

Science A

General Certificate of Secondary Education

Unit **A213/02**: Unit 3: Modules B3, C3, P3 (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.

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
<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

- a. Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).
- b. 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		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

- 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)	<pre> graph LR Start[] --> E[E] E --> C[C] C --> A[A] A --> B[B] </pre>	2	D not used. Give mark as long as at least 3 boxes have been completed (1) C immediately before A (1) allow marks for correct answers if words from sentences used rather than letters eg 'turns turbine' = C										
	(b)	<table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td>All the carbon dioxide given off....</td><td>√ (1)</td></tr> <tr><td>All the carbon in plants.....</td><td>√ (1)</td></tr> <tr><td> </td><td> </td></tr> </table>					All the carbon dioxide given off....	√ (1)	All the carbon in plants.....	√ (1)			2	one mark for each correct answer if 3 ticks given, deduct 1 mark 4 or 5 ticks = 0 marks
All the carbon dioxide given off....	√ (1)													
All the carbon in plants.....	√ (1)													
Total			4											

Question		Answer	Marks	Guidance								
2	(a)	<table border="1"> <tr><td></td><td></td></tr> <tr><td>....light grey</td><td>√</td></tr> </table> (1)		light grey	√	1					
....light grey	√											
	(b)	<table border="1"> <tr><td>..... less penetrating.....</td><td>√</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table> (1) less penetrating.....	√							1	
..... less penetrating.....	√											
	(c)	Any 3 but no more than 2 from either list: <ul style="list-style-type: none"> Comparison of Risk gamma more penetrating than X rays; gamma higher energy/higher frequency/shorter wavelength/more ionising; gamma cause more damage/harm to (eg body); idea that gamma cannot be turned off Situation gamma rays can be used in a confined space/example of gamma rays being used in a small space; gamma can be used where there is no electricity; gamma needed to destroy cancer/kill microbes/specific use which needs greater penetration eg thickness testing 	3	allow reverse argument in each case allow examples of greater penetration of gamma ignore higher on the scale/more powerful ignore X rays are not ionising ignore more damaging/harmful alone ignore stronger ignore gamma rays are portable alone ignore X rays need electricity alone allow uses eg sterilisation of equipment								
Total			5									

Question		Answer	Marks	Guidance															
3	(a)	answer between 2360-2385	1																
	(b)	12.9	2	<p>2 marks for correct answer</p> <p>allow 13 or answers to more decimal places</p> <p>ignore any working shown if any other answer (or no answer) is given, award 1 mark <u>max</u> for: '310' and '100' shown anywhere in the working</p>															
	(c)	<table border="1"> <tbody> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>The perceived risk.....</td> <td>√</td> <td>(1)</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>Even though the chance of.....</td> <td>√</td> <td>(1)</td> </tr> </tbody> </table>							The perceived risk.....	√	(1)				Even though the chance of.....	√	(1)	2	<p>one mark for each correct answer if 3 ticks are given, deduct 1 mark 4 or 5 ticks = 0 marks</p>
The perceived risk.....	√	(1)																	
Even though the chance of.....	√	(1)																	
Total			5																

Question		Answer	Marks	Guidance
4	(a)	<p>any two from:</p> <p>religious conviction; natural selection/evolution is too slow to observe;</p> <p>did not like the idea that they were evolved from "apes";</p> <p>insufficient evidence;</p> <p>lack of knowledge of a genetic mechanism</p>	2	<p>two clearly distinct arguments</p> <p>allow "not enough time for it to have happened"</p> <p>accept already had an explanation they were satisfied with/did not want to accept new ideas</p> <p>ignore 'no evidence/proof'</p>
	(b)	<p>Any three from:</p> <p>variation not all the males have the same size tails/same number eyespots;</p> <p>competition males compete for mates/females prefer males with bigger tails/more eyespots;</p> <p>reproduction (selected) males are more likely to reproduce;</p> <p>evolutionary consequence passing on genes for bigger tails (so tail size increases over time);</p>	3	<p>allow reverse arguments</p> <p>'females prefer to mate with males with most eyespots' is a quote but gets points 1 & 2</p> <p>NB 'males with bigger tails/more eyespots are more likely to reproduce' = 2 marks (marking points 1 & 3)</p> <p>accept offspring have bigger tails</p>
Total			5	

