

## **Additional Science A**

**Twenty First Century Science Suite**

**General Certificate of Secondary Education J631**

### **Mark Schemes for the Units**

---

**January 2010**

**J631/MS/R/10J**

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of pupils of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support which keep pace with the changing needs of today's society.

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.

© OCR 2010

Any enquiries about publications should be addressed to:

OCR Publications  
PO Box 5050  
Annesley  
NOTTINGHAM  
NG15 0DL

Telephone: 0870 770 6622  
Facsimile: 01223 552610  
E-mail: [publications@ocr.org.uk](mailto:publications@ocr.org.uk)

## CONTENTS

### GCSE Twenty First Century Additional Science A (J631)

#### MARK SCHEMES FOR THE UNITS

Unit/Content	Page
Guidance for Examiners	1
A215/01 Modules B4, C4, P4 Foundation Tier	3
A215/02 Modules B4, C4, P4 Higher Tier	11
A216/01 Modules B5, C5, P5 Foundation Tier	19
A216/02 Modules B5, C5, P5 Higher Tier	25
A217/01 Modules B6, C6, P6 Foundation Tier	34
A217/02 Modules B6, C6, P6 Higher Tier	42
Grade Thresholds	49

# Guidance for Examiners

Additional Guidance within any mark scheme takes precedence over the following guidance.

- 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 Accept any clear, unambiguous response which is correct, e.g. mis-spellings if phonetically correct (but check additional guidance).
- 4 Abbreviations, annotations and conventions used in the detailed mark scheme:

/	= alternative and acceptable answers for the same marking point
(1)	= separates marking points
<b>not/reject</b>	= answers which are not worthy of credit
<b>ignore</b>	= statements which are irrelevant - applies to neutral answers
<b>allow/accept</b>	= answers that can be accepted
(words)	= words which are not essential to gain credit
<u>words</u>	= 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'  
(1)

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 Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

E.g.

For a one mark question, where ticks in boxes 3 and 4 are required for the mark:

Put ticks (✓) in the two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth 0 marks.

Put ticks (✓) in the two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth one mark.

Put ticks (✓) in the two correct boxes.

<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth one mark.

8 The list principle:

If a list of responses greater than the number requested is given, 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, e.g. 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.

9 Marking method for tick boxes:

Always check the additional guidance.

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.

If there is at least one tick, ignore crosses. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses.

Credit should be given for each box correctly ticked. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

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

Edinburgh	
Manchester	
Paris	
Southampton	

**the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).**

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

# A215/01 Modules B4, C4, P4 Foundation Tier

Question		Expected Answers		Marks	Additional Guidance
1	a	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">rapid pulse ...</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">shivering</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">slurred speech</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">dry skin</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">hypothermia</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">heat stroke</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">wrap in wet towels</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">insulate the patient</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">... still as possible</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">use a fan</div> </div>	[4]	<p>all eight lines correct = 4 marks      six or seven lines correct = 3 marks      four or five lines correct = 2 marks      two or three lines correct = 1 mark      if there are two lines from a 'symptom' box then neither line is creditworthy      if there are two lines to a 'treatment' box then neither line is creditworthy</p>	
	b	i	40°C (1)	[1]	
		ii	34°C (1)	[1]	
			<b>Total</b>	<b>[6]</b>	

Question		Expected Answers	Marks	Additional Guidance
2	a	partially permeable / semi-permeable	[1]	accept 'dialysis tubing / 'Visking tubing' not 'permeable' ignore 'mildly permeable' ignore 'cell membrane'
	b	only water moves ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>	[1]	
	c	add more glucose to solution A <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	[1]	
		<b>Total</b>	[3]	

A215/01

## Mark Scheme

January 2010

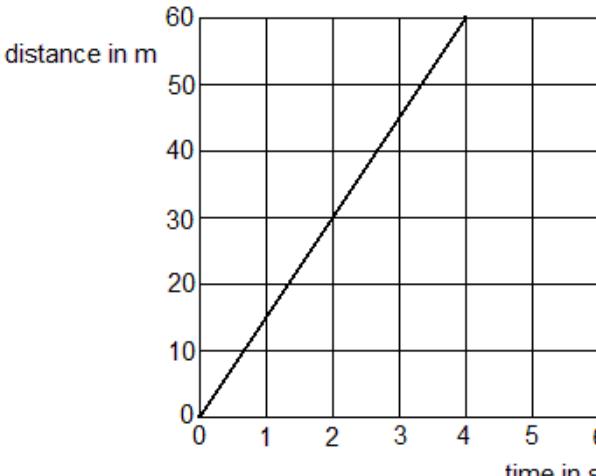
Question		Expected Answers	Marks	Additional Guidance
3	a	realises that the amount of gas produced is less than at 40°C (1) (because the enzyme is) denatured (1)	[2]	<p><b>accept</b> an answer of zero</p> <p><b>accept</b> damaged/ stop working / destroyed / <b>not</b> killed award both marks independently</p>
	b	realises that the reaction is between enzyme and hydrogen peroxide (not oxygen) (1) discusses inability to fit together (1)  discusses difference in shape (of the enzyme/ lock and key) (1)	[3]	<p>the terms 'lock' and 'key' do not have to be used (they are in the stem)</p> <p><b>allow</b> 'enzyme will break down hydrogen peroxide' (from stem) assume that 'active site' means 'enzyme' unless contradicted</p> <p><b>allow</b> the fit mark even if the wrong things are being fitted eg 'the two enzymes fit together' idea of fit must be unambiguous 'enzyme might not have the right lock / key for hydrogen peroxide' is not clear enough for 'fit' though it still gets 1 mark for 'reacts with peroxide'</p> <p><b>allow</b> 'the key won't fit the lock' 'only catalase will fit hydrogen peroxide' = 2 marks (fit, reacts with peroxide)</p> <p>shape must be in terms of the enzyme/lock and key 'the key is the wrong shape to fit the lock' = 2 marks (BOD)</p> <p><b>accept</b> diagrammatic answers which show these points</p> <p><b>accept</b> reverse argument that only peroxide is the right shape to fit catalase</p>
Total			[5]	

Question		Expected Answers	Marks	Additional Guidance
4	a	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px; text-align: center;">0</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">proton</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">almost zero</div> </div> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px; text-align: center;">-1</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">neutron</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">1</div> </div> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px; text-align: center;">+1</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">electron</div> </div>	[2]	<p>all six lines correct = 2 marks      three or more lines correct = 1 mark      if there are two lines from a 'charge box' then neither line is creditworthy      if there are two lines from a 'particle' box to a 'relative mass' box then neither line is creditworthy</p>
	b	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px; width: 150px; height: 40px;"></div> <div style="border: 1px solid black; padding: 2px; text-align: center;">... which has gained or lost electrons</div> </div> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px; width: 150px; height: 40px;"></div> <div style="border: 1px solid black; padding: 2px; width: 150px; height: 40px;"></div> </div> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px; text-align: center;">An atom or a group of atoms ...</div> <div style="border: 1px solid black; padding: 2px; width: 150px; height: 40px;"></div> </div> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px; width: 150px; height: 40px;"></div> <div style="border: 1px solid black; padding: 2px; width: 150px; height: 40px;"></div> </div>	[2]	<p>only the correct starting box used = 1 mark      only the correct end box used = 1 mark      eg 2 lines from the correct starting box = 1 mark</p>
		<b>Total</b>	[4]	

