

Additional Science A

General Certificate of Secondary Education

Unit **A215/01**: Modules B4, C4, P4

Mark Scheme for January 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

	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
	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.

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 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 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, 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.

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, 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

Question		Answer	Marks	Guidance										
1	(a)	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>part in the control system</p> <div style="border: 1px solid black; padding: 5px; width: 80px; margin: 5px;">processor</div> <div style="border: 1px solid black; padding: 5px; width: 80px; margin: 5px;">temperature sensor inside the fridge</div> <div style="border: 1px solid black; padding: 5px; width: 80px; margin: 5px;">pump and coolant</div> </div> <div style="text-align: center;"> <p>part in the human body</p> <div style="border: 1px solid black; padding: 5px; width: 80px; margin: 5px;">receptor</div> <div style="border: 1px solid black; padding: 5px; width: 80px; margin: 5px;">effector</div> <div style="border: 1px solid black; padding: 5px; width: 80px; margin: 5px;">brain</div> </div> </div>	2	3 correct lines = 2 marks 1 or 2 correct lines = 1 mark										
	(b)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">blood transfers heat to her skin</td> <td style="text-align: center; width: 30px;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="padding: 2px;">blood transfers heat to her brain</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="padding: 2px;">sweat evaporates</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="padding: 2px;">sweat condenses</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="padding: 2px;">she shivers</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	blood transfers heat to her skin	<input checked="" type="checkbox"/>	blood transfers heat to her brain	<input type="checkbox"/>	sweat evaporates	<input checked="" type="checkbox"/>	sweat condenses	<input type="checkbox"/>	she shivers	<input type="checkbox"/>	2	1 mark for each correct tick if more than 2 boxes are ticked, deduct 1 mark for each wrong box.
blood transfers heat to her skin	<input checked="" type="checkbox"/>													
blood transfers heat to her brain	<input type="checkbox"/>													
sweat evaporates	<input checked="" type="checkbox"/>													
sweat condenses	<input type="checkbox"/>													
she shivers	<input type="checkbox"/>													
	(c)	D C B A	2	D anywhere before C C anywhere before B B anywhere before A 3 correct = 2 marks 2 correct = 1 mark 1 correct = 0 marks										
Total			6											

Question		Answer	Marks	Guidance
2	(a)	1 cm	1	
	(b)	0 cm	1	
	(c)	Mark	1	
Total			3	

Question		Answer	Marks	Guidance
3	(a)	<p>any three from: one or two marks from:</p> <ul style="list-style-type: none"> uses the term diffusion (for either process) uses osmosis in context of movement of water only <p>and max two marks out of the three for:</p> <ul style="list-style-type: none"> oxygen/water moves from high to low concentration. [ignore oxygen moves from low to high concn unless it contradicts the previous] mentions partially/semi permeable membrane in context of osmosis only osmosis direction 	3	<p>only penalise incorrect statements if they CON another statement, otherwise ignore ignore irrelevant statements</p> <p>membrane – accept ‘little holes’</p> <p>assume osmosis explanation refers to the water molecules unless in the context of a solution accept ‘high to low concentrations’ ie refers to water concn accept ‘low to high solution concn’ – refers to solution accept ‘dilute to high [concn]’ – ‘dilute’ refers to solution</p> <p>“Both processes are diffusion, substances move from high to low concentration” = 2 ‘move along the concentration gradient’ not enough, direction not clear.</p>

Question		Answer	Marks	Guidance
3	(b)	more concentrated homeostasis	1	both required for the mark
	(c)	<p style="text-align: center;">effect of alcohol on urine</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">increased volume</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">decreased volume</div> </div> <div style="display: flex; justify-content: center; align-items: center; margin: 5px 0;"> <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px;"></div> <div style="width: 100px; height: 10px; border: 1px solid black; margin-right: 5px;"></div> </div> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">could lead to dehydration</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">could lead to rehydration</div> </div> <p style="text-align: center;">consequence</p>	1	must only have one line
Total			5	

Question		Answer	Marks	Guidance
4		the idea of colour ; comparing colour of sun with a test on earth; idea that colours are “ unique ” to an element/if the colours match then there are the same elements;	3	eg comparing flame test with what is observed also give credit for any of the more advanced ideas below: spectrum/lines idea that pattern is characteristic
Total			3	

