

**Science A**

General Certificate of Secondary Education

Unit **A211/02**: Unit 1: Modules B1, C1, P1 (Higher Tier)

# **Mark Scheme for January 2013**

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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
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
<u>words</u>	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	credit alternative wording / or words to that effect
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

- Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).
- 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 the third and fourth boxes are required for the mark:*



*This would be worth  
1 mark.*

*This would be worth  
0 marks.*

*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-box questions:

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 and other markings. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses. Credit should be given according to the instructions given in the guidance column for the question. 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 cities in England:*

Edinburgh	<input type="checkbox"/>
Manchester	<input type="checkbox"/>
Paris	<input type="checkbox"/>
Southampton	<input type="checkbox"/>

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		✓		✓	✓		✓	
<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:
- 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:

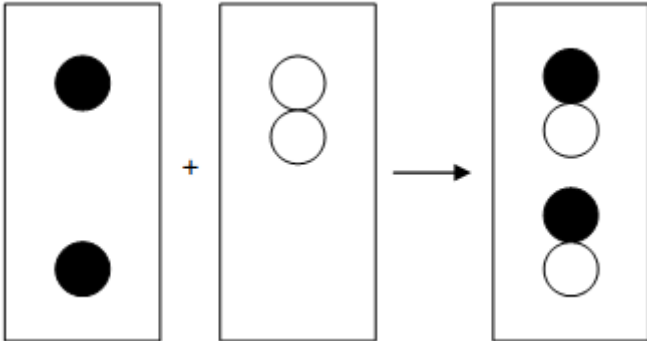
- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Question			Answer	Marks	Guidance
1	(a)		<div><div>chromosome</div><div>dominant allele</div><div>recessive allele</div><div>gene</div></div> <div><div>only one needed to have the feature it produces</div><div>two copies needed to have the feature it produces</div><div>codes for many different proteins</div><div>instructions for a cell that describes ...how to make a protein</div></div>	3	four correct = 3 marks three correct = 2 marks two correct = 1 mark
	(b)	(i)	all of 1, 2 and 4 (1)	1	<b>allow</b> any order if more than three answers then no marks can be awarded
		(ii)	50%/0.5/½	1	<b>accept</b> 1 to 1 <b>accept</b> any correct fraction/ratio, eg 1 in 2 / 5 in 10 <b>do not accept</b> 50 without the % symbol
	(c)		<div><div></div><div></div><div>...make the missing protein... ✓</div><div></div></div> <div>(1)</div>	1	
	(d)		<i>embryonic stem cells:</i> are unspecialised/undifferentiated (1) can develop into any kind of cell (1)  <b>up to 2 marks from</b> may be able to replace damaged cells/tissues (1) idea of nuclear replacement (1) no issues of tissue rejection (1)	3	<b>do not allow</b> ‘become specialised’

Question			Answer	Marks	Guidance						
1	(e)		<table><tr><th>Risk</th><th>Reliability</th><th>Ethics</th></tr><tr><td>Katie</td><td>Tim Vikram</td><td>Florence Patrick</td></tr></table>	Risk	Reliability	Ethics	Katie	Tim Vikram	Florence Patrick	3	<p>all 5 correct = 3 marks 4 correct = 2 marks 2 or 3 correct = 1 mark</p> <p>if the same name appears in more than one box then that name is not given credit.</p> <p><b>allow</b> any unambiguous indication of choice eg K for Katie</p>
Risk	Reliability	Ethics									
Katie	Tim Vikram	Florence Patrick									
			Total	12							

Question			Answer	Marks	Guidance
2			<p><b>any two:</b> nucleus removed from egg (cell) (1) nucleus removed from adult body cell (1)</p> <p>(adult body cell) nucleus put into (empty) egg cell (1)</p> <p>embryo implanted into (surrogate) mother/put into uterus (1) embryo grows into clone of adult from which body cell nucleus was taken (1)</p>	2	<p><b>do not allow</b> vague references to 'putting back into mother'</p>
			<b>Total</b>	<b>2</b>	



Question			Answer	Marks	Guidance																				
3	(a)		<p>correct CO molecule (1) 2 C atoms + 2 CO molecules (O unchanged) (1)</p> 	2																					
	(b)	(i)	<table border="1"><thead><tr><th>Claim...</th><th>Charlotte</th><th>Jim</th><th>Both of them</th><th>Neither of them</th></tr></thead><tbody><tr><td>Air quality...</td><td>✓</td><td></td><td></td><td></td></tr><tr><td>Nuclear fuel...</td><td></td><td></td><td></td><td>✓</td></tr><tr><td>Small-scale...</td><td></td><td>✓</td><td></td><td></td></tr></tbody></table>	Claim...	Charlotte	Jim	Both of them	Neither of them	Air quality...	✓				Nuclear fuel...				✓	Small-scale...		✓			3	one mark for each correct row more than one tick in a row scores no marks
Claim...	Charlotte	Jim	Both of them	Neither of them																					
Air quality...	✓																								
Nuclear fuel...				✓																					
Small-scale...		✓																							
		(ii)	<p>more electricity is made for each tonne of coal</p> <div><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></div>	1	tick in any other box = 0 marks																				