Question		Expected Answers	Marks	Additional Guidance																
5	a	idea of reaction / reactivity / tarnish (1) (what it reacts with) – oxygen / air /water / moisture (1)	[2]	<p>‘sodium won’t react with oil’ = reactivity mark</p> <p><b>ignore</b> reference to danger</p> <p>take reference to rusting as meaning ‘tarnish’</p> <p>it is possible to get the second mark even when the first point is garbled eg</p> <p>‘so that protons and electrons <u>in the air</u> do not affect the experiment’ = 1 mark</p> <p>‘sodium mixes with the air’ = second mark only</p>																
	b	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td></td><td></td></tr> <tr><td>x</td><td></td></tr> <tr><td>x</td><td></td></tr> <tr><td>x</td><td></td></tr> <tr><td>x</td><td></td></tr> </table> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>			x		x		x		x								[1]	any two (or more) of the four boxes indicated
x																				
x																				
x																				
x																				
	c	<p><b>any two from:</b></p> <p>floats;</p> <p>melts;</p> <p>gets smaller / disappears / dissolves;</p> <p>bubbles/fizzes/gas/smoke/steam;</p> <p>moves across the surface;</p> <p>catches fire / explodes / spits / sparks / pops;</p>	[2]	<p>if more than two observations, mark the first two non-neutral statements</p> <p>neutral – ‘sodium hydroxide’, idea of reaction, ‘it will change colour’</p> <p><b>accept</b> hydrogen for the bubbles mark</p> <p><b>reject</b> incorrect gas named</p> <p>if flame colour given it must be correct (yellow) for the ‘catches fire’ mark</p>																

Question		Expected Answers	Marks	Additional Guidance
5	d	<p>... burns with a yellow flame. <input checked="" type="checkbox"/> (1)</p>	[1]	
Total			[6]	

6	a	 	[1]	both second and third boxes indicated to score the mark
	b	 (1)	[1]	
	c	<p>bromine + sodium → sodium bromide</p>	[1]	accept bromine and sodium in either order ignore any chemical symbols
	d	<p>Ions are in the solid at the start.</p> <p>Ions then spread through the liquid.</p> <p><input type="text"/></p> <p><input type="text"/></p>	[1]	
Total			[4]	

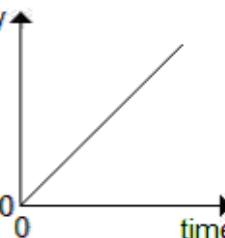
Question		Expected Answers	Marks	Additional Guidance
7	a	opposite force eg counter force (1)  equal magnitude to driving force (direction not stated) (1)	[2]	<b>accept</b> anything which gives the idea of an opposing force eg friction, resistance, air resistance, drag, antagonising force, 'force from the other side of the bus' <b>ignore</b> 'reaction force' <b>accept</b> cancels out driving force / gives zero resultant force / forces are balanced <b>accept</b> 'equal force pushing it back' = 2
	b	distance in m  time in s	[2]	for any credit to be awarded for either mark, the line must reach 2 seconds OR 30 m <b>accept</b> hand-drawn if clearly intended to be straight one straight line through the origin = 1 mark correct gradient (30m increase in 2s, 60m in 4s, accurate to 1/10 <sup>th</sup> of a large square by eye) = 1 mark treat crosses as neutral neutral – line extends backwards past the origin a straight line which goes to at least 30m, 2 sec and then changes direction = 0 marks
Total		[4]		

A215/01

## Mark Scheme

January 2010

Question		Expected Answers	Marks	Additional Guidance
8	a	6000 x 12 (1)	[1]	
	b	backwards backwards opposite the same as	[2]	4 or 3 correct = 2 marks 2 correct = 1 mark 0 or 1 correct = 0 marks
	c	A (1)	[1]	accept any clear indication of response if letter not given look for an indication on the diagram
	d	... its speed and direction of motion. <input type="checkbox"/> (1) <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	[1]	
		<b>Total</b>	[5]	

9	a	kinetic (1) gravitational potential (1)	[2]	accept 'gpe', 'gravitational' or 'potential' on its own
	b	Carlos (1)	[1]	accept any clear indication of response
	c	velocity  (1)	[1]	accept any clear indication of response more than one graph indicated = 0 marks
	d	... energy is lost through heating. <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>	[1]	
		<b>Total</b>	[5]	

# A215/02 Modules B4, C4, P4 Higher Tier

Question		Expected Answers	Marks	Additional Guidance
1	a	realises that the amount of gas produced is less than at 40°C (1)	[1]	<b>accept</b> an answer of zero look for the prediction in the table itself
	b	realises that the reaction is between enzyme and hydrogen peroxide (not oxygen) (1) discusses inability to fit together (1)  discusses difference in shape (of the enzyme/lock and key) (1)	[3]	the terms 'lock' and 'key' do not have to be used (they are in the stem) <b>allow</b> 'enzyme will break down hydrogen peroxide' (from stem) assume that 'active site' means 'enzyme' unless contradicted  <b>allow</b> the fit mark even if the wrong things are being fitted eg 'the two enzymes fit together' idea of fit must be unambiguous 'enzyme might not have the right lock / key for hydrogen peroxide' is not clear enough for 'fit' though it still gets 1 mark for 'reacts with peroxide' <b>allow</b> 'the key won't fit the lock' 'only catalase will fit hydrogen peroxide' = 2 marks (fit, reacts with peroxide)  shape must be in terms of the enzyme/lock and key 'the key is the wrong shape to fit the lock' = 2 marks (BOD) <b>accept</b> diagrammatic answers which show these points <b>accept</b> reverse argument that only peroxide is the right shape to fit catalase
	c	i active site (1)	[1]	no other answer is acceptable

Question		Expected Answers			Marks	Additional Guidance
	ii	... shape of the enzyme is changed. <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			[1]	if more than one box is ticked score 0 <b>accept</b> any clear indication of correct response
		<b>Total</b>			[6]	

2	a		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="background-color: #cccccc;">A</td><td>D</td><td>H</td><td>G</td><td>C</td></tr> </table>	A	D	H	G	C	[3]	<p>D anywhere before H = 1 mark          H anywhere before G = 1 mark          G anywhere before C = 1 mark          if no credit gained from these, allow 1 mark for D in the first box</p>
A	D	H	G	C						
	b		<p><b>any two from:</b>          breathing;          sweating;          faeces;          crying;</p>	[2]	<p><b>accept</b> respiration as an alternative to breathing  <b>allow</b> menstruation  <b>ignore</b> bleeding  <b>allow</b> spitting/drooling/dribbling but references to salivation alone are not sufficient  <b>allow</b> vomiting</p>					
			<b>Total</b>		[5]					

