

Science A

General Certificate of Secondary Education

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

Mark Scheme for June 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.

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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

Annotation	Meaning
	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

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

- 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)	Enzymes Growth / making specific structures / building cells a/w / repairing cells;	1	both for one mark										
	(b)	Y	1											
	(c)	<table border="1"> <tbody> <tr><td>kidney</td><td></td></tr> <tr><td>muscle</td><td></td></tr> <tr><td>ovary</td><td></td></tr> <tr><td>stomach</td><td></td></tr> <tr><td>testis</td><td>✓</td></tr> </tbody> </table>	kidney		muscle		ovary		stomach		testis	✓	1	more than 1 tick = 0
kidney														
muscle														
ovary														
stomach														
testis	✓													
	(d)	2	1											
Total			4											

Question		Answer	Marks	Guidance										
2	(a)	Beatrice;	1											
	(b)	<table border="1"> <tbody> <tr><td>Brain cells are unspecialised.</td><td></td></tr> <tr><td>Unspecialised cells can develop into any type of cell.</td><td>✓</td></tr> <tr><td>Stem cells are similar to brain cells.</td><td></td></tr> <tr><td>Stem cells contain only the genes needed to make brain cells.</td><td></td></tr> <tr><td>Stem cells are unspecialised.</td><td>✓</td></tr> </tbody> </table>	Brain cells are unspecialised.		Unspecialised cells can develop into any type of cell.	✓	Stem cells are similar to brain cells.		Stem cells contain only the genes needed to make brain cells.		Stem cells are unspecialised.	✓	1	both for one mark
Brain cells are unspecialised.														
Unspecialised cells can develop into any type of cell.	✓													
Stem cells are similar to brain cells.														
Stem cells contain only the genes needed to make brain cells.														
Stem cells are unspecialised.	✓													
Total			2											

Question			Answer	Marks	Guidance								
3	(a)	(i)	Father Hh Mother hh; (1) (Mary) Hh and hh; (1)	2									
		(ii)	50% / 0.5 / 1:1 / 50:50 ;	1	Allow any clear indication of "half" Allow "evens"								
	(b)		<table border="1"> <tr> <td>Mary's grandmother does not have the disorder.</td> <td></td> </tr> <tr> <td>The symptoms do not show until later in life.</td> <td>✓</td> </tr> <tr> <td>The allele for Huntington's disorder is recessive.</td> <td></td> </tr> <tr> <td>Environmental factors might prevent the disorder from developing.</td> <td></td> </tr> </table>	Mary's grandmother does not have the disorder.		The symptoms do not show until later in life.	✓	The allele for Huntington's disorder is recessive.		Environmental factors might prevent the disorder from developing.		1	More than 1 tick = 0
Mary's grandmother does not have the disorder.													
The symptoms do not show until later in life.	✓												
The allele for Huntington's disorder is recessive.													
Environmental factors might prevent the disorder from developing.													
Total				4									

Question			Answer	Marks	Guidance
4	(a)		Pre-implantation genetic diagnosis;	1	allow PGD
	(b)		Can be used for sex selection / gender selection; Can be used for match to cure existing child of disease; Can be used as organ donors; Not natural/ethical/playing god; Can be used for designer babies / selecting a desired characteristic;	3	
Total				4	

