div>used to form gametes</div> <div>replace damaged tissues</div> <div>close match to cells in patient</div> <table><tr><td>T</td><td>F</td></tr><tr><td></td><td>✓</td></tr><tr><td>✓</td><td></td></tr><tr><td>✓</td><td></td></tr></table>	T	F		✓	✓		✓		1	<b>all</b> correct for one mark <b>allow</b> a clear response eg. X or shading etc. <b>ignore</b> X if combination of ✓ and X used
T	F												
	✓												
✓													
✓													
	b		<div>they are unspecialised</div> <div>they grow rapidly</div>	1	<b>both</b> correct for one mark more than 2 responses = 0 marks <b>allow</b> any other clear response eg. underline or ✓								
	c		8 cells	1	more than 2 responses = 0 marks <b>allow</b> any other clear response eg. underline or ✓								
	d		Jemima Lucy	2	2 correct responses = 2 marks 1 correct response = 1 mark <b>allow</b> either order for responses  if no responses on dotted lines, look for a clear response on the diagram eg. ✓, ring or shading								
			<b>Total</b>	<b>5</b>									



A216/02

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale																		
4	a	i	8	1	if more than one response = 0 marks																		
		ii	<table><tr><td></td><td>first stage</td><td>second stage</td></tr><tr><td>route A</td><td>3</td><td>2</td></tr><tr><td>route B</td><td>6</td><td>9</td></tr></table> <p style="text-align: center;"><b>OR</b></p> <table><tr><td></td><td>first stage</td><td>second stage</td></tr><tr><td>route A</td><td>6</td><td>9</td></tr><tr><td>route B</td><td>3</td><td>2</td></tr></table>		first stage	second stage	route A	3	2	route B	6	9		first stage	second stage	route A	6	9	route B	3	2	1	<b>all</b> correct for one mark
	first stage	second stage																					
route A	3	2																					
route B	6	9																					
	first stage	second stage																					
route A	6	9																					
route B	3	2																					
	b	i	fat <b>and</b> carbohydrate	1	<b>both</b> correct = 1 mark <b>allow</b> any order  'hydrocarbon' is incorrect																		
		ii	carbon hydrogen oxygen nitrogen	1	all four needed for (1) <b>allow</b> any order <b>allow</b> correct symbols: C H O and N																		
			<b>Total</b>	<b>4</b>																			

5	a		MgBr <sub>2</sub>	1	if more than one response = 0 marks  <b>allow</b> any other clear response eg. underline or ✓
	b		Na <sub>2</sub> SO <sub>4</sub>	1	if more than one response = 0 marks  <b>allow</b> any other clear response eg. underline or ✓
			<b>Total</b>	<b>2</b>	

A216/02

## Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale														
6	a		<div>various amounts of minerals metals can be extracted they are pure compounds</div> <table><tr><td>T</td><td>F</td></tr><tr><td>✓</td><td></td></tr><tr><td>✓</td><td></td></tr><tr><td></td><td>✓</td></tr></table>	T	F	✓		✓			✓	1	<p><b>all</b> correct for one mark</p> <p><b>allow</b> a clear response eg. X or shading etc.</p> <p><b>ignore</b> X if combination of ✓ and X used</p>						
T	F																		
✓																			
✓																			
	✓																		
	b		<div>ions produced when ore melts ions present in solid ore ion in solid move to electrodes negative ions move towards anode metals are discharged positive ions move towards cathode ions in liquid move to the electrodes</div> <table><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><tr><td>✓</td><td></td></tr><tr><td>✓</td><td></td></tr></table>		✓	✓			✓	✓		✓		✓		✓		3	<p>7 correct = 3 marks 5 or 6 correct = 2 marks 3 or 4 correct = 1 mark 2 correct or less = 0 marks</p> <p><b>allow</b> a clear response eg. X or shading etc.</p> <p><b>ignore</b> X if combination of ✓ and X used</p> <p>if more than 7 ticks – <b>deduct</b> 1 mark for each additional tick</p>
	✓																		
✓																			
	✓																		
✓																			
✓																			
✓																			
✓																			
	c		52.9 tonnes	1	<p>if more than one response = 0 marks</p> <p><b>allow</b> any other clear response eg. underline or ✓</p>														
			<b>Total</b>	<b>5</b>															