Question		Expected Answers	Marks	Additional Guidance
3	a	hypothalamus (1)	[1]	
	b	<p>hypothalamus (1)</p>	[2]	one mark for each correct side anything other than <b>two</b> lines on a side cannot score
		Total	[3]	

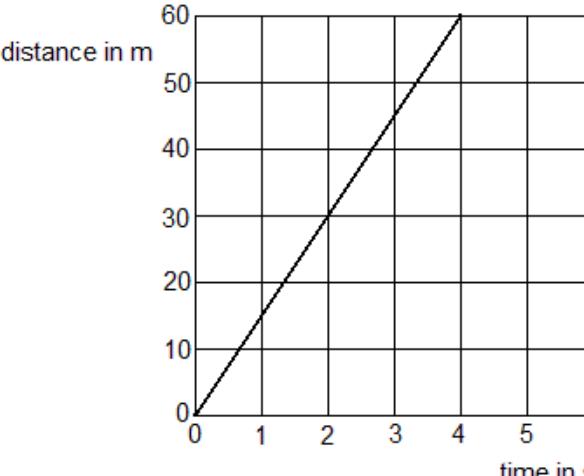
Question		Expected Answers	Marks	Additional Guidance
4	a	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">0</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">proton</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">almost zero</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">1</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">-1</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">neutron</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">+</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">+1</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">electron</div> </div>	[2]	<p>all six lines correct = 2 marks      three or more lines correct = 1 mark      if there are two lines from a 'charge box' then neither line is creditworthy      if there are two lines from a 'particle' box to a 'relative mass' box then neither line is creditworthy</p>
	b	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;"></div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">... which has gained or lost electrons</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;"></div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;"></div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">An atom or a group of atoms ...</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;"></div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;"></div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;"></div> </div>	[2]	<p>only the correct starting box used = 1 mark      only the correct end box used = 1 mark      eg 2 lines from the correct starting box = 1 mark</p>
	c	$\text{Li}^+$ $\text{S}^{2-}$	[1]	<p><b>accept</b> <math>\text{Li}^{1+}</math> <math>\text{Li}^{+1}</math>  <b>accept</b> <math>\text{S}^{-2}</math> <math>\text{S}^{--}</math>      charges must be indicated in superscript to the right of the letter  <b>reject</b> Li instead of Li</p>
	d	A and D (1)	[1]	<p><b>accept</b> in either order  <b>accept</b> any clear indication of response, including writing the electron arrangements</p>
		<b>Total</b>	<b>[6]</b>	

A215/02

## Mark Scheme

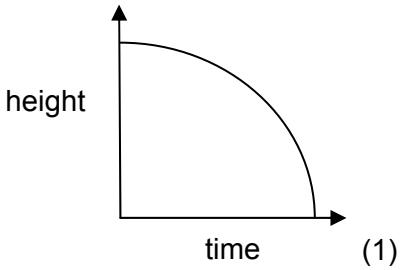
January 2010

Question		Expected Answers	Marks	Additional Guidance
5	a	<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1;"> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 10px;"></div> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 10px;"></div> </div> <div style="flex: 1; text-align: right;"> <div style="border: 1px solid black; width: 50px; height: 20px; margin-bottom: 10px;"></div> <div style="border: 1px solid black; width: 50px; height: 20px; margin-bottom: 10px;"></div> <div style="border: 1px solid black; width: 50px; height: 20px; margin-bottom: 10px;"></div> <div style="border: 1px solid black; width: 50px; height: 20px; margin-bottom: 10px;"></div> <div style="border: 1px solid black; width: 50px; height: 20px; margin-bottom: 10px;"></div> </div> </div> <p>solid</p> <p>colourless</p>	[1]	more than 1 line drawn = 0 marks
	b	<p>(solid is made of) ions (1)</p> <p>ions separate/drift apart/move freely / (they) become spread through the water (molecules) / diffuse (1)</p>	[2]	<p>needs to state or imply the idea that the solid lattice already has ions eg solid has ionic bonding scores this mark</p> <p>atoms/molecules contradicts the first mark</p> <p><b>allow</b> references to molecules/particles/atoms moving for the second mark - <b>not</b> elements or electrons</p> <p>reference to water molecules moving freely does not score this mark</p>
	c	<p>i</p> <p>sodium hydroxide and hydrogen (1)</p>	[1]	<p>both required for the mark</p> <p><b>accept</b> in either order</p> <p>if symbols are used they must be correct</p>
		<p>ii</p> <p><math>2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2</math></p>	[3]	<p>left hand side species correct (1)</p> <p>do <b>not</b> allow NA for Na</p> <p>right hand side species correct (1)</p> <p>do <b>not</b> allow NaHO for NaOH</p> <p>equation balanced (1)</p> <p>no ecf but allow balancing mark if NA or NaHO or NAHO are correctly balanced</p> <p><b>ignore</b> state symbols eg aq</p>
		<p>iii</p> <p>reaction gives out energy / reaction gets hot / exothermic(1)</p>	[1]	
		<b>Total</b>	<b>[8]</b>	

Question		Expected Answers	Marks	Additional Guidance
6	a	opposite force eg counter force (1)  equal magnitude to driving force (direction not stated) (1)	[2]	<b>accept</b> anything which gives the idea of an opposing force eg friction, resistance, air resistance, drag, antagonising force, 'force from the other side of the bus' <b>ignore</b> 'reaction force' <b>accept</b> cancels out driving force / gives zero resultant force / forces are balanced <b>accept</b> 'equal force pushing it back' = 2
	b	 <p>distance in m</p> <p>time in s</p>	[2]	for any credit to be awarded for either mark, the line must reach 2 seconds OR 30 m <b>accept</b> hand-drawn if clearly intended to be straight one straight line through the origin = 1 mark correct gradient (30m increase in 2s, 60m in 4s, accurate to 1/10 <sup>th</sup> of a large square by eye) = 1 mark treat crosses as neutral neutral – line extends backwards past the origin a straight line which goes to at least 30m, 2 sec and then changes direction = 0 marks
Total			[4]	

Question		Expected Answers	Marks	Additional Guidance
7	a	B (1)	[1]	accept any clear indication of response
	b	72 000 (1)	[1]	accept any clear indication of response
	c	<div style="display: flex; justify-content: space-between;"> <div style="flex: 1;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">The gas is ...</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">The engine is ...</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">The force on the engine is ...</div> </div> <div style="flex: 1;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">... pushed forwards ...</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">... pushed backwards ...</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">... the same size ...</div> </div> </div>	[2]	<p>3 lines correct = 2 marks      2 lines correct = 1 mark      1 or 0 lines correct = 0 marks      if there is more than 1 line from any left hand box no credit can be given for that box</p>

