

Additional Science A

General Certificate of Secondary Education

Unit **A217/02**: Modules B6, C6, P6 (Foundation Tier)

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.

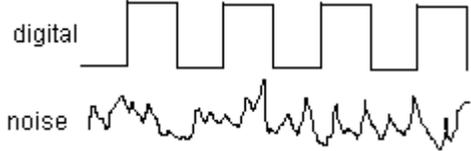
Credit should be given for each box correctly ticked. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

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)	infrared (light)	1	
	(b)	<p>description of digital;</p> <ul style="list-style-type: none"> on or off / square wave / 1 or 0 / pulses <p>description of noise;</p> <ul style="list-style-type: none"> random signal / wave picked up in the cable / signal with no information / interference. <p>EITHER digital signal can be cleaned up at the receiver; OR noise is not picked up by optical fibres/ difficult for noise to get into the optical fibre.</p>	3	<p>accept diagrams instead of descriptions</p> 
Total			4	

Question		Answer	Marks	Guidance								
2	(a)	energy / information	1									
	(b)		2	correct answer of 0.5 m for [1] accept 340 / 680 answer (correct or incorrect) in the correct box for [1]								
	(c)	<table border="1"> <tbody> <tr> <td></td> <td></td> </tr> <tr> <td>The waves are diffracted by the gap in the wall.</td> <td>✓</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>			The waves are diffracted by the gap in the wall.	✓					1	
The waves are diffracted by the gap in the wall.	✓											
	(d)	speed	1	accept wavelength accept change of medium								
Total			5									

Question		Answer	Marks	Guidance
3	(a)	any two of : wavelength; frequency; speed (in a vacuum);	1	accept polarisation accept phase
	(b)	energy of each photon in the beam number of photons emitted per second	2	correct pattern for [2] one mistake for [1]
	(c) (i)	both interfere in cancel	1	
	(ii)	The light from the laser has a wavelike nature.	1	
Total			5	

Question		Answer	Marks	Guidance										
4	(a)	40%	1											
	(b)	dark	1											
	(c)	<table border="1"> <tr> <td>it helps protect them from birds</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td></td> <td><input type="checkbox"/></td> </tr> <tr> <td>it prevents the Sun drying them out</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td></td> <td><input type="checkbox"/></td> </tr> <tr> <td></td> <td><input type="checkbox"/></td> </tr> </table>	it helps protect them from birds	<input checked="" type="checkbox"/>		<input type="checkbox"/>	it prevents the Sun drying them out	<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	2	
it helps protect them from birds	<input checked="" type="checkbox"/>													
	<input type="checkbox"/>													
it prevents the Sun drying them out	<input checked="" type="checkbox"/>													
	<input type="checkbox"/>													
	<input type="checkbox"/>													
	(d)	<table border="1"> <tr> <td>A secondary stimulus is associated with a primary stimulus.</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td></td> <td><input type="checkbox"/></td> </tr> <tr> <td>The final response has no direct link to the primary stimulus</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td></td> <td><input type="checkbox"/></td> </tr> </table>	A secondary stimulus is associated with a primary stimulus.	<input checked="" type="checkbox"/>		<input type="checkbox"/>	The final response has no direct link to the primary stimulus	<input checked="" type="checkbox"/>		<input type="checkbox"/>	2	1 mark for each correct tick. if more than 2 boxes ticked deduct 1 mark for each extra box.		
A secondary stimulus is associated with a primary stimulus.	<input checked="" type="checkbox"/>													
	<input type="checkbox"/>													
The final response has no direct link to the primary stimulus	<input checked="" type="checkbox"/>													
	<input type="checkbox"/>													
	(e)	brain neuron motor	2	3 correct = 2 marks 2 correct = 1 mark 0 or 1 correct = 0 marks										
Total			8											

Question		Answer	Marks	Guidance								
5	(a)	<table border="1"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>passed the age it can acquire language skills</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table>					passed the age it can acquire language skills	✓			1	if more than 1 box ticked award 0 marks
passed the age it can acquire language skills	✓											
	(b)	pathways more likely	1	both correct for 1 mark								
		Total	2									

Question	Answer	Marks	Guidance										
6 (a)	any 3 from: chemical released from neuron 1; chemical diffuses across the gap / synapse / cleft; chemical links to receptors on membrane of neuron 2; this triggers impulse in neuron 2; receptors are specific as to the chemical they will link with; chemical is then removed from the synapse / reabsorbed in neuron 1;	3											
(b)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">action of Ecstasy</td> <td style="width: 50%; text-align: center;">effect on brain</td> </tr> <tr> <td style="height: 20px;"></td> <td style="height: 20px;"></td> </tr> <tr> <td style="text-align: center;">blocks removal of serotonin from synapse</td> <td style="text-align: center;">increases serotonin concentration and so enhances mood</td> </tr> <tr> <td style="height: 20px;"></td> <td style="height: 20px;"></td> </tr> <tr> <td style="height: 20px;"></td> <td style="height: 20px;"></td> </tr> </table>	action of Ecstasy	effect on brain			blocks removal of serotonin from synapse	increases serotonin concentration and so enhances mood					1	if more than 1 line drawn then 0 marks.
action of Ecstasy	effect on brain												
blocks removal of serotonin from synapse	increases serotonin concentration and so enhances mood												
	Total	4											

Question		Answer	Marks	Guidance				
7	(a)	lead iodide lead nitrate potassium iodide potassium nitrate <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td>✓</td></tr> <tr><td>✓</td></tr> </table>			✓	✓	1	
✓								
✓								
	(b)	10 (cm ³)	1					
	(c)	to remove impurities that are; soluble in water; water must have no [dissolved] impurities itself.	3	accept "potassium nitrate" for impurities accept distilled water is "pure" but not "purer"				
Total			5					

Question		Answer	Marks	Guidance
8	(a)	reaction may not go to completion difficulty in extracting product from reaction mixture more detail e.g. left in reaction vessel / on filter paper / during filtration / during evaporation loss at each stage	3	ignore may not have 100% reaction ignore other products in that reaction accept other reactions take place
	(b) (i)	10% 11.1% 45% 80% 90%	1	
	(ii)	(4500 / 5000) x 100	1	allow equation given in words: actual yield/theoretical yield x 100
Total			5	

Question		Answer	Marks	Guidance
9	(a)	$\text{MgCO}_3 + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$	3	3 formulae correct = 1 mark all formulae correct = 2 marks and correctly balanced with correct formulae = 3 marks
	(b)	OH^-	1	negative charge must be included accept "hydroxide (ion)"
			Total	4

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