

**Science A**

General Certificate of Secondary Education

Unit **A212/01**: Unit 2: Modules B2, C2, P2 (Foundation 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
<b>not/reject</b>	answers which are not worthy of credit
<b>ignore</b>	statements which are irrelevant - applies to neutral answers
<b>allow/accept</b>	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:
- 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)	<p style="text-align: right;"><input type="checkbox"/></p> <p>New trees can be planted... <input checked="" type="checkbox"/> (1)</p> <p style="text-align: right;"><input type="checkbox"/></p> <p style="text-align: right;"><input type="checkbox"/></p> <p>Poly(ethene) is made from crude oil. <input checked="" type="checkbox"/> (1)</p>	2													
	(b)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;"></th> <th style="width: 10%; text-align: center;">true</th> <th style="width: 10%; text-align: center;">false</th> </tr> </thead> <tbody> <tr> <td>The life cycle of a paper bag uses 0.3 MJ more energy than a poly(ethene) bag.</td> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td>2.4 MJ of energy is used in the life cycle of a poly(ethene) bag.</td> <td></td> <td style="text-align: center;">✓</td> </tr> <tr> <td>1.7 MJ of energy is used in the life cycle of a paper bag.</td> <td style="text-align: center;">✓</td> <td></td> </tr> </tbody> </table>		true	false	The life cycle of a paper bag uses 0.3 MJ more energy than a poly(ethene) bag.	✓		2.4 MJ of energy is used in the life cycle of a poly(ethene) bag.		✓	1.7 MJ of energy is used in the life cycle of a paper bag.	✓		2	<p>all 3 correct = 2 marks 2 or 1 correct = 1 mark</p>
	true	false														
The life cycle of a paper bag uses 0.3 MJ more energy than a poly(ethene) bag.	✓															
2.4 MJ of energy is used in the life cycle of a poly(ethene) bag.		✓														
1.7 MJ of energy is used in the life cycle of a paper bag.	✓															
	(c)	<p>candidate is aware that there are fewer journeys / lorries used (with polythene bags than paper bags) (1)</p> <p>candidate is aware that there is less pollution (from the lorries / journeys etc.)(1)</p>	2	<p><b>ignore</b> answers relating to sustainability of fuel / recycling / other environmental impacts</p> <p><b>allow</b> implication that less fuel / energy used in transportation</p> <p>if type of bag not named, assume paper, as implied in the stem</p>												
	(d)	<p>...recycled, burned or thrown away? <input checked="" type="checkbox"/> (1)</p> <p style="text-align: right;"><input type="checkbox"/></p> <p>How much carbon dioxide is released... <input checked="" type="checkbox"/> (1)</p> <p style="text-align: right;"><input type="checkbox"/></p> <p style="text-align: right;"><input type="checkbox"/></p>	2													
<b>Total</b>			<b>8</b>													

Question			Answer	Marks	Guidance
2	(a)	(i)	To find out if the results are repeatable. <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>	1	
		(ii)	<b>any two from:</b> outlier / anomaly / 34 far outside other values / 34 is an outlier (1); outlier discarded (1); lowest and highest of other values (1);	2	<b>allow</b> "most of the values are in this range"  answers such as "ignore / discard 34" get 2 marks
		(iii)	50 (1)	1	
	(b)		molecule (1); sliding over each other (1);	2	1 mark for each correct answer
			<b>Total</b>	<b>6</b>	



Question			Answer	Marks	Guidance
3	(a)	(i)	radio (waves) (1)	1	
		(ii)	light (1)	1	
		(iii)	<b>any two from:</b> radio (waves); microwaves; infrared; light	1	BOTH must be correct for 1 mark
	(b)		emits reflects absorbs	2	all correct = 2 marks one or two correct = 1 mark
<b>Total</b>				<b>5</b>	

Question			Answer	Marks	Guidance								
4	(a)	(i)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>B</td> <td>F</td> <td>A</td> <td>D</td> <td>C</td> <td>E</td> </tr> </table>	B	F	A	D	C	E	2	all correct = 2 marks  (B)FAxxx <b>or</b> (B)xxDCE gets 1 mark		
B	F	A	D	C	E								
		(ii)	flooding (1)  idea of a consequence, eg drowning, loss of homes or farmland, damage (to infrastructure), problems for economy etc. (1)	2	<b>allow</b> descriptions of flooding e.g. covers fields, goes into cities <b>ignore</b> tsunamis, coastal erosion, dangerous  marks are independent								
	(b)	(i)	<table style="width: 100%;"> <tr> <td style="width: 80%;">Jolene</td> <td style="width: 20%; text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Lawrence</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>Peter</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Amelia</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table>	Jolene	<input type="checkbox"/>	Lawrence	<input checked="" type="checkbox"/>	Peter	<input type="checkbox"/>	Amelia	<input checked="" type="checkbox"/>	1	both required for 1 mark  <b>accept</b> any clear and unambiguous response
Jolene	<input type="checkbox"/>												
Lawrence	<input checked="" type="checkbox"/>												
Peter	<input type="checkbox"/>												
Amelia	<input checked="" type="checkbox"/>												
		(ii)	<table style="width: 100%;"> <tr> <td style="width: 80%;">Jolene</td> <td style="width: 20%; text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Lawrence</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Peter</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Amelia</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table>	Jolene	<input type="checkbox"/>	Lawrence	<input type="checkbox"/>	Peter	<input type="checkbox"/>	Amelia	<input checked="" type="checkbox"/>	1	<b>accept</b> any clear and unambiguous response
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Jolene	<input type="checkbox"/>												
Lawrence	<input checked="" type="checkbox"/>												
Peter	<input type="checkbox"/>												
Amelia	<input type="checkbox"/>												
<b>Total</b>				<b>7</b>									