Question		Answer	Marks	Guidance																				
5	(a)	homeostasis	1	ignore misspelling																				
	(b) (i)	E	1	accept any unambiguous indication of E																				
	(ii)	B C D	2	any order is acceptable 3 correct (2) 2 correct (1) 1 or 0 correct (0)																				
	(c)	<table border="1"> <thead> <tr> <th></th> <th>hormone</th> <th>nerve</th> <th>both</th> </tr> </thead> <tbody> <tr> <td>long lasting</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>fast</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>electrical</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>constant int environ.</td> <td></td> <td></td> <td>✓</td> </tr> </tbody> </table>		hormone	nerve	both	long lasting	✓			fast		✓		electrical		✓		constant int environ.			✓	2	all 4 rows = (2) 2 or 3 rows correct = (1)
	hormone	nerve	both																					
long lasting	✓																							
fast		✓																						
electrical		✓																						
constant int environ.			✓																					
Total			6																					

Question		Answer	Marks	Guidance
6	(a)	B, C, E (1)	1	any order and no other letters present
	(b) (i)	B, D, F or any two from these	1	any order no other letters present any two of the correct letters, or all 3, will gain this mark
	(ii)	D (1)	1	
Total			3	

Question			Answer	Marks	Guidance															
7	(a)	(i)	<table border="1"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>vegetable oil</td><td>√ (1)</td></tr> <tr><td></td><td></td></tr> <tr><td>water</td><td>√ (1)</td></tr> </table>					vegetable oil	√ (1)			water	√ (1)	2	<p>each correct answer = 1 mark if three ticks made deduct 1 mark four or five ticks = 0 marks</p> <p>allow any other indication of correct response eg underlining, cross, shading</p>					
vegetable oil	√ (1)																			
water	√ (1)																			
		(ii)	<table border="1"> <thead> <tr> <th></th> <th>true</th> <th>false</th> </tr> </thead> <tbody> <tr> <td>...passed a safety test...</td> <td>√</td> <td></td> </tr> <tr> <td>...supply energy...</td> <td></td> <td>√</td> </tr> <tr> <td>...approved for use...</td> <td>√</td> <td></td> </tr> <tr> <td>....never harmful.</td> <td></td> <td>√</td> </tr> </tbody> </table>		true	false	...passed a safety test...	√		...supply energy...		√	...approved for use...	√	never harmful.		√	2	<p>all four boxes correct = 2 marks three or two correct = 1 mark</p> <p>allow any other indication of correct response eg underlining, cross, shading</p>
	true	false																		
...passed a safety test...	√																			
...supply energy...		√																		
...approved for use...	√																			
....never harmful.		√																		
	(b)	(i)	polymers (1); sugars (1); oxygen (1)	3	must be these examples; ignore misspelling if it is clear which word is intended.															
		(ii)	glucose small soluble molecules absorbed into the blood	1	all correct for the mark															
			Total	8																

Question		Answer	Marks	Guidance										
8	(a)	<table border="1"> <tr><td>Charlotte</td><td></td></tr> <tr><td>Gabriel</td><td></td></tr> <tr><td>Craig</td><td></td></tr> <tr><td>Laura</td><td>√ (1)</td></tr> <tr><td>Pranav</td><td></td></tr> </table>	Charlotte		Gabriel		Craig		Laura	√ (1)	Pranav		1	allow any other indication of correct response eg underlining, cross, shading
Charlotte														
Gabriel														
Craig														
Laura	√ (1)													
Pranav														
	(b)	<p>benefit of enjoying eggs/eating them for protein (1)</p> <p>outweighs risk of getting diabetes / don't understand the risk/ underestimate the risk / scientists disagree on the risk (1)</p>	2	<p>ignore not enough evidence</p> <p>ignore the risk is small</p>										
	(c)	<p>up to three points from:</p> <p>the risk of getting diabetes with no eggs (1)</p> <p>increase in risk from eating eggs (1)</p> <p>consequences of getting diabetes (1)</p> <p>other factors that may be credited:</p> <p>genetic factors: could be family or community/ethnic group (1)</p> <p>lifestyle factors; accept one from: diet, exercise, obesity, smoking, alcohol (1)</p> <p>sample discrepancies: accept one from age, gender, home, job, egg types (1);</p> <p>lack of a suggested causal mechanism (1);</p> <p>pre-existing medical condition may increase risk of getting type 2 diabetes (1)</p>	3	<p>must specify a lifestyle factor to get this mark.</p> <p>egg types: eg size, species, battery/free range ie Dominic needs an explanation for how eggs can actually cause diabetes.</p> <p>do not allow small sample size</p>										
Total			6											

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