

**Additional Science A**

General Certificate of Secondary Education

Unit **A215/01**: 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.

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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
<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
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

<b>Edinburgh</b>	
<b>Manchester</b>	
<b>Paris</b>	
<b>Southampton</b>	

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).

<b>Edinburgh</b>			✓			✓	✓	✓	✓	
<b>Manchester</b>	✓	x	✓	✓	✓				✓	
<b>Paris</b>				✓	✓		✓	✓	✓	
<b>Southampton</b>	✓	x		✓		✓	✓		✓	
<b>Score:</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NR</b>

- e. For answers marked by levels of response:
- i. **Read through the whole answer from start to finish**
  - ii. **Decide the level that best fits** the answer – match the quality of the answer to the closest level descriptor
  - iii. **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)	receptor/sensor detects stimuli / temperature (OWTTE);  processor deals with information / signals (OWTTE);  effectors / change the temperature / produce a response (OWTTE);	3	Use of the words 'senses', 'processes', 'effects' must be qualified <b>allow</b> change in temperature / hot / cold / heat  <b>allow</b> 'is like the brain' <b>allow</b> receives and/or sends information  <b>allow</b> example of a response eg turns heater off/on <b>allow</b> 'are like the muscles'
	(b)	sweating	1	
<b>Total</b>			<b>4</b>	


Question		Answer	Marks	Guidance
2	(a) (i)	it is <b>[all]</b> (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: <b>A,C,D</b> dilute: <b>B</b>	2	all correct = 2 marks 3 correct = 1 mark
<b>Total</b>			<b>4</b>	

Question		Answer	Marks	Guidance																						
3	(a)	<table border="1"> <tr><td>less than</td><td></td></tr> <tr><td>more than</td><td></td></tr> <tr><td>equal to</td><td>✓</td></tr> <tr><td></td><td></td></tr> <tr><td>less than</td><td>✓</td></tr> <tr><td>more than</td><td></td></tr> <tr><td>equal to</td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>hypothermia</td><td>✓</td></tr> <tr><td>hypothalamus</td><td></td></tr> <tr><td>homeostasis</td><td></td></tr> </table>	less than		more than		equal to	✓			less than	✓	more than		equal to				hypothermia	✓	hypothalamus		homeostasis		3	1 mark for each correct response
less than																										
more than																										
equal to	✓																									
less than	✓																									
more than																										
equal to																										
hypothermia	✓																									
hypothalamus																										
homeostasis																										
	(b)	<p>any 3 from temperature rises;</p> <p>molecules move more quickly / have more energy;</p> <p>more collisions lead to reaction / collisions more frequent;</p> <p>faster reaction;</p> <p>implication that there is a temperature that enzymes work best (ORA)</p>	3	<p><b>accept</b> 'he warms up'</p> <p><b>ignore</b> no longer have hypothermia</p> <p><b>accept</b> enzymes move more quickly</p> <p><b>allow</b> enzymes work faster</p> <p><b>allow</b> enzymes have an optimum / correct / right / best temperature (better/certain/specific temperature alone not enough)</p> <p><b>reject</b> quoted temperature unless 36 – 37 °C</p>																						
<b>Total</b>			<b>6</b>																							

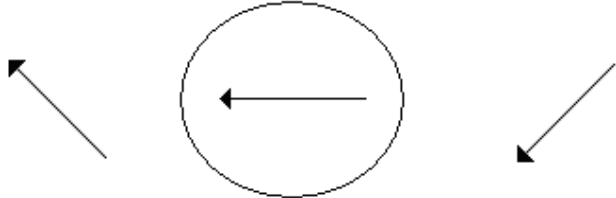
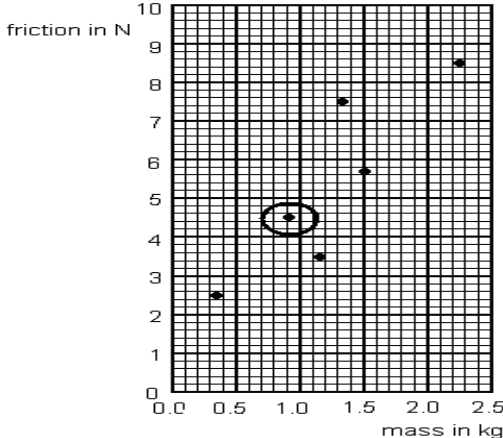