A216/02

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale
7	a		C	1	if more than one response = 0 marks  if no response on dotted line, look for a clear response on the list in the question eg. ✓, ring or shading
	b		A, B and C	1	<b>all</b> 3 correct for one mark  if more than 3 responses = 0 marks  if no responses on dotted line, look for a clear response on the diagram eg. ✓, ring or shading
			<b>Total</b>	<b>2</b>	

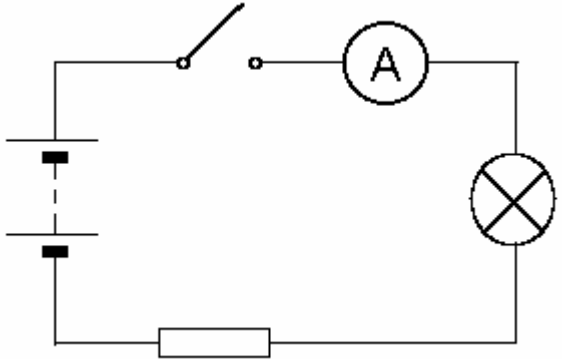
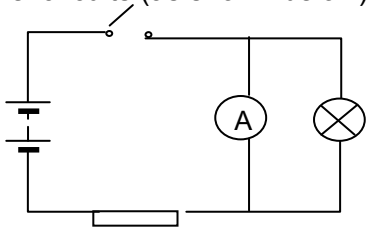
  

8			C	1	if more than one response = 0 marks  if no response on dotted line, look for a clear response on the list in the question eg. ✓, ring or shading
			<b>Total</b>	<b>1</b>	

A216/02

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale
9	a	i	an insulator <div style="display: inline-block; vertical-align: middle;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 2px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 2px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 2px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div>	1	if more than one response = 0 marks <b>allow</b> a clear response eg. X or shading etc.
		ii	charge <div style="display: inline-block; vertical-align: middle;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 2px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 2px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 2px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div>	1	if more than one response = 0 marks <b>allow</b> a clear response eg. X or shading etc.
	b			1	circuit must be completed with an ammeter shown as a circle containing a capital A  <b>ignore</b> line through ammeter  any gaps in circuit = 0  circuit must be a single path as shown (ie a series circuit)  ammeter can go anywhere along this single path  parallel circuits (as shown below) are <b>incorrect</b> 
	c		without the resistor in parallel with the lamp in series with the lamp <div style="display: inline-block; vertical-align: middle; margin-left: 10px;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin-bottom: 2px; text-align: center;">true</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-bottom: 2px; text-align: center;">true</div> <div style="border: 1px solid black; width: 40px; height: 20px; text-align: center;">false</div> </div>	1	<b>all</b> correct = 1 mark <b>allow</b> F and T in this case, accept ✓ = true and X = false
			<b>Total</b>	<b>4</b>	

A216/02

## Mark Scheme

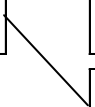

January 2008

Question			Expected Answers	Marks	Rationale						
10	a		electromagnetic induction	1	if more than one response = 0 marks  <b>allow</b> a clear response eg. X or shading etc.						
	b		<table border="1"> <tr> <td>(F)</td><td>B</td><td>A</td><td>D</td><td>C</td><td>(E)</td></tr> </table>	(F)	B	A	D	C	(E)	3	B somewhere before A = 1 mark A somewhere before D = 1 mark D somewhere before C = 1 mark
(F)	B	A	D	C	(E)						
	c		$12 \times \frac{5}{9}$	1	if more than one response = 0 marks  <b>allow</b> a clear response eg. X or shading etc.						
			<b>Total</b>	<b>5</b>							

