

Additional Science A

General Certificate of Secondary Education

Unit **A215/02**: Modules B4, C4, P4

Mark Scheme for June 2012

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

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

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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

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Annotations

Used in the detailed Mark Scheme:

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

Available in scoris to annotate scripts

Annotation	Meaning
	indicate uncertainty or ambiguity
	benefit of doubt
	contradiction
	incorrect response
	error carried forward
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response

Annotation	Meaning
	no benefit of doubt
	reject
	correct response
	draw attention to particular part of candidate's response
	information omitted

Subject-specific Marking Instructions

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

Eg

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

This would be worth 1 mark.

c. 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, eg 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.

d. 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, eg 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.

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).

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

- e. For answers marked by levels of response:
- Read through the whole answer from start to finish**
 - Decide the level that best fits** the answer – match the quality of the answer to the closest level descriptor
 - To determine the mark within the level**, consider the following:

Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

- iv. Use the **L1**, **L2**, **L3** annotations in Scoris to show your decision; do not use ticks.

Quality of Written Communication skills assessed in 6-mark extended writing questions include:

- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Question			Answer	Marks	Guidance
1	(a)	(i)	it is [all] (re)absorbed	1	ignore diffusion allow "goes into blood/veins" ignore "goes into body"
		(ii)	salt, urea	1	both needed for the mark
	(b)		concentrated: A,C,D dilute: B	2	all correct = 2 marks 3 correct = 1 mark
	(c)	(i)	pituitary	1	
		(ii)	E C A	1	
Total				6	

Question			Answer	Marks	Guidance										
2	(a)		any three from: sweat was produced to cool down; became dehydrated owtte; (as his body ran out of water) could no longer produce sweat; (when not producing sweat) could not cool down; so temperature rose more/ he has heat stroke;	3	accept idea of need to conserve water										
		(b)	<table border="1"> <tbody> <tr> <td>give him food</td> <td></td> </tr> <tr> <td>sponge him with water</td> <td>✓</td> </tr> <tr> <td>give him alcoholic drinks</td> <td></td> </tr> <tr> <td>handle him gently to keep blood flowing to the limbs low</td> <td></td> </tr> <tr> <td>use a fan</td> <td>✓</td> </tr> <tr> <td>insulate him</td> <td></td> </tr> </tbody> </table>	give him food		sponge him with water	✓	give him alcoholic drinks		handle him gently to keep blood flowing to the limbs low		use a fan	✓	insulate him	
give him food															
sponge him with water	✓														
give him alcoholic drinks															
handle him gently to keep blood flowing to the limbs low															
use a fan	✓														
insulate him															
Total				4											

Question		Answer	Marks	Guidance
3	(a)	active site	1	
	(b)	any three from: raising temperature can <u>denature</u> the enzyme; causes changes to shape of active site; substrate no longer fits; enzyme stops working / fewer effective enzyme molecules; denaturation / damage to enzyme is permanent;	3	accept "changes shape of enzyme"
Total			4	

Question		Answer	Marks	Guidance								
4	(a)	84-145	1	[Actual MPt of sodium. = 97.8, mean of Li & K = 121, mean +/- 24 = 97-145]								
	(b)	<table border="1" style="margin-left: 20px;"> <thead> <tr> <th>particle</th> <th>number</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td>11</td> </tr> <tr> <td>neutron(s)</td> <td></td> </tr> </tbody> </table>	particle	number				11	neutron(s)		1	both answers for 1 mark
particle	number											
	11											
neutron(s)												
	(c)	NaOH	1									
Total			3									

