

Science A

General Certificate of Secondary Education

Unit **A212/02**: Unit 2: Modules B2, C2, P2 (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:
- Read through the whole answer from start to finish**
 - Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor
 - 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)	(i)	any two from: outlier / anomaly / 34 far outside other values / 34 is an outlier (1); outlier discarded (1); lowest and highest of other values (1);	2	allow “most of the values are in this range” answers such as “ignore / discard 34” get 2 marks
		(ii)	50 (1)	1	accept 49 as this is the median value
	(b)		molecules; sliding (past each other); flexible;	1	words in correct order all 3 correct = 1 mark accept any clear indication
			Total	4	

Question			Answer	Marks	Guidance															
2	(a)		<table><tr><th>paper</th><th>poly(ethene)</th><th>cannot tell</th></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><tr><td></td><td></td><td>✓</td></tr></table>	paper	poly(ethene)	cannot tell		✓			✓			✓				✓	3	all 4 lines correct = 3 marks 3 lines correct = 2 marks 2 lines correct = 1 mark 1 line correct = 0 marks
paper	poly(ethene)	cannot tell																		
	✓																			
	✓																			
	✓																			
		✓																		
	(b)		candidate is aware that there are fewer journeys / lorries used (with polythene bags than paper bags) (1); candidate is aware that there is less pollution (from the lorries / journeys etc.)(1)	2	ignore answers relating to sustainability of fuel / recycling / other environmental impacts allow implication that less fuel / energy used in transportation if type of bag not named, assume paper, as implied in the stem															
			Total	5																

Question			Answer	Marks	Guidance												
3	(a)	(i)	carbon and hydrogen (1)	1	both answers in either order = 1 mark ignore “C” or “H”												
		(ii)	B and C (1)	1	both answers in either order = 1 mark												
	(b)	(i)	polymerisation (1)	1	accept polymerising but not polymers												
		(ii)	<table><tr><td>decreases melting point</td><td>melting point stays the same</td><td>increases melting point</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></table>	decreases melting point	melting point stays the same	increases melting point	✓					✓	✓			2	3 correct = 2 marks 2 or 1 correct = 1 mark
decreases melting point	melting point stays the same	increases melting point															
✓																	
		✓															
✓																	
			Total	5													

Question			Answer	Marks	Guidance
4	(a)		<p>Nitrogen in the... <input type="checkbox"/></p> <p>Ozone absorbs ultraviolet... <input type="checkbox"/></p> <p>Pollutant chemicals... <input checked="" type="checkbox"/> (1)</p> <p>...are not reversible. <input type="checkbox"/></p> <p>...protects living things... <input type="checkbox"/></p> <p>Ultraviolet radiation breaks up <input checked="" type="checkbox"/> (1)</p>	2	if 3 ticks given deduct 1 mark 4, 5 or 6 ticks = 0 marks
	(b)		<p>stated benefit: look good, feel good, get a tan, helps relaxing, vitamin D (1)</p> <p>benefit outweighs risk (1)</p>	2	second mark here must have a judgement on benefit and risk, and why the benefit is greater
			Total	4	

Question			Answer	Marks	Guidance								
5	(a)		<table><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 or (B)xxDCE gets 1 mark		
B	F	A	D	C	E								
	(b)	(i)	<table><tr><td>Jolene</td><td><input type="checkbox"/></td></tr><tr><td>Lawrence</td><td><input type="checkbox"/></td></tr><tr><td>Peter</td><td><input type="checkbox"/></td></tr><tr><td>Amelia</td><td><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	accept any clear and unambiguous response
Jolene	<input type="checkbox"/>												
Lawrence	<input type="checkbox"/>												
Peter	<input type="checkbox"/>												
Amelia	<input checked="" type="checkbox"/>												
		(ii)	<table><tr><td>Jolene</td><td><input type="checkbox"/></td></tr><tr><td>Lawrence</td><td><input checked="" type="checkbox"/></td></tr><tr><td>Peter</td><td><input type="checkbox"/></td></tr><tr><td>Amelia</td><td><input type="checkbox"/></td></tr></table>	Jolene	<input type="checkbox"/>	Lawrence	<input checked="" type="checkbox"/>	Peter	<input type="checkbox"/>	Amelia	<input type="checkbox"/>	1	accept any clear and unambiguous response
Jolene	<input type="checkbox"/>												
Lawrence	<input checked="" type="checkbox"/>												
Peter	<input type="checkbox"/>												
Amelia	<input type="checkbox"/>												
			Total	4									