Question		Answer	Marks	Guidance										
5	(a)	Buses lower pollution per passenger (1) People walk/cycle/ride buses so <u>less fuel</u> used which means less pollution (1)	2											
	(b)	(i) NO and CO (1); CO₂ (1)	2	1 mark for both NO and CO 1 mark for CO ₂ with correct subscript.										
		(ii) any two from: nitrogen and oxygen <u>from the air</u> ; (1) react at high temperatures;(1) to make nitrogen monoxide; (1) react in the engine;(1) any one from: nitrogen monoxide is further oxidised/ reacts with more oxygen; (1) to make nitrogen dioxide <u>outside the engine</u> ; (1)	3	Allow 'in the air' for outside the car engine.										
		(iii) <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">They react together in catalytic converters.</td> <td style="width: 20px; text-align: center;"> </td> </tr> <tr> <td style="padding: 2px;">They are both used in photosynthesis.</td> <td style="text-align: center;"> </td> </tr> <tr> <td style="padding: 2px;">They are both heavier than air, so they are deposited on surfaces, making them dirty.</td> <td style="text-align: center;"> </td> </tr> <tr> <td style="padding: 2px;">They both dissolve in rain water.</td> <td style="text-align: center;">✓</td> </tr> <tr> <td style="padding: 2px;">They are both lighter than air, so they move away from the Earth.</td> <td style="text-align: center;"> </td> </tr> </table>	They react together in catalytic converters.		They are both used in photosynthesis.		They are both heavier than air, so they are deposited on surfaces, making them dirty.		They both dissolve in rain water.	✓	They are both lighter than air, so they move away from the Earth.		1	tick in any other box = 0
They react together in catalytic converters.														
They are both used in photosynthesis.														
They are both heavier than air, so they are deposited on surfaces, making them dirty.														
They both dissolve in rain water.	✓													
They are both lighter than air, so they move away from the Earth.														
	(c)	(i) Chris and Dave	1	both answers correct for 1 mark										
		(ii) Flora	1											
Total			10											

Question			Answer	Marks	Guidance										
6	(a)	(i)	<table border="1"> <tr> <td>As the distance from the motorway increases, the concentration of carbon particulates increase.</td> <td></td> </tr> <tr> <td>The nearer the measurements are to the motorway, the fewer the carbon particulates.</td> <td></td> </tr> <tr> <td>The concentration of carbon particulates decreases by $2\mu\text{g}/\text{m}^3$ every 20m from the motorway.</td> <td></td> </tr> <tr> <td>The further the measurements are from the motorway, the smaller the concentration of carbon particulates.</td> <td>✓</td> </tr> </table>	As the distance from the motorway increases, the concentration of carbon particulates increase.		The nearer the measurements are to the motorway, the fewer the carbon particulates.		The concentration of carbon particulates decreases by $2\mu\text{g}/\text{m}^3$ every 20m from the motorway.		The further the measurements are from the motorway, the smaller the concentration of carbon particulates.	✓	1	tick in any other box = 0		
As the distance from the motorway increases, the concentration of carbon particulates increase.															
The nearer the measurements are to the motorway, the fewer the carbon particulates.															
The concentration of carbon particulates decreases by $2\mu\text{g}/\text{m}^3$ every 20m from the motorway.															
The further the measurements are from the motorway, the smaller the concentration of carbon particulates.	✓														
		(ii)	<table border="1"> <tr> <td>There is no data on the number of vehicles on the motorway</td> <td></td> </tr> <tr> <td>Mark has taken the wrong measurements</td> <td></td> </tr> <tr> <td>Mark has not calculated the true value of the carbon particulate concentration</td> <td></td> </tr> <tr> <td>The carbon particulates may not have come from the motorway traffic</td> <td>✓</td> </tr> <tr> <td>Other pollutants were not measured</td> <td></td> </tr> </table>	There is no data on the number of vehicles on the motorway		Mark has taken the wrong measurements		Mark has not calculated the true value of the carbon particulate concentration		The carbon particulates may not have come from the motorway traffic	✓	Other pollutants were not measured		1	tick in any other box = 0
There is no data on the number of vehicles on the motorway															
Mark has taken the wrong measurements															
Mark has not calculated the true value of the carbon particulate concentration															
The carbon particulates may not have come from the motorway traffic	✓														
Other pollutants were not measured															
	(b)		5; (1) 4; (1)	2	1 mark for each correct answer (in the correct order)										
Total				4											

Question		Answer	Marks	Guidance
7		Reasons for lack of acceptance include Wegener was an outsider / (only) a meteorologist / not a geologist / was a foreigner (1); continental movement not observable (1); no known mechanism for movement (1); other explanations/theories for the evidence (1)	2	any two points “not enough evidence/proof” is not worth a mark “didn’t think/believe continents are moving” needs more detail accept “land bridges” idea reject ‘Wegener was not a scientist’
Total			2	

Question		Answer	Marks	Guidance
8		Cloud of gases and/or dust (1); Collapsed/condensed (under gravity) to form Sun, planets, etc (1)	2	Ignore “big bang / explosion” type mechanisms
Total			2	