Question		Expected Answers	Marks	Additional Guidance
7	d	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> The instantaneous speed ... <input checked="" type="checkbox"/> (1)	[1]	accept any clear indication of response more than 1 box ticked scores 0 marks
		<b>Total</b>	<b>[5]</b>	

8	a	C (1)	[1]	accept any clear indication of response
	b	Carlos (1)	[1]	accept any clear indication of response accept 2240J
	c		[1]	accept any clear indication of response
	d	<input type="checkbox"/> The reaction force ... <input checked="" type="checkbox"/> (1) As he hits the crash mat ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>	[2]	deduct 1 mark for every extra box ticked candidate cannot score less than zero marks
		<b>Total</b>	<b>[5]</b>	

# A216/01 Modules B5, C5, P5 Foundation Tier

Question			Expected Answers	Marks	Additional Guidance
1	a		CO <sub>2</sub> (1)	[1]	if more than one choice, no marks
	b		$  \begin{array}{c}  \text{H} - \text{O} \quad \quad \quad \text{O} - \text{H} \\  \quad \quad \diagup \quad \quad \quad \diagdown \\  \quad \quad \text{Si} \quad \quad \\  \quad \quad \diagdown \quad \quad \diagup \\  \text{H} - \text{O} \quad \quad \quad \text{O} - \text{H}  \end{array}  (1)  $	[1]	ring around middle choice if more than one choice, no marks
	c		... has a giant covalent structure. <input checked="" type="checkbox"/> (1)	[1]	if more than one choice, no marks
			<b>Total</b>	<b>[3]</b>	

Question		Expected Answers	Marks	Additional Guidance
2	a	<p>property</p> <p>why it is useful</p>	[3]	<p>all four property boxes have one line going to the correct place = 3 marks</p> <p>only three of the property boxes have one line going to the correct place = 2 marks</p> <p>only two of the property boxes have one line going to the correct place = 1 mark</p> <p>only one of the property boxes has one line going to the correct place = 0 marks</p>
	b	FeO (1)	[1]	if more than one choice, no marks
	c	D (1)	[1]	if more than one choice, no marks
	d i	g (1)	[1]	
	ii	carbon not reactive (enough) / metals (too) reactive / owtte (1)	[1]	<p>accept 'they are more reactive' as 'metals' is plural in the question</p> <p>accept 'it is not reactive' since this must refer to carbon</p>
	iii	aluminium (1)	[1]	If more than one choice, no marks.
	<b>Total</b>		[8]	
3		<p><b>any three from:</b></p> <p>indicates that ions are charged; (ions) can move; electrodes attract ... ; ... ions of opposite charge; (metal appears at) negative electrode/cathode; non-metal appears at other electrode;</p>	[3]	<p>accept an indication on the diagram for any of these points</p> <p>accept e.g. reference to opposites attracting</p>
		<b>Total</b>	[3]	

Question		Expected Answers	Marks	Additional Guidance
4	a		[2]	ammeter: correct symbol (capital A in circle) in correct place = 1 mark  voltmeter: correct symbol (capital V in circle) in correct place = 1 mark
	b	decreases increases	[1]	both required for mark
	c	charge amperes	[1]	both required for mark
		<b>Total</b>	[4]	

5	a	generator (1)	[1]	if more than one choice, no marks
	b	<b>any two from:</b> spin the magnet faster; use a stronger magnet; have more coils/turns (of wire); put some iron in the coil; move the magnet closer/inside the coil;	[2]	do <b>not</b> apply list principle - give marks for any valid different points <b>accept</b> 'spin it faster' or 'move it faster' is OK <b>not</b> 'bigger magnet' <b>not</b> 'coil(s) closer together' <b>allow</b> 'metal' for iron
	c	C (1)	[1]	if more than one choice, no marks
	d	There is now a current in the coil. <input checked="" type="checkbox"/> (1)  <input type="checkbox"/>  <input type="checkbox"/>	[1]	if more than one choice, no marks
		<b>Total</b>	[5]	

Question		Expected Answers	Marks	Additional Guidance
6	a	115 (1)	[1]	
	b	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">power</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">the push ...</div> </div> <div style="margin-top: 10px;"> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">voltage</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">the rate ...</div> </div> <div style="margin-top: 10px;"> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">current</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">the amount ...</div> </div> </div> </div>	[2]	<p>three lines correct = 2 marks      one or two lines correct = 1 mark      if more than one line from any left-hand box, <b>ignore</b> all lines from that box</p>
	c	1.2 (1)	[1]	
	d	Alan (1)	[1]	if more than one choice, no marks
		<b>Total</b>	[5]	

Question		Expected Answers		Marks	Additional Guidance
7	a		true      false ... the same number of ... <input type="checkbox"/> <input checked="" type="checkbox"/> ... produce gametes (sex cells). <input checked="" type="checkbox"/> <input type="checkbox"/> ... identical to the parent cell. <input checked="" type="checkbox"/> <input type="checkbox"/> ... different numbers of ... <input type="checkbox"/> <input checked="" type="checkbox"/>	[2]	four correct = 2 marks two or three correct = 1 mark
	b	i	body cell (1) mitosis (1) embryo (1)	[3]	
		ii	after the eight cell stage <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	[1]	if more than one choice, no marks
			<b>Total</b>	[6]	

Question		Expected Answers	Marks	Additional Guidance
8	a	<b>any two from:</b> (all) cells have the same (set of) genes; idea that different genes do different jobs; idea that gene can be switched on/off; some (genes switched on);	[2]	answer must refer to genes <b>ignore</b> 'different cells have different genes' <b>ignore</b> incorrect context eg 'different cells have different genes which do different jobs' = 1 mark for 2 <sup>nd</sup> marking point 'genes are switched on' = 1 mark 'some genes are switched on' = 2 marks 'some genes are switched off' = 2 marks 'the genes for making chlorophyll are switched on in the leaf not in the root' = 2 marks
	b	hormone/auxin/rooting powder (1)  meristem/unspecialised (cells) (1)	[2]	<b>accept</b> plant it / put in a dish of compost/nutrient/water <b>ignore</b> unqualified 'powder' <b>ignore</b> 'stem cells' <b>ignore</b> 'cut it down the middle'
<b>Total</b>			[4]	

9	a	nucleus (1)	[1]	
	b	cytoplasm/ribosome (1)	[1]	
	c	double two four	[2]	three correct = 2 marks one or two correct = 1 mark
<b>Total</b>			[4]	

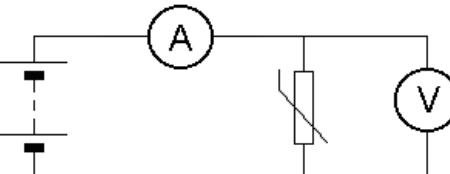
# A216/02 Modules B5, C5, P5 Higher Tier

