

Science A

General Certificate of Secondary Education

Unit **A211/01**: Unit 1: Modules B1, C1, P1 (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 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

Question		Answer	Marks	Guidance								
1	(a)	<table border="1"> <tr> <td>a pair of chromosomes</td> <td></td> </tr> <tr> <td>a code for making DNA</td> <td></td> </tr> <tr> <td>a short section of protein</td> <td></td> </tr> <tr> <td>an instruction for making a protein</td> <td>✓</td> </tr> </table>	a pair of chromosomes		a code for making DNA		a short section of protein		an instruction for making a protein	✓	1	
a pair of chromosomes												
a code for making DNA												
a short section of protein												
an instruction for making a protein	✓											
	(b)	<p>any three from:</p> <p>may have religious objections to testing/test unnatural (1)</p> <p>may not want to worry (family)/scared of results (1)</p> <p>may not want insurers to know (1)</p> <p>may not want employers to know (1)</p> <p>test may be a false positive or false negative (1)</p> <p>don't want to change lifestyle/want to get on with life (1)</p> <p>environment also affects chances of disease (1)</p> <p>can change lifestyle/avoid environmental risk factors (eg decrease eating fatty food/increase exercise)/ early treatment/delay onset/make preparations/find cure (1)</p> <p>hereditary considerations (e.g. passing on to children/family member may have disease/determine parentage) (1)</p> <p>may/may not want to help solve a crime (1)</p>	3	<p>accept it is too expensive/waste of money/waste of time;</p> <p>accept worried about side effects/possible miscarriage</p> <p>accept want to find out (result)/don't want to know (result)</p>								
Total			4									

Question		Answer	Marks	Guidance										
2	(a)	<p style="text-align: center;">individual decision</p> <pre> graph LR A[adult] --- B[do not have children] C[fetus in womb] --- D[do not implant the embryo] E[embryo produced by IVF] --- D C --- F[have an abortion] E --- F </pre>	2	all three correct = 2 marks one or two correct = 1 mark										
	(b)	(i)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">H</td> <td style="text-align: center;">h</td> </tr> <tr> <td style="text-align: center;">h</td> <td style="text-align: center;">Hh</td> <td style="text-align: center;">hh</td> </tr> <tr> <td style="text-align: center;">h</td> <td style="text-align: center;">Hh</td> <td style="text-align: center;">hh</td> </tr> </table>		H	h	h	Hh	hh	h	Hh	hh	1	one mark for all alleles correct accept hH for Hh
	H	h												
h	Hh	hh												
h	Hh	hh												
		(ii)	circle round both Hh as shown in (b)(i)/separate circles around both Hh	1	allow ecf from bi (i.e. circle or circles around ALL combinations of 2 alleles with at least one H)									
	(c)	circle round 7440	1											
Total			5											

Question		Answer	Marks	Guidance	
3	(a)	They have the same number of...	1		
		They have the same mother and...			
		They developed from a single...			✓
		They developed from two identical...			
	(b)	eye colour	1		
		blood group			
		weight			✓
		scars			✓
Total			2		

Question		Answer	Marks	Guidance
4	(a)	they can develop into any kind of cell (1)	1	
	(b) (i)	Jon (1)	1	
	(ii)	Philip (1)	1	
Total			3	

Question		Answer	Marks	Guidance															
5	(a)	78% nitrogen and 21% oxygen;(1) 1% argon;(1)	2	allow chemical symbols N, O, Ar. Ignore any spelling errors as long as the meaning is clear. accept 'argon and other gases' or 'argon and noble gases' for 1%															
	(b) (i)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>name</th> <th>formula</th> <th>diagram</th> </tr> </thead> <tbody> <tr> <td>carbon monoxide</td> <td>NO</td> <td></td> </tr> <tr> <td>nitrogen monoxide</td> <td>CO</td> <td></td> </tr> <tr> <td>nitrogen dioxide</td> <td>SO₂</td> <td></td> </tr> <tr> <td>sulfur dioxide</td> <td>NO₂</td> <td></td> </tr> </tbody> </table>	name	formula	diagram	carbon monoxide	NO		nitrogen monoxide	CO		nitrogen dioxide	SO ₂		sulfur dioxide	NO ₂		3	mark lines across from name to formula to diagram. all 4 lines correct = 3 marks 3 lines correct = 2 marks 2 lines correct = 1 mark
name	formula	diagram																	
carbon monoxide	NO																		
nitrogen monoxide	CO																		
nitrogen dioxide	SO ₂																		
sulfur dioxide	NO ₂																		
	(ii)	<p>any three from: dissolves / reacts / mixes / combines with rain / water / moisture/ clouds;</p> <p>(forms) acid rain;</p> <p>damages metal / stone;</p> <p>harms / kills plants / animals / fish;</p>	3	<p>accept buildings/statues for stone and destroys for damages but not breaks ignore destroys plants etc</p> <p>ignore effects on humans/global warming</p>															
Total			8																