Question			Answer	Marks	Guidance
3	(c)		<b>any two from:</b> sulfur atoms are in coal (1) idea that combustion of sulfur produces sulfur dioxide (1) idea of removing sulfur before burning (1) burn/use fuel with lower sulfur content (1) idea of removing sulfur dioxide from flue gas/scrubbing flue gas (1) qualification of any point eg use of calcium oxide/alkali/production of gypsum (1)	2	<b>ignore</b> any reference to alternative energy  <b>ignore</b> any reference to catalytic converters  this mark is for the comparison of sulfur content
			<b>Total</b>	<b>8</b>	

Question			Answer	Marks	Guidance
4	(a)		60 – 98(1)	1	both numbers needed <b>allow</b> 98 – 60
	(b)	(i)	D (1) and B (1)	2	(1) for each correct answer <b>accept</b> either order
		(ii)	E (1)	1	

Question			Answer	Marks	Guidance
4	(c)		<div> <div></div> <div> <p>There is a real difference between nitrogen dioxide concentration in Silver Street and Benet Street</p> <div></div> <div></div> <div></div> <div></div> </div> <div> <p>The range of values for Silver Street is outside the range of values for Benet Street</p> <div></div> <div></div> </div> </div>	2	<p>(1) for 2nd box on left</p> <p>(1) for 3rd box on right</p> <p>more than one line between boxes on the left and right = 0 marks</p>
			<b>Total</b>	<b>6</b>	

Question			Answer	Marks	Guidance
5			<p>probability of large asteroids colliding with Earth is low (1)</p> <p><b>plus any three from:</b></p> <p>because Earth is small compared with universe/space (1)</p> <p>consequences very severe (1)</p> <p><b>local effects</b>, eg shock wave, explosive impact (1)</p> <p>impact in ocean – tsunami (1)</p> <p>impact on land – forest fires, dust clouds, earthquakes, volcanoes, craters (1)</p> <p><b>global consequences</b>, eg block out Sun (1)</p> <p>idea of (cooler) climate change (1)</p> <p>Idea of extinction (1)</p> <p><b>risk</b> = probability x consequences (1)</p>	4	
			<b>Total</b>	<b>4</b>	

Question			Answer	Marks	Guidance								
6	(a)		<table><tr><td>Nicola</td><td></td></tr><tr><td>Tayo</td><td></td></tr><tr><td>Aziz</td><td>✓</td></tr><tr><td>Lauren</td><td>✓</td></tr></table>	Nicola		Tayo		Aziz	✓	Lauren	✓	1	both needed for the mark
Nicola													
Tayo													
Aziz	✓												
Lauren	✓												
	(b)		<table><tr><td>Nicola</td><td></td></tr><tr><td>Tayo</td><td>✓</td></tr><tr><td>Aziz</td><td>✓</td></tr><tr><td>Lauren</td><td></td></tr></table>	Nicola		Tayo	✓	Aziz	✓	Lauren		1	both needed for the mark
Nicola													
Tayo	✓												
Aziz	✓												
Lauren													

Question			Answer				Marks	Guidance	
6	(c)						4	one mark for each correct row if more than 1 tick in a row, that row scores 0 marks  BUT if the row for Nicola has an extra tick (as shown in brackets on the mark scheme) the mark for that row may still be awarded as this is treated as neutral	
				Can be done	Cannot be done	Should be done			Should not be done
			Nicola	(✓)		✓			
			Tayo						✓
			Aziz		✓				
			Lauren	✓					
			Total				6		

Question			Answer	Marks	Guidance								
7	(a)		mantle	1	<b>accept</b> upper mantle								
	(b)		5 m	1	<b>accept</b> any clear marking of the third answer to indicate choice. <b>accept</b> '5m' written. <b>accept</b> '500cm' written.								
	(c)		<table><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td>pattern of magnetic strips</td><td>D</td></tr><tr><td>chain of mountains</td><td>D</td></tr></table>					pattern of magnetic strips	D	chain of mountains	D	2	two correct responses = 2 marks one correct response = 1 mark  if more than two responses, each incorrect response cancels out a correct one
pattern of magnetic strips	D												
chain of mountains	D												
			Total	4									

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