Question		Expected Answers	Marks	Additional Guidance
1	a	<p>property</p> <p>why it is useful</p> <p>... conductor</p> <p>high melting ...</p> <p>malleable</p> <p>strong</p> <p>... roof supports</p> <p>... hammered ...</p> <p>... conductor</p> <p>... barbecues</p> <p>... magnets</p>	[3]	<p>all four property boxes have one line going to the correct place = 3 marks</p> <p>only three of the property boxes have one line going to the correct place = 2 marks</p> <p>only two of the property boxes have one line going to the correct place = 1 mark</p> <p>only one of the property boxes has one line going to the correct place = 0 marks</p>
	b	FeO (1)	[1]	
	c	<p>A D C B (1)</p>	[1]	
	d	56g (1)	[1]	

Question		Expected Answers	Marks	Additional Guidance
1	e	<p><b>any two from:</b>            (small) molecules;            (molecules/particles - <b>not</b> atoms) far apart;            weak forces (implied between carbon monoxide molecules <b>not</b> between atoms);            strong forces (implied inside carbon monoxide);            'covalent' used correctly;</p>	[2]	<p><b>accept</b> bonds 'loose'</p> <p>assume the candidate is discussing bonds holding atoms within the molecule unless stated otherwise            one mark for each correct point which has not been contradicted</p> <p><b>ignore</b> pairs of statements which are contradictory  <b>ignore</b> incorrect statements which do not contradict a correct statement  <b>allow</b> the word 'bond' for any interaction</p>
	f	<p>contains electrons <input checked="" type="checkbox"/></p> <p>contains positive ions <input checked="" type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/></p> <p>...electrons are free to move <input checked="" type="checkbox"/>  <input type="checkbox"/></p>	[2]	<p>3 correct = 2 marks            2 correct = 1 mark            1 correct = 0 marks</p> <p>if more than three ticks, each extra tick cancels out one correct marking point</p>

Question		Expected Answers	Marks	Additional Guidance
1	g	<p>(electrolyte) is ionic / contains ions / charged particles(1)</p> <p>movement (of particles mentioned above) (1)</p> <p>(attracted to/move) towards the electrodes (1)</p>	[3]	<p>particles become charged = contradiction</p> <p><b>reject</b> electrons/atoms/molecules/neutrons for first marking point only but allow 'protons'</p> <p><b>allow</b> named examples eg sodium ions and chloride ions</p> <p><b>allow</b> 'contains positive ions' or 'contains negative ions'</p> <p><b>ignore</b> attraction for the 'movement' marking point</p> <p><b>ignore</b> incorrect directions eg 'positive particles to anode'</p> <p>'electrons move towards electrodes' = 2 marks</p> <p>'ion free to move but stay in a regular pattern' = 1 for ions contradiction for movement</p>
		<b>Total</b>	<b>[13]</b>	

Question		Expected Answers	Marks	Additional Guidance
2	a	<p>chemically unreactive <input checked="" type="checkbox"/></p> <p>high melting point <input checked="" type="checkbox"/></p> <p>good thermal insulator <input checked="" type="checkbox"/></p> <p><input type="checkbox"/></p>	[1]	
	b	<p>electrostatic repulsion</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p>electrons and nuclei</p>	[1]	there must be the one correct line only
		<b>Total</b>		[2]

Question		Expected Answers	Marks	Additional Guidance
3	a		[2]	ammeter: correct symbol (capital A in circle) in correct place = 1 mark voltmeter: correct symbol (capital V in circle) in correct place = 1 mark
	b	decreases increases	[1]	both correct = 1 mark <b>accept</b> any unambiguous response
	c	charge amperes	[1]	both correct = 1 mark <b>accept</b> any unambiguous response
		<b>Total</b>	[4]	

Question		Expected Answers	Marks	Additional Guidance
4	a	<p><b>maximum of three marks made up of</b></p> <p><b>any two from:</b></p> <p>any important property of the magnet eg polarity / distance (from coil) / direction of movement (but not direction of spin); reference to movement of magnet / change in magnetism, including 'spin' of the magnet; effect of speed of movement; the current /voltage/electrons change direction;</p> <p><b>and any three from:</b></p> <p>explains reversal of current/voltage (not just change) / links reversal of current to each half turn of the magnet; use of high level term – 'induction'; use of high level term - '(magnetic) field'</p>	[3]	<p>unspecified 'it' refers to the magnet</p> <p><b>ignore</b> attraction and repulsion by or to the magnet <b>ignore</b> reference to the word 'charge' in connection with the magnet <b>ignore</b> reference to 'ends' of the magnet <b>reject</b> 'the coil makes the magnet move' (wrong causality)</p> <p><b>examples:</b> 'different ends of the magnet have different charge' = 0 marks 'different ends of the magnet have different charged poles' = 1 mark 'moving magnet makes electric current' = 1 mark 'moving magnet makes electrons move backwards and forwards' = 2 marks (reversal not explained) 'as the magnet spins the coil of wire is attracted and repelled' = 2 marks 'as one pole of the magnet enters the coil, the direction of the current goes one way, as the opposite enters, the current is sent in the opposite direction' = 3 marks 'the current changes direction' = 1 mark 'the current changes direction for every half turn of the magnet' = 2 marks</p>
	b	a.c. moving	[1]	<b>accept</b> any unambiguous response
	c	0.5 A (1)	[1]	
		<b>Total</b>	[5]	

Question		Expected Answers	Marks	Additional Guidance						
5	a	0.65 (2) if answer wrong look for working for maximum of 1 mark $\frac{150}{230} \text{ (1)}$	[2]	correct numerical answer with no working = 2 marks <b>accept</b> answers from 0.6 – 0.7  if no numerical working given <b>accept</b> $I=P/V$ (1) <b>ignore</b> $P=IV$						
	b	5% (1)	[1]							
	c	a.c. is easier to generate than d.c.  ... distributed more efficiently ...	[1]							
	d	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>current</td> <td>increases</td> </tr> <tr> <td>resistance</td> <td>decreases</td> </tr> <tr> <td>potential difference</td> <td>stays the same</td> </tr> </table>	current	increases	resistance	decreases	potential difference	stays the same	[1]	
current	increases									
resistance	decreases									
potential difference	stays the same									
		Total	[5]							

Question		Expected Answers	Marks	Additional Guidance										
6	a	<table border="1"> <thead> <tr> <th>base</th><th>% present</th></tr> </thead> <tbody> <tr> <td>C</td><td>20</td></tr> <tr> <td>A</td><td>30</td></tr> <tr> <td>T</td><td>30</td></tr> <tr> <td>G</td><td>20</td></tr> </tbody> </table>	base	% present	C	20	A	30	T	30	G	20	[1]	
base	% present													
C	20													
A	30													
T	30													
G	20													
	b	i amino acids (1)	[1]	if answer not on dotted line, look for a ringed word										
		ii ... are made in the cytoplasm. <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>  A copy of the gene carries ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>	[2]	if more than two ticks, each extra tick cancels out one correct marking point										
		Total	[4]											