Question			Answer	Marks	Guidance
6	(a)	(i)	ring around 4 in table in the evening column	1	
		(ii)	$(10+12+15+8+10)\div 5$ (1) =11 (1)	2	attempt to calculate a mean (adding up some values and dividing by how many values were used, even if the values are not correct) = 1 mark correct answer with or without working = 2 marks
		(iii)	58 to 71	1	accept 71 to 58
	(b)		(levels of) particulates high in the afternoon; (1) (levels of) particulates low in the morning; (1) (levels of) particulates higher in the afternoon (than the morning) ORA; (2)	2	accept particulates increased (in the afternoon) (2)
			Total	6	

Question		Answer	Marks	Guidance								
7	(a)	<table border="1"> <tr><td>Anna</td><td><input type="checkbox"/></td></tr> <tr><td>Brian</td><td><input type="checkbox"/></td></tr> <tr><td>Chandra</td><td><input type="checkbox"/></td></tr> <tr><td>Daniel</td><td><input checked="" type="checkbox"/></td></tr> </table>	Anna	<input type="checkbox"/>	Brian	<input type="checkbox"/>	Chandra	<input type="checkbox"/>	Daniel	<input checked="" type="checkbox"/>	1	
Anna	<input type="checkbox"/>											
Brian	<input type="checkbox"/>											
Chandra	<input type="checkbox"/>											
Daniel	<input checked="" type="checkbox"/>											
	(b)	<table border="1"> <tr><td>Anna</td><td><input type="checkbox"/></td></tr> <tr><td>Brian</td><td><input type="checkbox"/></td></tr> <tr><td>Chandra</td><td><input checked="" type="checkbox"/></td></tr> <tr><td>Daniel</td><td><input type="checkbox"/></td></tr> </table>	Anna	<input type="checkbox"/>	Brian	<input type="checkbox"/>	Chandra	<input checked="" type="checkbox"/>	Daniel	<input type="checkbox"/>	1	
Anna	<input type="checkbox"/>											
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Chandra	<input checked="" type="checkbox"/>											
Daniel	<input type="checkbox"/>											
	(c)	<table border="1"> <tr><td>Anna</td><td><input checked="" type="checkbox"/></td></tr> <tr><td>Brian</td><td><input type="checkbox"/></td></tr> <tr><td>Chandra</td><td><input type="checkbox"/></td></tr> <tr><td>Daniel</td><td><input type="checkbox"/></td></tr> </table>	Anna	<input checked="" type="checkbox"/>	Brian	<input type="checkbox"/>	Chandra	<input type="checkbox"/>	Daniel	<input type="checkbox"/>	1	
Anna	<input checked="" type="checkbox"/>											
Brian	<input type="checkbox"/>											
Chandra	<input type="checkbox"/>											
Daniel	<input type="checkbox"/>											
	(d)	<table border="1"> <tr><td>Anna</td><td><input checked="" type="checkbox"/></td></tr> <tr><td>Brian</td><td><input type="checkbox"/></td></tr> <tr><td>Chandra</td><td><input type="checkbox"/></td></tr> <tr><td>Daniel</td><td><input checked="" type="checkbox"/></td></tr> </table>	Anna	<input checked="" type="checkbox"/>	Brian	<input type="checkbox"/>	Chandra	<input type="checkbox"/>	Daniel	<input checked="" type="checkbox"/>	1	
Anna	<input checked="" type="checkbox"/>											
Brian	<input type="checkbox"/>											
Chandra	<input type="checkbox"/>											
Daniel	<input checked="" type="checkbox"/>											
Total			4									