Question		Answer	Marks	Guidance																					
5	(a)	<p>any three from:</p> <p>flame colour;</p> <p>discusses difference in colour [for different elements] OR gives the colour for sodium [yellow or orange];</p> <p>characteristic spectrum;</p> <p>lines in the spectrum;</p>	3	<p>[individual colours are not on the spec, but give credit as it shows realisation that flame colour is characteristic]</p> <p>'yellow flame' = 2 marks [flame colour, and correct colour]</p>																					
	(b)	<table border="1"> <thead> <tr> <th></th> <th>true</th> <th>false</th> </tr> </thead> <tbody> <tr> <td>... the ions move freely</td> <td>✓</td> <td></td> </tr> <tr> <td>... the ions turn into atoms</td> <td></td> <td>✓</td> </tr> <tr> <td>... hydrogen gas is produced</td> <td></td> <td>✓</td> </tr> <tr> <td>... solution will conduct electricity</td> <td>✓</td> <td></td> </tr> <tr> <td>... the ions separate</td> <td>✓</td> <td></td> </tr> <tr> <td>... float on the surface and react</td> <td></td> <td>✓</td> </tr> </tbody> </table>		true	false	... the ions move freely	✓		... the ions turn into atoms		✓	... hydrogen gas is produced		✓	... solution will conduct electricity	✓		... the ions separate	✓		... float on the surface and react		✓	2	<p>all 6 lines correct = 2</p> <p>4 or 5 correct = 1</p>
	true	false																							
... the ions move freely	✓																								
... the ions turn into atoms		✓																							
... hydrogen gas is produced		✓																							
... solution will conduct electricity	✓																								
... the ions separate	✓																								
... float on the surface and react		✓																							
	(c)	3-	1																						
Total			6																						

Question		Answer	Marks	Guidance
6	(a)	chlorine bromine iodine	1	
	(b)	→ iodine + sodium chloride	1	products may be either way round and 'iodine' NOT 'iodide' and "chloride" NOT "chlorine"
	(c)	$\text{Br}_2 + 2\text{NaI} \rightarrow 2\text{NaBr} + \text{I}_2$	3	NaBr(1) I_2 (1), balanced (1)
Total			5	

Question		Answer	Marks	Guidance
7	(a)	Carlo	1	correct answer is 216.7N
	(b)	counter driving	1	both needed in the correct order to earn the mark
	(c)	momentum decreases during collision; crumpling increases time of collision; force is rate of change of momentum;	3	accept correct reference to impulse
Total			5	

Question		Answer	Marks	Guidance	
8	(a)	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; width: 150px;"> <p style="text-align: center; margin: 0;">force</p> <p style="margin: 2px 0;">friction from table</p> <p style="margin: 2px 0;">weight of block</p> <p style="margin: 2px 0;">reaction from table</p> </div> <div style="border: 1px solid black; padding: 5px; width: 100px;"> <p style="text-align: center; margin: 0;">direction</p> <p style="text-align: center; margin: 2px 0;">↑</p> <p style="text-align: center; margin: 2px 0;">→</p> <p style="text-align: center; margin: 2px 0;">↓</p> <p style="text-align: center; margin: 2px 0;">←</p> </div> </div>	1	correct pattern for [1]	
	(b)	<p>The kinetic energy of the block ... <input type="checkbox"/></p> <p>The block cools down as it heats ... <input type="checkbox"/></p> <p>Bill transfers energy to the block ... <input checked="" type="checkbox"/></p> <p>Bill does no work because the <input type="checkbox"/></p> <p>The gravitational potential energy ... <input type="checkbox"/></p> <p>Friction transfers energy as heat ... <input checked="" type="checkbox"/></p>	2	correct pattern for [2] one mistake for [1]	
	(c)	(i)	1.35 J	1	
		(ii)	momentum	1	
Total			5		

Question		Answer	Marks	Guidance
9	(a)	10 m/s	1	reject -10 m/s
	(b)		2	<p>straight line with any gradient going the full width of the graph [1]</p> <p>starts at -15 m/s at 2.0 s and ends at 0 m/s at 3.5 s for [1]</p> <p>can be a curve, can change gradient, but must not hit 0m/s before 3.5s.</p>
	(c)	increases; decreases;	1	
Total			4	

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