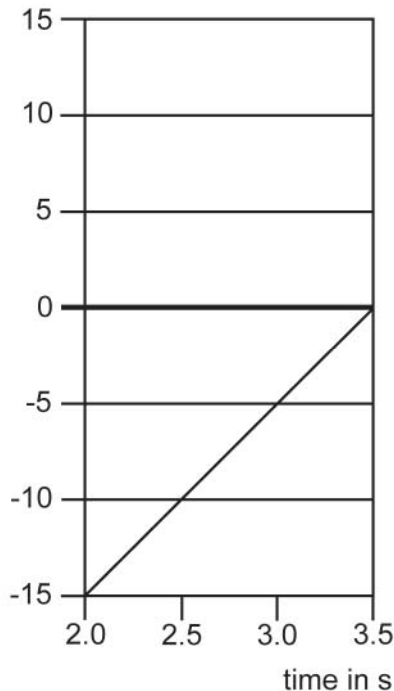
Question		Answer	Marks	Guidance								
4	(a)	<table border="1"> <tr><td>blue</td><td></td></tr> <tr><td>brown</td><td></td></tr> <tr><td>green</td><td></td></tr> <tr><td>colourless</td><td>✓</td></tr> </table>	blue		brown		green		colourless	✓	1	
blue												
brown												
green												
colourless	✓											
	(b)	<p><b>any three from:</b></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>								
	(c)	<table border="1"> <tr><td>Solid sodium chloride always conducts electricity.</td><td></td></tr> <tr><td>Solid sodium chloride often conducts electricity.</td><td></td></tr> <tr><td>Melted sodium chloride conducts electricity.</td><td>✓</td></tr> <tr><td>Sodium chloride solution conducts electricity.</td><td>✓</td></tr> </table>	Solid sodium chloride always conducts electricity.		Solid sodium chloride often conducts electricity.		Melted sodium chloride conducts electricity.	✓	Sodium chloride solution conducts electricity.	✓	1	both answers needed for mark (ticks in 3 <sup>rd</sup> and 4 <sup>th</sup> boxes)
Solid sodium chloride always conducts electricity.												
Solid sodium chloride often conducts electricity.												
Melted sodium chloride conducts electricity.	✓											
Sodium chloride solution conducts electricity.	✓											
<b>Total</b>			<b>5</b>									

Question		Answer	Marks	Guidance
5	(a)	84-145	1	[Actual MPt of sodium. = 97.8, mean of Li & K = 121, mean +/- 24 = 97-145]
	(b)	(i) 11	1	
		(ii) neutrons	1	
	(c)	2.8	1	
	(d)	NaOH	1	
		<b>Total</b>	<b>5</b>	

Question		Answer	Marks	Guidance								
6	(a)	<table border="1"> <tr> <td>wear gloves</td> <td></td> </tr> <tr> <td>wear a lab coat</td> <td></td> </tr> <tr> <td>use a fume cupboard</td> <td>✓</td> </tr> <tr> <td>tie any long hair back</td> <td></td> </tr> </table>	wear gloves		wear a lab coat		use a fume cupboard	✓	tie any long hair back		1	
wear gloves												
wear a lab coat												
use a fume cupboard	✓											
tie any long hair back												
	(b)	<div style="text-align: center;">  </div> (tick in 4 <sup>th</sup> box)	1	<b>accept</b> symbol drawn on the bottle itself.								
	(c)	chlorine bromine iodine	1	all 3 needed for 1 mark <b>not</b> ....ide <b>accept</b> Cl <sub>2</sub> /Cl etc								
	(d)	chlorine + sodium iodide → iodine + sodium chloride	1	reactants may be either way round products may be either way round 'ide' and 'ine' endings must be correct if symbol equation given, must be completely correct Cl <sub>2</sub> + 2NaI → I <sub>2</sub> + 2NaCl								
		<b>Total</b>	<b>4</b>									

Question		Answer	Marks	Guidance
7	(a)	$200 \times 9$	1	
	(b)	bigger opposite	1	needs both correct
	(c)	any 3 from:  if she has a crash / car stops suddenly;  increases time (for her to stop);  rate of momentum change reduced;  force is rate of change of momentum;  it will reduce the force (on her);  to a safe level / causes less damage to her;	3	context of seat belt, air bag or crumple zone is neutral  <b>accept</b> impact / pressure / push for force  <b>not</b> prevents injury/ saves her life  <b>if no other mark scored, accept</b> description of device action only eg seat belt stops her from going through the windscreen/seat belt locks/crumple zones absorb impact for 1 mark
<b>Total</b>			<b>5</b>	

Question		Answer	Marks	Guidance
8	(a)		1	
	(b)	(i) 4.8 (J)	1	
		(ii) temperature	1	
	(c)	(i) 	1	
		(ii) <p>The friction is the same for all of the blocks. <input type="checkbox"/></p> <p>There is no link between the friction and the mass. <input type="checkbox"/></p> <p>Increasing the mass of the block increases the friction. <input checked="" type="checkbox"/></p> <p>Increasing the mass of the block decreases the friction. <input type="checkbox"/></p>	1	
<b>Total</b>			<b>5</b>	

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

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