Question		Answer	Marks	Guidance								
9	(a)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>only Dr Adams</td> <td><input type="checkbox"/></td> </tr> <tr> <td>only Dr Baker</td> <td><input type="checkbox"/></td> </tr> <tr> <td>both scientists</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>neither scientist</td> <td><input type="checkbox"/></td> </tr> </tbody> </table>	only Dr Adams	<input type="checkbox"/>	only Dr Baker	<input type="checkbox"/>	both scientists	<input checked="" type="checkbox"/>	neither scientist	<input type="checkbox"/>	1	tick in any other box = 0
only Dr Adams	<input type="checkbox"/>											
only Dr Baker	<input type="checkbox"/>											
both scientists	<input checked="" type="checkbox"/>											
neither scientist	<input type="checkbox"/>											

Question		Answer	Marks	Guidance								
	(b)	<table border="1"> <tr><td>only Dr Adams</td><td></td></tr> <tr><td>only Dr Baker</td><td></td></tr> <tr><td>both scientists</td><td>✓</td></tr> <tr><td>neither scientist</td><td></td></tr> </table>	only Dr Adams		only Dr Baker		both scientists	✓	neither scientist		1	tick in any other box = 0
only Dr Adams												
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only Dr Adams	✓											
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both scientists												
neither scientist												
	(d)	<table border="1"> <tr><td>only Dr Adams</td><td></td></tr> <tr><td>only Dr Baker</td><td>✓</td></tr> <tr><td>both scientists</td><td></td></tr> <tr><td>neither scientist</td><td></td></tr> </table>	only Dr Adams		only Dr Baker	✓	both scientists		neither scientist		1	tick in any other box = 0
only Dr Adams												
only Dr Baker	✓											
both scientists												
neither scientist												
Total			4									

Question		Answer	Marks	Guidance								
10	(a)	10000000	1									
	(b)	<table border="1"> <tr> <td>The depth of the ocean has not changed.</td> <td><input type="checkbox"/></td> </tr> <tr> <td>The spreading rate has stayed constant.</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>The Earth's magnetism reverses at regular time intervals.</td> <td><input type="checkbox"/></td> </tr> <tr> <td>Erosion of the sea floor has not taken place.</td> <td><input type="checkbox"/></td> </tr> </table>	The depth of the ocean has not changed.	<input type="checkbox"/>	The spreading rate has stayed constant.	<input checked="" type="checkbox"/>	The Earth's magnetism reverses at regular time intervals.	<input type="checkbox"/>	Erosion of the sea floor has not taken place.	<input type="checkbox"/>	1	tick in any other box = 0
The depth of the ocean has not changed.	<input type="checkbox"/>											
The spreading rate has stayed constant.	<input checked="" type="checkbox"/>											
The Earth's magnetism reverses at regular time intervals.	<input type="checkbox"/>											
Erosion of the sea floor has not taken place.	<input type="checkbox"/>											
	(c)	<table border="1"> <tr> <td>They show that continents are moving apart.</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>They provide a mechanism for the movement of tectonic plates.</td> <td><input type="checkbox"/></td> </tr> <tr> <td>They show that magnetic changes had occurred in the past.</td> <td><input type="checkbox"/></td> </tr> <tr> <td>They prove that there was no 'land bridge' between continents.</td> <td><input type="checkbox"/></td> </tr> </table>	They show that continents are moving apart.	<input checked="" type="checkbox"/>	They provide a mechanism for the movement of tectonic plates.	<input type="checkbox"/>	They show that magnetic changes had occurred in the past.	<input type="checkbox"/>	They prove that there was no 'land bridge' between continents.	<input type="checkbox"/>	1	tick in any other box = 0
They show that continents are moving apart.	<input checked="" type="checkbox"/>											
They provide a mechanism for the movement of tectonic plates.	<input type="checkbox"/>											
They show that magnetic changes had occurred in the past.	<input type="checkbox"/>											
They prove that there was no 'land bridge' between continents.	<input type="checkbox"/>											
Total			3									

Question		Answer	Marks	Guidance	
11		Some distant galaxies...	3	one mark for each correct	
		Galaxies contain thousands...			✓
		The galaxies started moving...			
		The Universe contains thousands...			✓
		Scientists can accurately predict...			
		Although galaxies are moving...			
		On average, galaxies which are...			✓
		Total	3		

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