Question			Answer	Marks	Guidance
6	(a)	(i)	E	1	
		(ii)	D, E and F	1	all 3 needed accept names (ultraviolet, X-ray, gamma) allow mis-spellings
	(b)		<div>Bone absorbs <input checked="" type="checkbox"/> (1)</div> <div>High intensity <input type="checkbox"/></div> <div>Bone reflects... <input type="checkbox"/></div> <div>Bone transmits... <input type="checkbox"/></div> <div>Light parts of the film... <input checked="" type="checkbox"/> (1)</div>	2	if 3 ticks given deduct 1 mark 4 or 5 ticks = 0 marks
	(c)		chooses one of infrared, microwaves, radio waves (1); describes use in transferring information (1)	2	eg IR: optical fibre communications, remote controls; microwaves: mobile phones / satellite transmissions radio: radio / TV; accept light only if valid method described, eg semaphore, heliograph
			Total	6	

Question			Answer	Marks	Guidance
7				3	<p>do not count the line from top left to bottom right one mark for each correct line</p> <p>if a candidate draws more than three lines and makes no attempt to cross them out, then each extra wrong line cancels out one correct line eg four lines drawn, three of them correct, results in two marks</p> <p>accept non-straight lines</p>
			Total	3	

Question			Answer	Marks	Guidance
8	(a)		<p>scientists working in the same area comment on the study (1)</p> <p>checks the reliability of the study / method (1)</p>	2	<p>“checks” must be qualified</p> <p>eg repeat the tests / replicate the tests / show it is biased / show results are made up / ORA</p>
	(b)		<p>sentence 1 and fat can be deposited in the arteries that lead to the heart muscle (1)</p> <p>sentence 3 and the blood carries the oxygen / glucose the heart muscle needs (1)</p>	2	<p>accept “vessels” for “arteries”</p> <p>accept “cholesterol” for “fat”</p> <p>answers in either order</p>
			Total	4	

Question		Answer	Marks	Guidance															
9	(a)	<div> <div></div> <div></div> <div>(1) antibodies present before real infection</div> <div> <div>dead disease causing micro organisms</div> <div>(1) white blood cells make antibodies against micro organisms</div> <div></div> </div> <div></div> <div></div> <div></div> </div>	2	<p>one mark for each correct line any other lines between sections = 0 marks for that section</p> <p>allow 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"> <tr> <td></td><td>Safety only</td><td>Effectiveness only</td><td>safety and effectiveness</td><td></td></tr> <tr> <td>health</td><td>✓</td><td></td><td></td><td>(1)</td></tr> <tr> <td>with illness</td><td></td><td></td><td>✓</td><td>(1)</td></tr> </table>		Safety only	Effectiveness only	safety and effectiveness		health	✓			(1)	with illness			✓	(1)	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																
health	✓			(1)															
with illness			✓	(1)															
	(c)	(i) double blind means: neither researcher / doctor or participant / patient know who is receiving the drug / medicine under test (1)	1																
		(ii) placebos are rarely used as: it is unethical not to give patients treatment / gives false hope / cannot cure them (1)	1																
	(d)	<div> <div>increased use of antibiotics...</div> <div> <div>✓</div> <div></div> <div></div> </div> <div>random changes in genes...</div> <div> <div>✓</div> <div></div> </div> </div>	1	<p>both ticks = 1 mark tick in any other box = 0 marks</p>															
		Total	7																

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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