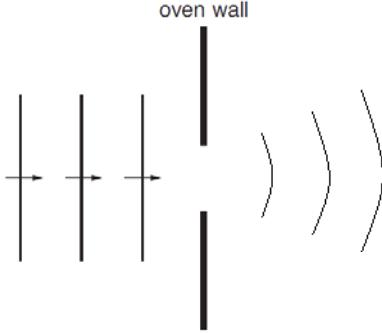
Question		Expected Answers	Marks	Additional Guidance
7	a	<b>any two from:</b> (all) cells have the same (set of) genes; idea that different genes do different jobs; idea that gene can be switched on/off; some (genes switched on);	[2]	answer must refer to genes <b>ignore</b> 'different cells have different genes' <b>ignore</b> incorrect context eg 'different cells have different genes which do different jobs' = 1 mark for 2 <sup>nd</sup> marking point 'genes are switched on' = 1 mark 'some genes are switched on' = 2 marks 'some genes are switched off' = 2 marks 'the genes for making chlorophyll are switched on in the leaf not in the root' = 2 marks
	b	hormone/auxin/rooting powder (1)  meristem/unspecialised (cells) (1)	[2]	<b>accept</b> plant it / put in a dish of compost/nutrient/water <b>ignore</b> unqualified 'powder' <b>ignore</b> 'stem cells' <b>ignore</b> 'cut it down the middle'
<b>Total</b>			[4]	

8	a	B (1)	[1]	<b>accept</b> any unambiguous response
	b	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>E</span> <span>C</span> <span>A</span> </div> (2)	[2]	ACE in incorrect order = 1 mark any letters incorrect = 0 marks
	c	Amelia (1) Sam (1)	[2]	any order <b>accept</b> any unambiguous response <b>accept</b> 'A' and 'S'
<b>Total</b>			[5]	

# A217/01 Modules B6, C6, P6 Foundation Tier

Question		Expected Answers						Marks	Additional Guidance
1	a	<input type="checkbox"/> radio <input checked="" type="checkbox"/> micro wave <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> visible <input type="checkbox"/> <input type="checkbox"/> X-ray <input type="checkbox"/>						[1]	accept any clear and unambiguous response
	b	transmitter (1) modulate (1) decreases (1)						[3]	
	c	It is easier to remove ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>						[1]	more than 1 response = 0 marks accept any other clear response eg underlined or ticked statements, crosses, shaded in boxes (if no other type of response shown in boxes)
		<b>Total</b>						[5]	

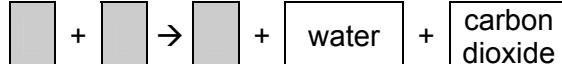
Question		Expected Answers	Marks	Additional Guidance
2	a	refracted (1) reflected (1)	[2]	one mark for each correct response more than 1 response for each dotted line = 0 marks (for line) <b>accept</b> any other clear response eg lines linking words to spaces <b>accept</b> phonetic spelling
	b	The angle of refraction of ...  <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	[1]	more than 1 response = 0 marks <b>accept</b> any other clear response eg underlined or ticked statements, crosses, shaded in boxes (if no other type of response shown in boxes)
	c	Bess (1)	[1]	<b>accept</b> any other clear response eg lines linking words to spaces or tick at talking head
		<b>Total</b>	[4]	

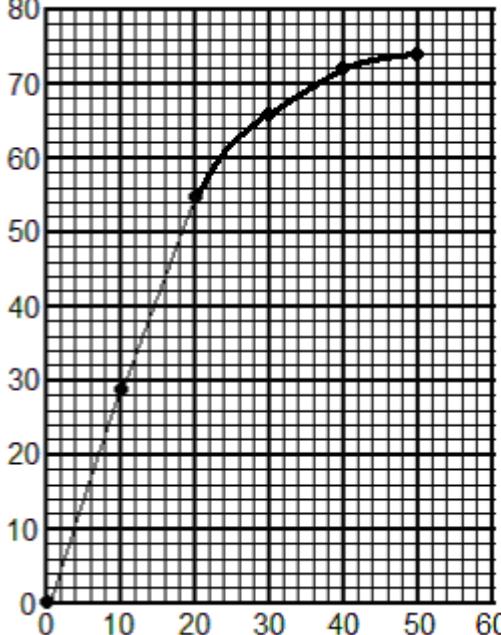
Question		Expected Answers	Marks	Additional Guidance
3	a	(the energy) increases (1) (the speed) stays the same (1)	[2]	<b>accept</b> more energy = energy increases <b>reject</b> <u>use</u> more energy <b>reject</b> speed increases
	b		[1]	look for at least one wavefront on the right-hand side of the hole, curved as shown – must have at least one solid (not broken) line <b>ignore</b> incorrect spacing between wavefronts/ additional arrows
	c	<b>any two from:</b> food absorbs <u>microwaves</u> ; because food contains water; plate does not absorb <u>microwaves</u> ; because plate does not contain water; not enough time for <u>heat</u> to conduct from food to plate;	[2]	<b>ignore</b> references to heat (except final marking option) <b>ignore</b> references to energy (except heat energy, final marking point) <b>accept</b> photons = microwave <b>accept</b> moisture = water <b>accept</b> <u>microwave</u> passes straight through / reflected/bounced off
		<b>Total</b>	[5]	

Question		Expected Answers	Marks	Additional Guidance
4	a	reflex sensory muscles motor	[3]	4 correct = 3 marks 3 correct = 2 marks 2 correct = 1 mark 1 or 0 correct = 0 marks <b>accept</b> any other clear response eg lines linking words to spaces <b>accept</b> phonetic spelling
	b	... pathways between the neurons. <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	[1]	more than 1 response = 0 marks  <b>accept</b> any other clear response eg underlined or ticked statements, crosses, shaded in boxes (if no other type of response shown in boxes)
Total		[4]		

Question		Expected Answers	Marks	Additional Guidance
5	a	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">           muscle cells ...         </div> <div style="border: 1px solid black; padding: 5px; text-align: center;">           processor         </div> <div style="border: 1px solid black; padding: 5px; text-align: center;">           light sensitive ...         </div> <div style="border: 1px solid black; padding: 5px; text-align: center;">           effector         </div> <div style="border: 1px solid black; padding: 5px; text-align: center;">           central nervous ...         </div> <div style="border: 1px solid black; padding: 5px; text-align: center;">           receptor         </div> </div>	[2]	3 correct lines = 2 marks 1 or 2 correct lines = 1 mark lines need not be straight
	b	<b>i</b> any two from: startle; stepping; grasping/holding/gripping a person's finger; foot/toes curling;	[2]	<b>accept</b> descriptions of reflexes instead of names for full marks  <b>accept</b> walking motion = stepping <b>ignore</b> rooting/sucking <b>accept</b> bending of toes = foot curling
		<b>ii</b> gag / blink / knee jerk (1)	[1]	<b>reject</b> iris contraction/ pupil reflex <b>allow</b> description of reflexes instead of name for one mark <b>ignore</b> taking hand away from hot/sharp object, sucking, swimming
<b>Total</b>			[5]	