Question			Answer	Marks	Guidance												
5	(a)	(i)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center;">photograph</td> <td style="width: 33%; text-align: center;">name</td> <td style="width: 33%; text-align: center;">colour</td> </tr> <tr> <td style="text-align: center; border: 1px solid black; padding: 5px;">gas</td> <td style="text-align: center; border: 1px solid black; padding: 5px;">bromine</td> <td style="text-align: center; border: 1px solid black; padding: 5px;">green</td> </tr> <tr> <td style="text-align: center; border: 1px solid black; padding: 5px;">liquid</td> <td style="text-align: center; border: 1px solid black; padding: 5px;">chlorine</td> <td style="text-align: center; border: 1px solid black; padding: 5px;">grey/black</td> </tr> <tr> <td style="text-align: center; border: 1px solid black; padding: 5px;">solid</td> <td style="text-align: center; border: 1px solid black; padding: 5px;">iodine</td> <td style="text-align: center; border: 1px solid black; padding: 5px;">red/brown</td> </tr> </table>	photograph	name	colour	gas	bromine	green	liquid	chlorine	grey/black	solid	iodine	red/brown	3	all 6 lines correct = 3 3, 4 or 5 lines correct = 2 1 or 2 lines correct = 1
photograph	name	colour															
gas	bromine	green															
liquid	chlorine	grey/black															
solid	iodine	red/brown															
		(ii)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 2px;">bleaches it</td> <td style="text-align: center; width: 20px;">✓</td> </tr> <tr> <td style="padding: 2px;">burns it</td> <td></td> </tr> <tr> <td style="padding: 2px;">evaporates it</td> <td></td> </tr> <tr> <td style="padding: 2px;">neutralises it</td> <td></td> </tr> </table>	bleaches it	✓	burns it		evaporates it		neutralises it		1					
bleaches it	✓																
burns it																	
evaporates it																	
neutralises it																	
		(iii)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 2px;">it attracts bacteria</td> <td></td> </tr> <tr> <td style="padding: 2px;">it kills bacteria</td> <td style="text-align: center;">✓</td> </tr> <tr> <td style="padding: 2px;">it neutralises bacteria</td> <td></td> </tr> <tr> <td style="padding: 2px;">it repels bacteria</td> <td></td> </tr> </table>	it attracts bacteria		it kills bacteria	✓	it neutralises bacteria		it repels bacteria		1					
it attracts bacteria																	
it kills bacteria	✓																
it neutralises bacteria																	
it repels bacteria																	
	(b)	(i)	<table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">sodium</td> <td style="padding: 0 10px;">+</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">bromine</td> <td style="padding: 0 10px;">→</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">sodium bromide</td> </tr> </table>	sodium	+	bromine	→	sodium bromide	1	sodium and bromine in either order sodium bromide must end in 'ide'							
sodium	+	bromine	→	sodium bromide													

Question			Answer	Marks	Guidance
5	(b)	(ii)	NABR NaBr NabR nABr	1	
		(iii)	700-760	1	
Total				8	

Question			Answer	Marks	Guidance								
6	(a)		<table border="1"> <tr> <td>They have different numbers of protons.</td> <td>✓</td> </tr> <tr> <td>They have different numbers of neutrons.</td> <td></td> </tr> <tr> <td>They have different relative atomic masses.</td> <td></td> </tr> <tr> <td>They have different sizes.</td> <td></td> </tr> </table>	They have different numbers of protons.	✓	They have different numbers of neutrons.		They have different relative atomic masses.		They have different sizes.		1	
They have different numbers of protons.	✓												
They have different numbers of neutrons.													
They have different relative atomic masses.													
They have different sizes.													
	(b)			1	6 in the outer shell, in any arrangement 8 in the middle shell, any arrangement accept dots, or 'e', instead of crosses, but candidate must use the same symbol for all the electrons								
	(c)		<table border="1"> <tr> <td>The ion has one electron more than the atom.</td> <td>✓</td> </tr> <tr> <td>The ion has one electron less than the atom.</td> <td></td> </tr> <tr> <td>The ion has one electron shell more than the atom.</td> <td></td> </tr> <tr> <td>The ion has one electron shell less than the atom.</td> <td></td> </tr> </table>	The ion has one electron more than the atom.	✓	The ion has one electron less than the atom.		The ion has one electron shell more than the atom.		The ion has one electron shell less than the atom.		1	
The ion has one electron more than the atom.	✓												
The ion has one electron less than the atom.													
The ion has one electron shell more than the atom.													
The ion has one electron shell less than the atom.													
Total				3									

Question		Answer	Marks	Guidance								
7	(a)	35 (m/s)	1	accept from 34.0 to 36.0								
	(b)	gravitational potential energy decreases; kinetic energy increases; total energy decreases;	3	PE is transferred to KE for 2 marks accept stays the same								
	(c)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>His weight increases.</td> <td><input type="checkbox"/></td> </tr> <tr> <td>His weight decreases.</td> <td><input type="checkbox"/></td> </tr> <tr> <td>Air resistance increases.</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>Air resistance decreases.</td> <td><input type="checkbox"/></td> </tr> </tbody> </table>	His weight increases.	<input type="checkbox"/>	His weight decreases.	<input type="checkbox"/>	Air resistance increases.	<input checked="" type="checkbox"/>	Air resistance decreases.	<input type="checkbox"/>	1	
His weight increases.	<input type="checkbox"/>											
His weight decreases.	<input type="checkbox"/>											
Air resistance increases.	<input checked="" type="checkbox"/>											
Air resistance decreases.	<input type="checkbox"/>											
Total			5									

Question		Answer	Marks	Guidance
8	(a)	size: 1000 [N] direction: backwards/opposite direction indicated reason: gas and rocket are an interaction pair (owtte) / idea of opposing pair of forces	3	accept "same" accept "out the back", "left" or "west" accept force on rocket from gas [is equal] and opposite to force on gas from rocket / momentum change of gas equal and opposite to momentum change of rocket ignore arguments about balanced forces giving a steady speed
	(b)	1000×10	1	
	(c)	C	1	
Total			5	

Question		Answer	Marks	Guidance	
9	(a)	It transfers kinetic energy from the car to Jack.	1		
		It increases the time for which forces act on Jack.			✓
		It provides a counter force to the force from the wall.			
		It redirects the force from the wall towards the ground.			
	(b)	7.5 (m/s)	1		
	(c)	force Work	2		
		Total	4		

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