Question		Answer	Marks	Guidance
5		<p><b>benefit:</b> idea of looking good, feeling good, vitamin (D) production;</p> <p><b>risk:</b> identification / recognition of risk</p>	2	<p><b>max 1 mark for benefit, 1 mark for risk</b></p> <p><b>accept</b> 'get a tan' for benefit mark</p> <p>identification e.g. skin cancer, sun burn                      recognition of risk might be eg they do not feel that (skin) cancer / sun burn will affect them / they are not worried about sunburn / (skin) cancer /they think sun cream will protect them</p>
<b>Total</b>			<b>2</b>	

Question		Answer	Marks	Guidance
6		<p>Antibiotics do not work against viruses. <input type="checkbox"/></p> <p><input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p>Flu is caused by viruses. <input checked="" type="checkbox"/> (1)</p>	2	
<b>Total</b>			<b>2</b>	

Question			Answer	Marks	Guidance
7	(a)	(i)	1972 and lower than (1)	1	both needed for the mark
		(ii)	<p><b>any two reasonable suggestions</b>, e.g.:</p> <p>fewer people smoke;  (improvement in) diet;  (men take more) exercise;  (men drink) less alcohol;</p>	2	<p>max 2  reasons must be plausible to the candidate – we are not after precise historical knowledge <b>accept</b> any reasonable ideas</p> <p>ideas must be different “men do more sport and take more exercise” = 1 mark only</p> <p><b>ignore</b> general statements about healthy lifestyle – “they would be more healthy”, “more fitness”, “cleaner lifestyle”</p> <p>direction of change not needed eg “change in diet” but if direction given, it must be correct</p> <p>medical arguments must be about lifestyle, eg “more men are vaccinated” not ‘more doctors’ or better healthcare</p> <p>treat food as different from alcohol</p> <p>“they do different jobs” – not enough unless more detail given</p>
	(b)		1 (1) and 3 (1)	2	either order
<b>Total</b>				<b>5</b>	

Question		Answer	Marks	Guidance												
8	(a)	<div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; width: 100px; height: 40px;"></div> <div style="border: 1px solid black; width: 150px; height: 40px;"></div> <div style="border: 1px solid black; padding: 2px;">(1) antibodies present before real infection</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="border: 1px solid black; padding: 2px;">dead disease-causing micro-organisms</div> <div style="border: 1px solid black; padding: 2px;">(1) white blood cells make antibodies against micro organisms</div> <div style="border: 1px solid black; width: 100px; height: 40px;"></div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="border: 1px solid black; width: 100px; height: 20px;"></div> <div style="border: 1px solid black; width: 150px; height: 20px;"></div> <div style="border: 1px solid black; width: 100px; height: 20px;"></div> </div>	2	<p>one mark for each correct line any other lines between sections = 0 marks for that section</p> <p><b>allow</b> bottom box (small number of disease causing microorganisms) as an alternative to middle box for first mark, to account for attenuated microorganism use</p>												
	(b)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 20%;">safety only</th> <th style="width: 20%;">effectiveness only</th> <th style="width: 30%;">safety and effectiveness</th> </tr> </thead> <tbody> <tr> <td>Healthy</td> <td style="text-align: center;">✓</td> <td></td> <td></td> </tr> <tr> <td>...with the illness</td> <td></td> <td></td> <td style="text-align: center;">✓</td> </tr> </tbody> </table> <div style="text-align: right; margin-top: 5px;">(1) (1)</div>		safety only	effectiveness only	safety and effectiveness	Healthy	✓			...with the illness			✓	2	<p>one mark for each correct line more than one tick in any line = 0 marks</p>
	safety only	effectiveness only	safety and effectiveness													
Healthy	✓															
...with the illness			✓													
	(c) (i)	<p>The micro organisms are not killed by antibodies.</p> <div style="text-align: right; margin-top: 10px;"> <input type="checkbox"/>  <input type="checkbox"/>  <input checked="" type="checkbox"/> </div>	1	<p>more than one box ticked = 0 marks</p>												

Question		Answer	Marks	Guidance
	(ii)	<p><b>any two from:</b></p> <p>always finish a course of antibiotics (1);</p> <p>only take antibiotics when necessary (1);</p> <p>regularly change the antibiotic being used (in the population) (1);</p> <p>use combination of antibiotics (1);</p> <p>develop new antibiotics (1);</p>	2	<p><b>ignore</b> ref. to stronger antibiotic / larger doses</p> <p><b>accept</b> AW eg stop taking too many antibiotics / do not use for a cold / do not use all the time / only give when sure needed</p> <p><b>accept</b> use a different antibiotic / don't give them the same one twice</p>
<b>Total</b>			<b>7</b>	

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