Question		Answer	Marks	Guidance																
8	(a)	CAED(B)	2	CA as order of first two (1); ED as order of last two (1) allow CEAD(B) for 1 mark																
	(b)	<table border="1"> <tr> <td>Earth</td> <td>Universe</td> <td>Sub</td> <td></td> </tr> <tr> <td>Sun</td> <td>Universe</td> <td>Earth</td> <td></td> </tr> <tr> <td>Universe</td> <td>Sun</td> <td>Earth</td> <td>✓</td> </tr> <tr> <td>Universe</td> <td>Earth</td> <td>Sun</td> <td></td> </tr> </table>	Earth	Universe	Sub		Sun	Universe	Earth		Universe	Sun	Earth	✓	Universe	Earth	Sun		1	
Earth	Universe	Sub																		
Sun	Universe	Earth																		
Universe	Sun	Earth	✓																	
Universe	Earth	Sun																		
Total			3																	

Question		Answer	Marks	Guidance																				
9		<table border="1"> <thead> <tr> <th>evidence</th> <th>change shown</th> </tr> </thead> <tbody> <tr> <td>erosion /cliffs / shape of rocks / displaced rocks</td> <td>mountains / cliffs / rocks have been worn down/made smaller / eroded</td> </tr> <tr> <td>layers in (sedimentary) rocks</td> <td>from build-up of sediments (on sea floors) / sedimentation</td> </tr> <tr> <td>magnetic stripes on seafloor</td> <td>spread of seafloor/changes in Earth's magnetic field</td> </tr> <tr> <td>similar rock layers / types in different continents / matching shapes</td> <td>must have been once joined / continents moved / plates moved</td> </tr> <tr> <td>crystal size / rock types</td> <td>temperature changes / cooling / heating</td> </tr> <tr> <td>fossils</td> <td>plants and animals buried or climatic change or evolution or extinctions or continental drift</td> </tr> <tr> <td>folding</td> <td>(sedimentary) rocks changed by Earth movements</td> </tr> <tr> <td>radioactivity</td> <td>isotopes decay</td> </tr> <tr> <td>craters</td> <td>asteroid impacts (in the past)</td> </tr> </tbody> </table>	evidence	change shown	erosion /cliffs / shape of rocks / displaced rocks	mountains / cliffs / rocks have been worn down/made smaller / eroded	layers in (sedimentary) rocks	from build-up of sediments (on sea floors) / sedimentation	magnetic stripes on seafloor	spread of seafloor/changes in Earth's magnetic field	similar rock layers / types in different continents / matching shapes	must have been once joined / continents moved / plates moved	crystal size / rock types	temperature changes / cooling / heating	fossils	plants and animals buried or climatic change or evolution or extinctions or continental drift	folding	(sedimentary) rocks changed by Earth movements	radioactivity	isotopes decay	craters	asteroid impacts (in the past)	2	one mark for example of evidence, and one for change allow older rocks under younger rocks etc for rock layers allow countries moved ignore age of rocks ignore dating of rocks
		evidence	change shown																					
		erosion /cliffs / shape of rocks / displaced rocks	mountains / cliffs / rocks have been worn down/made smaller / eroded																					
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		folding	(sedimentary) rocks changed by Earth movements																					
radioactivity	isotopes decay																							
craters	asteroid impacts (in the past)																							
Total		2																						

Question		Answer	Marks	Guidance
10		idea of immensity of Universe (1); (very) many planets (1); possibility of life arising has many chances (1)	3	accept many galaxies/many stars
Total			3	

Question		Answer	Marks	Guidance								
11	(a)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Earthquakes</td> <td></td> </tr> <tr> <td>Light Pollution</td> <td>✓</td> </tr> <tr> <td>Sunlight</td> <td></td> </tr> <tr> <td>Tides</td> <td></td> </tr> </table>	Earthquakes		Light Pollution	✓	Sunlight		Tides		1	
Earthquakes												
Light Pollution	✓											
Sunlight												
Tides												
	(b)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>bouncing laser beams off the star</td> <td></td> </tr> <tr> <td>comparing the brightness of the stars</td> <td>✓</td> </tr> <tr> <td>sending a rocket to the star</td> <td></td> </tr> <tr> <td>using parallax</td> <td>✓</td> </tr> </table>	bouncing laser beams off the star		comparing the brightness of the stars	✓	sending a rocket to the star		using parallax	✓	1	both needed
bouncing laser beams off the star												
comparing the brightness of the stars	✓											
sending a rocket to the star												
using parallax	✓											
Total			2									

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