



GCSE

Science A

General Certificate of Secondary Education

Unit **A213/01**: Unit 3: Modules B3, C3, P3 (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"/>

Put ticks (✓) in the two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

Put ticks (✓) in the two correct boxes.

<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

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 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	✓	✗	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	✗		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

Question		Answer	Mark	Guidance
1	(a)	DCBA	2	DC first (1); BA next (1) DCAB = 1 CDBA = 1
	(b)	advantages: no fuel cost (1); no fossil fuel used (1); no CO ₂ produced (when running) (1); renewable/ (resource) won't run out (1); disadvantages: lower power/energy compared with fossil-fuel power stations (1); expensive/difficult to build/install/maintain/repair (1); environmental disturbance to ocean (1); hazard to/from shipping (1); economic disturbance to fishing/sailing (1); variable power output/variation in waves (1); possibility of storm damage to equipment (1)	3	one mark in each category + one other allow no greenhouse gases produced. If refer to global warming, need to mention gases (which cause..) ignore ref to pollution alone needs some comparison with fossil fuel station accept effects on wildlife/birds/fish e.g. kill, harm, disturb ignore ref. to tides
	(c)	1.8	1	± 0.05
	(d)	power output increases /goes up (1) constant /levels / plateaus out after about 5-6m / 700-760 kW (1)	2	do not accept "at 7m" for 2 nd mark
		Total:	8	

Question		Answer	Mark	Guidance
2	(a)	<p>Gamma radiation is ionising radiation. <input checked="" type="checkbox"/></p> <p>Gamma radiation is very penetrating. <input checked="" type="checkbox"/></p> <p>The activity is less under water. <input type="checkbox"/></p> <p>The radiation dissolves in the water. <input type="checkbox"/></p>	1	<p>both answers needed for 1 mark tick in any other box = 0</p>
	(b)	<p>Underground/Suggestion 1: risk – could leak out into water sources/effect of earthquake (1)</p> <p>Ocean/Suggestion 2: risk – containers could (corrode and) leak into the oceans (1)</p> <p>Space/Suggestion 3: risk – accident (on launch) could contaminate huge areas (1)</p>	2	<p>any two disposal methods. method chosen must be clear, and risk must be from that method.</p> <p>allow container damaged by earthquake</p> <p>accept “could fall back to earth”.</p> <p>allow reference to reprocessing – risk - accident during transport</p>

Question		Answer	Mark	Guidance
2	(c)	<p>Protective screens can block radiation. <input type="checkbox"/></p> <p>The radiation might damage their bodies. <input checked="" type="checkbox"/></p> <p>They get paid well <input type="checkbox"/></p> <p>They might breathe in radioactive materials. <input checked="" type="checkbox"/></p> <p>They need to wear protective clothes. <input type="checkbox"/></p>	2	accept any clear indication of choice one mark for each correct answer if more than 2 boxes ticked, subtract 1 mark for each incorrect response
		Total:	5	

3			Space / rocks / radon in air / radon in rocks / food / drink	1	allow cosmic rays allow nuclear power stations allow named rocks eg. granite allow medical ideas unless refer to treatment ignore microwaves/X rays ignore buildings unless refers to stone
			Total:	1	

Question		Answer	Mark	Guidance										
4	(a)	<table border="1" data-bbox="534 246 990 516"> <tr><td>2 000 years ago.</td><td></td></tr> <tr><td>3 500 years ago.</td><td></td></tr> <tr><td>3 500 million years ago.</td><td>✓</td></tr> <tr><td>5 000 million years ago.</td><td></td></tr> <tr><td>14 000 million years ago.</td><td></td></tr> </table>	2 000 years ago.		3 500 years ago.		3 500 million years ago.	✓	5 000 million years ago.		14 000 million years ago.		1	accept any clear indication of choice if more than 1 box ticked = 0
2 000 years ago.														
3 500 years ago.														
3 500 million years ago.	✓													
5 000 million years ago.														
14 000 million years ago.														
	(b)	molecules (1)	1	accept any clear indication of choice including circling word, if no answer on line										
	(c)	any four from: similarities variation in populations (1) both depend on reproduction / breeding / produce offspring (1) characteristics/genes / traits passed on (1) differences in selective breeding man chooses which individuals will breed (1) in natural selection nature / environment determines which individuals will survive to breed (1) selective breeding shorter time scale than natural selection (1)	4	allow “we” as = human allow survival of the fittest allow competition do not allow natural or naturally for nature do not allow “natural selection is animals choosing who they breed with”										
		Total:	6											