6	a	cortex (1)	[1]	<b>accept</b> any clear and unambiguous response eg. underlined
	b		[2]	1 mark for each correct response more than 2 responses, deduct 1 mark for each additional response
MRI scans		<input type="checkbox"/>		
electrical stimulation		<input checked="" type="checkbox"/> (1)		
<b>Total</b>			[3]	

Question		Expected Answers	Marks	Additional Guidance
7		electrical synapses speeds up		[2] 3 correct = 2 marks 2 correct = 1 mark 1 or 0 correct = 0 marks
		<b>Total</b>		[2]
8	a	Bubbles appear in the liquid. <input checked="" type="checkbox"/> (1)  <input type="checkbox"/>  <input type="checkbox"/>	[1]	more than 1 response = 0 marks <b>accept</b> any other clear response eg underlined or ticked statements, crosses, shaded in boxes (if no other type of response shown in boxes)
	b	i 	[1]	2 correct responses = 1 mark <b>must</b> be in the correct order <b>accept</b> phonetic spelling <b>allow</b> hydrogen oxide for water <b>reject</b> carbon oxide
		ii Solid is left in the beaker. <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>	[1]	more than 1 response = 0 marks <b>accept</b> any other clear response eg underlined or ticked statements, crosses, shaded in boxes (if no other type of response shown in boxes)
		iii  <input type="checkbox"/>  <input type="checkbox"/>  evaporate some of the water <input checked="" type="checkbox"/> (1)  <input type="checkbox"/>	[1]	more than 1 response = 0 marks <b>accept</b> any other clear response eg underlined or ticked statements, crosses, shaded in boxes (if no other type of response shown in boxes)
		<b>Total</b>		[4]

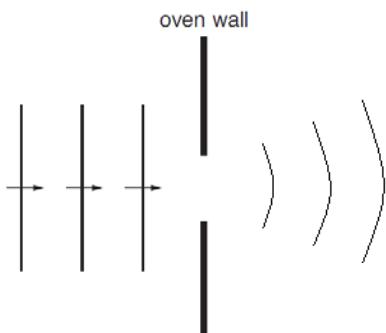
Question		Expected Answers	Marks	Additional Guidance	
9	a	<b>any two from:</b> increase <u>concentration</u> of (hydrochloric) acid; raise temperature; decrease particle size / increase surface area of particles; add catalyst; stir/agitate;	[1]	2 correct responses = 1 mark <b>accept</b> chemical = acid <b>accept</b> stronger acid = increase concentration of acid <b>ignore</b> more acid / more carbonate <b>accept</b> heat / warm up = raise temperature	
	b	i		[2]	points plotted within one square = 1 mark clear attempt to join points with a <u>smooth curve</u> = 1 mark <b>ignore</b> extended curve beyond final plot <b>allow</b> ecf from incorrectly plotted points for the correct curve = 1 mark max
		ii	acid <u>concentration</u> falls / copper carbonate runs out/used up / reactants used up (1)	[1]	<b>ignore</b> gas/CO <sub>2</sub> runs out/used up <b>ignore</b> less energy <b>ignore</b> less acid <b>accept</b> less (copper) carbonate/particles to react with <b>accept</b> no acid/carbonate left to react with = reactants used up
			Total	[4]	

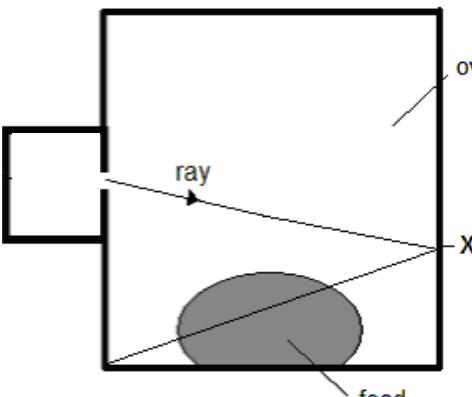
Question		Expected Answers	Marks	Additional Guidance
10	a	i 2 (1)	[1]	more than 1 response = 0 marks
		ii 3 (1)	[1]	more than 1 response = 0 marks
	b	i how fast the reaction goes <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	[1]	more than 1 response = 0 marks <b>accept</b> any other clear response eg underlined or ticked statements, crosses, shaded in boxes (if no other type of response shown in boxes)
		ii <input type="checkbox"/> <input type="checkbox"/> Catalysts speed up a reaction. <input checked="" type="checkbox"/> Catalysts are not used up ... <input checked="" type="checkbox"/>	[1]	2 correct responses = 1 mark more than 2 responses = 0 marks <b>accept</b> any other clear response eg underlined or ticked statements, crosses, shaded in boxes (if no other type of response shown in boxes)
		iii not enough ... safety valves ... tanks not ... reaction too fast reaction too slow	[2]	3 correct lines = 2 marks 1 or 2 correct lines = 1 mark
		<b>Total</b>	[6]	

# A217/02 Modules B6, C6, P6 Higher Tier

Question		Expected Answers	Marks	Additional Guidance
1	a	modulates transmits decodes	[2]	all three correct = 2 marks any two correct = 1 mark
	b	<b>any three from:</b> digital uses pulses / binary / 1 & 0 / on & off; noise/interference added to signal; noise/interference reduces quality; pulses can be restored/recognised; noise/interference can be removed;	[3]	<b>accept</b> a picture of a digital wave  <b>accept</b> eg hiss / static / crackles / distortion as noise <b>accept</b> less clear as reduced quality
<b>Total</b>			[5]	

2	a	refracted (1) reflected (1)	[2]	
	b	<input type="checkbox"/> <input type="checkbox"/> The angle of refraction ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	[1]	
	c	Bess (1)	[1]	
<b>Total</b>			[4]	

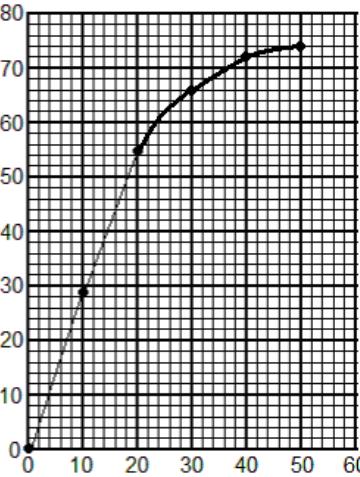
Question		Expected Answers	Marks	Additional Guidance	
3	a	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ... decreasing the wavelength .. <input checked="" type="checkbox"/> (1) ... increasing the rate ... <input checked="" type="checkbox"/> (1)	[2]	correct pattern = 2 marks one mistake = 1 mark a mistake is <ul style="list-style-type: none"> <li>• a tick in the wrong box</li> <li>• a missing tick</li> <li>• an extra tick</li> </ul>	
	b	i		[1]	look for at least one wavefront on the right-hand side of the hole, curved as shown – must have at least one solid (not broken) line <b>ignore</b> incorrect spacing between wavefronts/ additional arrows