A216/02

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale
11	a		<div style="display: flex; align-items: center; gap: 10px;"> <div style="border: 1px solid black; padding: 2px 10px;">B</div> <div style="border: 1px solid black; padding: 2px 10px;">C</div> <div style="border: 1px solid black; padding: 2px 10px;">A</div> </div>	2	B somewhere before C = 1 mark C somewhere before A = 1 mark
	b		<div style="display: flex; flex-direction: column; align-items: flex-start; gap: 10px;"> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 10px;">current</div> <div style="margin-left: 10px;">  </div> <div style="border: 1px solid black; padding: 2px 20px; width: 150px; height: 30px;"></div> </div> <div style="border: 1px solid black; padding: 2px 10px;">flow into next component</div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 10px;">voltages</div> <div style="margin-left: 10px;">  </div> <div style="border: 1px solid black; padding: 2px 20px; width: 150px; height: 30px;"></div> </div> <div style="border: 1px solid black; padding: 2px 10px;">transfer energy gained</div> </div>	2	one mark for each correct link  more than 2 lines – <b>deduct</b> 1 mark for each additional line
	c		6 - (0.08 x 45)	1	if more than one response = 0 marks  <b>allow</b> a clear response eg. X or shading etc.
			<b>Total</b>	<b>5</b>	
			<b>Paper Total</b>	<b>42</b>	

A217/01

Mark Scheme

January 2008

# A217/01 Modules B6, C6, P6 Foundation

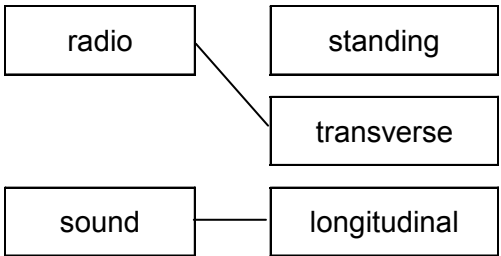
Question			Expected Answers	Marks	Rationale						
1	a	i	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>							1	must indicate infrared or i.r. in correct place
	a	ii	A (1)	1	any unambiguous correct response						
	b		A (1)	1	any unambiguous correct response						
	c		modulated (1) digital (1)	2	in the correct order any unambiguous correct response						
			<b>Total</b>	<b>5</b>							

2	a			3	4 correct (3) 2 or 3 correct (2) 1 correct (1)
	b		B (1)	1	any unambiguous correct response
			<b>Total</b>	<b>4</b>	

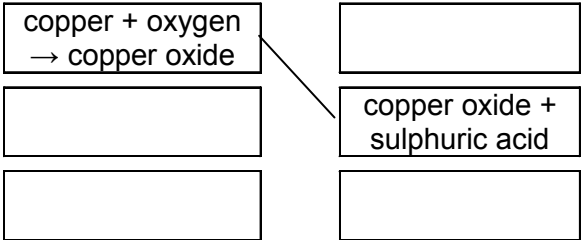
A217/01

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale
3	a		energy (1)	1	
	b	i	680 x 0.5 (1)	1	
	b	ii	doesn't change (1) increases (1)	2	in the correct order <b>allow</b> stays the same for doesn't change
	c			1	<b>both</b> correct for one mark
			<b>Total</b>	<b>5</b>	

4	a			2	left-hand side only top box indicated for [1] - <b>allow</b> more than one line to the box  right-hand side only middle box indicated for [1] - <b>allow</b> more than one line to the box
	b		<div style="border: 1px solid black; display: inline-block; padding: 2px;">(C)</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">B</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">D</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">A</div> B before D (1) D before A (1)	2	
			<b>Total</b>	<b>4</b>	



A217/01

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale
5	a	i	sulfuric acid (1)	1	any unambiguous correct response
	a	ii	MgSO <sub>4</sub> (1)	1	any unambiguous correct response
	b		<div>very fast</div> <div>very slow</div> <div>stopped</div> <div>A</div> <div>B</div> <div>C</div>	2	3 correct (2) 1 or 2 correct (1)
	c		<div>some water is made</div> <div>water reacts with hydrogen</div> <div>hydrogen reacts with oxygen</div> <div>oxygen reacts with hydrogen</div> <div>one hydrogen reacts with one oxygen</div> <div>one hydrogen reacts with two oxygen</div> <div>two hydrogen react with one oxygen</div> <div>T</div> <div>F</div> <div>T</div> <div>T</div> <div>F</div> <div>F</div> <div>T</div>	3	7 correct (3) 5 or 6 correct (2) 3 or 4 correct (1)  TF, TT, FF, T
			<b>Total</b>	<b>7</b>	