Question		Answer	Mark	Guidance												
5	(a)	(i) 5	1													
		(ii) H. floresiensis	1													
		(iii) circle round any of the three branches/junctions on the diagram	1													
	(iv)	<table border="1"> <tr><td>rapid environmental change</td><td>✓</td></tr> <tr><td>slow environmental change</td><td></td></tr> <tr><td>a constant environment</td><td></td></tr> <tr><td>extinction of a predator</td><td></td></tr> <tr><td>arrival of a new predator</td><td>✓</td></tr> </table>	rapid environmental change	✓	slow environmental change		a constant environment		extinction of a predator		arrival of a new predator	✓	2	accept any clear indication of choice 1 mark for each correct response if more than 2 boxes ticked, subtract 1 mark for each incorrect response		
rapid environmental change	✓															
slow environmental change																
a constant environment																
extinction of a predator																
arrival of a new predator	✓															
	(b)	<table border="1"> <tr><td>Scientists like a good argument.</td><td></td></tr> <tr><td>Some scientists think not...</td><td>✓</td></tr> <tr><td>Scientists do not need evidence.</td><td></td></tr> <tr><td>The number of hominid...</td><td></td></tr> <tr><td>The evidence can be interpreted...</td><td>✓</td></tr> <tr><td>Some scientists' reputations rely...</td><td>✓</td></tr> </table>	Scientists like a good argument.		Some scientists think not...	✓	Scientists do not need evidence.		The number of hominid...		The evidence can be interpreted...	✓	Some scientists' reputations rely...	✓	3	accept any clear indication of choice 1 mark for each correct response if more than 3 boxes ticked, subtract 1 mark for each incorrect response
Scientists like a good argument.																
Some scientists think not...	✓															
Scientists do not need evidence.																
The number of hominid...																
The evidence can be interpreted...	✓															
Some scientists' reputations rely...	✓															
			Total: 8													

Question		Answer	Mark	Guidance
6	(a)	any two from: manure adds nitrogen/nutrients/minerals (to soil); crops use up/soil loses nitrogen/nutrients/minerals; when crops harvested nitrogen/nutrients/minerals taken away;	2	allow "it" or ref to spreading as equivalent to manure
	(b)	any three from: sustainable; artificial fertilisers use oil/energy/resources; makes use of an otherwise waste substance; soil (structure) not damaged; more habitats for wildlife; no (harm to food chains from) pesticides; use natural predators to control pests; (artificial) fertilisers not washed into rivers;	3	ignore no fertiliser used "uses manure" is insufficient but "uses up manure" scores 1. accept examples: leave hedgerows, woodland, field margins allow "chemicals to kill pests" for a mark. ignore chemicals alone
		Total:	5	

Question		Answer	Mark	Guidance															
7	(a) (i)	<table border="1"> <thead> <tr> <th>E number</th> <th>type</th> <th>how it works</th> </tr> </thead> <tbody> <tr> <td>E211</td> <td>antioxidant</td> <td>stops food reacting with oxygen</td> </tr> <tr> <td>E324</td> <td>colouring</td> <td>stops the growth of microbes</td> </tr> <tr> <td>E401</td> <td>emulsifier</td> <td>allows oil and water to mix</td> </tr> <tr> <td></td> <td>preservative</td> <td></td> </tr> </tbody> </table>	E number	type	how it works	E211	antioxidant	stops food reacting with oxygen	E324	colouring	stops the growth of microbes	E401	emulsifier	allows oil and water to mix		preservative		3	1 mark for each correct line from E number to type to how it works. ignore any lines to or from colouring.
E number	type	how it works																	
E211	antioxidant	stops food reacting with oxygen																	
E324	colouring	stops the growth of microbes																	
E401	emulsifier	allows oil and water to mix																	
	preservative																		
	(ii)	<p>Eating food with additives is always a risk. <input type="checkbox"/></p> <p>The additives are completely safe. <input type="checkbox"/></p> <p>The additives have passed a safety test. <input checked="" type="checkbox"/></p> <p>The additives have been used for many years. <input type="checkbox"/></p>	1	accept any clear indication of choice if more than 1 box ticked = 0 marks															

Question		Answer	Mark	Guidance
7	(b)	<p>Measure the additives in food. <input type="checkbox"/></p> <p>Make sure the food tastes good. <input type="checkbox"/></p> <p>Check the foods are correctly labelled. <input type="checkbox"/></p> <p>Determine the safe levels of chemicals in food. <input checked="" type="checkbox"/></p>	1	tick in any other box = 0 marks
		Total:	5	

Question		Answer			Mark	Guidance															
8	(a)	<table border="1"> <thead> <tr> <th>Type 1</th> <th>Type 2</th> <th>Both</th> </tr> </thead> <tbody> <tr> <td>✓</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>✓</td> </tr> <tr> <td></td> <td>✓</td> <td></td> </tr> <tr> <td></td> <td>✓</td> <td></td> </tr> </tbody> </table>	Type 1	Type 2	Both	✓					✓		✓			✓		(1)	(1)	(1)	3 1 mark for each correct row accept any clear indication of choice
Type 1	Type 2	Both																			
✓																					
		✓																			
	✓																				
	✓																				
	(b)	<p>The risk to your health is much more than the benefit of eating what you want.</p> <p>The benefit of eating what you want is worth the risk of diabetes.</p> <p>People think that the risk of heart disease is much greater than it actually is.</p> <p>People who are not overweight still suffer from diabetes.</p>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1		accept any clear indication of choice if more than 1 box ticked = 0															
			Total:	4																	

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