Question			Expected Answers	Marks	Additional Guidance
3	b	ii		[1]	<p>look for a continuous straight line from the hole to X and then from X to the food - anywhere from grazing top of the food to where it meets the base of the food on the right</p> <p>does not have to go past the surface of the food</p> <p>must have no obvious gap or discontinuity from arrow head to the food</p> <p><b>accept</b> one line width mismatch in reflection at X</p> <p><b>ignore</b> rays reflected off surface of the food</p> <p><b>do not</b> accept lines clearly drawn without a ruler</p>
	c		absorb interfere	[1]	both required for mark
			<b>Total</b>	<b>[5]</b>	

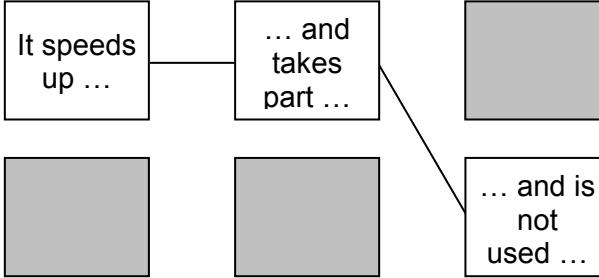
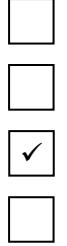
Question		Expected Answers	Marks	Additional Guidance
4	a	i B (1)	[1]	accept response on the diagram
		ii 2 m/s (1)	[1]	
		iii any two from: (electrically) insulate the nerve cell; prevent impulses getting into other cells; prevent impulses coming from other cells;	[2]	not to protect the cell / keep it warm ignore reference to speeding up the impulse
		iv (hormone) secreting (cell) (1)	[1]	accept gland / glandular / hormone (cell) ignore name of the gland eg pituitary, adrenal
	b	peripheral synapse diffusion specific	[2]	all four correct = 2 marks any three correct = 1 mark
		<b>Total</b>	[7]	

5	a		reflex sensory muscles motor	[3]	all four correct = 3 marks three correct = 2 marks two correct = 1 mark
	b	i	... pathways between the neurons. <input checked="" type="checkbox"/> (1)  <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	[1]	
		ii	through another neuron (to the motor neuron of the reflex arc) (1)	[1]	accept by using a different neuron pathway accept by creating a neuron pathway not a sensory neuron accept nerve if no mention of neurons then no marks
			<b>Total</b>	[5]	

Question		Expected Answers	Marks	Additional Guidance
6	a	cerebral cortex (1)	[1]	
	b	there is a pattern in the numbers (1)	[1]	<b>accept</b> valid description of the pattern eg all end in 58, first number goes 1, 2, 3 ... <b>ignore</b> references to amount of information to remember
<b>Total</b>			[2]	

7	a	<b>any three from:</b> increase <u>concentration</u> of (hydrochloric) acid; raise temperature; decrease particle size / increase surface area of particles; add catalyst; stir/agitate;	[2]	any three correct = 2 marks any two correct = 1 mark <b>accept</b> heat warm up = raise temperature <b>ignore</b> more acid / more carbonate mark the first three responses only
	b	i		points plotted within one square = 1 mark clear attempt to join points with a <u>smooth curve</u> = 1 mark <b>ignore</b> extended curve beyond final plot <b>allow</b> ecf from incorrectly plotted points for the correct curve = 1 mark max
		ii	acid <u>concentration</u> falls / copper carbonate runs out/used up / reactants used up (1)	<b>ignore</b> gas/CO <sub>2</sub> runs out/used up <b>ignore</b> less energy <b>ignore</b> less acid <b>accept</b> less (copper) carbonate/particles to react with <b>accept</b> no acid/carbonate left to react with = reactants used up
<b>Total</b>			[5]	

Question		Expected Answers	Marks	Additional Guidance
8	a		[3]	second box has $\text{HCl}$ (with correct use of capitals and no subscripts) = 1 mark last two boxes have $\text{H}_2\text{O}$ and $\text{CO}_2$ in any order (with correct capitals and subscripts) = 1 mark second box has 2 in front of formula (whether right or wrong) and none of the other boxes have numbers in front of formula = 1 mark
	b	hydrogen ions (1)	[1]	
	c		[2]	correct pattern = 2 marks first box B and last box either A or D = 1 mark (ignore the other boxes)
	d	59 (1)	[1]	
		<b>Total</b>	[7]	

Question		Expected Answers	Marks	Additional Guidance
9	a		[1]	correct pattern of lines = 1 mark
	b	<p>... produced per second. <input checked="" type="checkbox"/> (1)</p> 	[1]	
Total			[2]	

# Grade Thresholds

General Certificate of Secondary Education  
 GCSE Twenty First Century Additional Science A (J631)  
 January 2010 Examination Series

## Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
A215/01	Raw	42				23	19	15	11	7	0
	UMS	34				30	25	20	15	10	0
A215/02	Raw	42	28	23	18	13	9	7			0
	UMS	50	45	40	35	30	25	20			0
A216/01	Raw	42				23	19	15	11	7	0
	UMS	34				30	25	20	15	10	0
A216/02	Raw	42	29	24	19	14	10	8			0
	UMS	50	45	40	35	30	25	20			0
A217/01	Raw	42				23	18	14	10	6	0
	UMS	34				30	25	20	15	10	0
A217/02	Raw	42	32	27	20	14	10	8			0
	UMS	50	45	40	35	30	25	20			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
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	0.0	0.0	0.0	26.7	93.3	93.3	100.0	100.0	100.0	15

**332 candidates were entered for aggregation this series.**

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

Statistics are correct at the time of publication.

**OCR (Oxford Cambridge and RSA Examinations)**  
1 Hills Road  
Cambridge  
CB1 2EU

**OCR Customer Contact Centre**

**14 – 19 Qualifications (General)**

Telephone: 01223 553998  
Facsimile: 01223 552627  
Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

**www.ocr.org.uk**

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

**Oxford Cambridge and RSA Examinations**  
is a Company Limited by Guarantee  
Registered in England  
Registered Office: 1 Hills Road, Cambridge, CB1 2EU  
Registered Company Number: 3484466  
OCR is an exempt Charity

**OCR (Oxford Cambridge and RSA Examinations)**  
Head office  
Telephone: 01223 552552  
Facsimile: 01223 552553