6			<div>(A) (B) (C) (D) G F H E</div> <div>G before F (1)</div> <div>F before H (1)</div> <div>H before E (1)</div>	3	
			<b>Total</b>	<b>3</b>	

7	a		45% (1)	1	
	b		<div>attracted to shade</div> <div>dry out easily</div> <div> <div>✓</div> <div>✓</div> </div> <div>(1)</div> <div>(1)</div>	2	correct pattern of ticks (2) one mistake (1)
	c		involuntary (1)	1	any unambiguous correct response
			<b>Total</b>	<b>4</b>	

A217/01

Mark Scheme

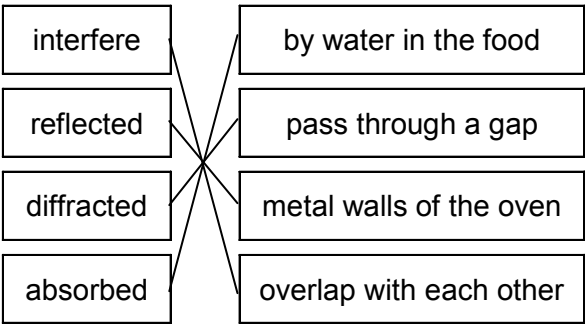
January 2008

Question	Expected Answers	Marks	Rationale
8	memory (1) intelligence (1)	2	either order
	<b>Total</b>	<b>2</b>	

9	a	<table><tr><td></td><td>letter</td><td></td></tr><tr><td>axon</td><td>C</td><td>(1)</td></tr><tr><td>cell nucleus</td><td>D</td><td>(1)</td></tr><tr><td>fatty sheath</td><td>B</td><td>(1)</td></tr></table>		letter		axon	C	(1)	cell nucleus	D	(1)	fatty sheath	B	(1)	3	
	letter															
axon	C	(1)														
cell nucleus	D	(1)														
fatty sheath	B	(1)														
	b	<table><tr><td>to insulate the axon</td><td><table><tr><td>✓</td></tr><tr><td></td></tr></table></td><td>(1)</td></tr><tr><td>allow nerve impulse to travel faster</td><td><table><tr><td>✓</td></tr><tr><td></td></tr></table></td><td>(1)</td></tr></table>	to insulate the axon	<table><tr><td>✓</td></tr><tr><td></td></tr></table>	✓		(1)	allow nerve impulse to travel faster	<table><tr><td>✓</td></tr><tr><td></td></tr></table>	✓		(1)	2	correct pattern of ticks (2) one mistake (1)		
to insulate the axon	<table><tr><td>✓</td></tr><tr><td></td></tr></table>	✓		(1)												
✓																
allow nerve impulse to travel faster	<table><tr><td>✓</td></tr><tr><td></td></tr></table>	✓		(1)												
✓																
	c	<table><tr><td>effector</td><td>brings about a change in the body</td></tr><tr><td>motor neuron</td><td>carries the impulse away from the receptor</td></tr><tr><td>receptor</td><td>carries the impulse towards the effector</td></tr><tr><td>sensory neuron</td><td>detects a specific stimulus</td></tr></table>	effector	brings about a change in the body	motor neuron	carries the impulse away from the receptor	receptor	carries the impulse towards the effector	sensory neuron	detects a specific stimulus	3	4 correct (3) 3 or 2 correct (2) 1 correct (1)				
effector	brings about a change in the body															
motor neuron	carries the impulse away from the receptor															
receptor	carries the impulse towards the effector															
sensory neuron	detects a specific stimulus															
		<b>Total</b>	<b>8</b>													

		<b>Paper Total</b>	<b>42</b>	
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# A217/02 Modules B6, C6, P6 Higher

Question			Expected Answers	Marks	Rationale
1	a			3	4 correct (3) 3 or 2 correct (2) 1 correct (1)
	b		B (1)	1	
			<b>Total</b>	<b>4</b>	

A217/02

Mark Scheme


January 2008

Question			Expected Answers	Marks	Rationale
2	a		intensity photons energy ( I. P. E. )	2	3 correct (2) 1 or 2 correct (1) <b>ignore</b> mis-spellings
	b		<div> <div>pulse represents</div> <div></div> <div>a 1 in the code</div> <div>a digital code</div> <div>beam transfers</div> <div></div> </div>	1	
	c	i	refraction (1)	1	
		ii	<div> <div></div> <div></div> <div>speeds up moving from plastic</div> <div>✓</div> <div></div> </div> <div>(1)</div>	1	
			<b>Total</b>	<b>5</b>	

A217/02

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale
3	a	i	340 (1) 680	1	
		ii	energy flow in same direction increases in amplitude right angles to the wave's direction	1	
	b	i	middle diagram (1) 	1	
		ii	analogue amplitude random amplified	2	4 correct (2) 3 correct (1)
			<b>Total</b>	<b>5</b>	

4	a		<div> <div>copper + oxygen → copper oxide</div> <div></div> <div></div> <div></div> <div></div> <div>copper oxide + sulphuric acid</div> <div></div> </div>	2	left correct (1) right correct (1)  LHS – only top box indicated, allow >1 line from the box RHS – only middle box indicated, allow >1 line to the box  (mark the boxes rather than the line)
	b		<div>(C) B D A</div> <div>B before D (1)</div> <div>D before A (1)</div>	2	
			<b>Total</b>	<b>4</b>	

A217/02

Mark Scheme

January 2008

Question			Expected Answers	Marks	Rationale
5	a	i	2 (1)	1	
		ii	120 (1)	1	<b>allow</b> 120 g If no total given allow '24+32+64' or '24+32+4x16'
		iii	15 (1)	1	
	b		25% (1)	1	
	c	i	B (1)	1	
		ii	C (1)	1	
		iii	D (1)	1	
			<b>Total</b>	<b>7</b>	

6	a		copper nitrate (1) $\text{Cu}(\text{NO}_3)_2$ (1)	2	no ECF
	b		$\text{MgCO}_3 + 2\text{HCl} \rightarrow \text{H}_2\text{O} + \text{MgCl}_2 + \text{CO}_2$ (1)	1	<b>allow</b> multiples of the correct answer
			<b>Total</b>	<b>3</b>	

7	a		45% (1)	1	
	b		<div> <div>attracted to shade</div> <div> <input type="checkbox"/>  <input checked="" type="checkbox"/>  <input type="checkbox"/> </div> <div>(1)</div> </div> <div> <div>dry out easily</div> <div> <input checked="" type="checkbox"/>  <input type="checkbox"/> </div> <div>(1)</div> </div>	2	correct pattern (2) one mistake (1)
	c		involuntary (1)	1	
			<b>Total</b>	<b>4</b>	

A217/02

Mark Scheme

January 2008

Question		Expected Answers	Marks	Rationale
8	a	<div style="border: 1px solid black; display: inline-block; padding: 2px;">(D) A B E C</div> A before B (1) B before E (1) E before C (1)	3	
	b	increased amount of serotonin <div style="display: inline-block; vertical-align: middle;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 2px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 2px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div> (1)	1	
	c	impulses only travel in one direction <div style="display: inline-block; vertical-align: middle;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 2px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 2px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div> (1)	1	
		<b>Total</b>	<b>5</b>	

9	a	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">bell ringing</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">primary stimulus</div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">food given</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">response</div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">dog salivating</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">secondary stimulus</div> </div>	1	all three correct for one mark
	b	cerebral cortex (1)	1	
	c	caterpillars with warning colours <div style="display: inline-block; vertical-align: middle;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 2px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 2px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div> (1)  goldfish may swim to the front <div style="display: inline-block; vertical-align: middle;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 2px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-bottom: 2px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div> (1)	2	correct pattern (2) one mistake (1)
	d	Jim and Harry (1)	1	
		<b>Total</b>	<b>5</b>	

		<b>Paper Total</b>	<b>42</b>	
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# Grade Thresholds

General Certificate of Secondary Education  
Additional Science A (Specification Code J631)  
January 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	33	28	22	17	12	9	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	25	22	19	16	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A216/02	Raw	42	33	29	24	20	16	14	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	28	24	21	18	15	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A217/02	Raw	42	35	31	26	21	16	13	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
<b>J631</b>	300	270	240	210	180	150	120	90	60	0

**No candidates were entered for aggregation this series. First aggregation opportunity is in June 2008.**

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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