

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
	no benefit of doubt

R	reject
	correct response
L1 , L2 , L3	indicate level awarded for a question marked by level of 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:

- 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)	rings around 10 and 50	1	both answers needed for 1 mark										
	(b)	any two from: larger surface area in particles than in lump/larger area to volume in particles; (1) so it works better/ faster; (1) spread out better; (1)	2											
	(c)	<table border="1"> <tbody> <tr> <td></td> <td></td> </tr> <tr> <td>Nanoparticles may be harmful.</td> <td>✓</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>Nanoparticles are being used without being tested.</td> <td>✓</td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>			Nanoparticles may be harmful.	✓			Nanoparticles are being used without being tested.	✓			2	1 mark for each correct tick if 3 boxes ticked deduct 1 mark 4 or 5 boxes ticked = 0 marks
Nanoparticles may be harmful.	✓													
Nanoparticles are being used without being tested.	✓													
		Total	5											

Question			Answer	Marks	Guidance								
2	(a)	(i)	<table border="1"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>The size of the pieces of material.</td><td>✓</td></tr> </table>							The size of the pieces of material.	✓	1	tick in any other box = 0 marks
The size of the pieces of material.	✓												
		(ii)	any two from: make sure results are repeatable; look for outliers; discard outliers; to produce a mean/average	2	<p>allow reliable/reproducible allow alternative wording for outlier e.g. the one that doesn't fit</p> <p>do not allow fair test ignore accurate ignore samples same/different</p>								
	(b)	(i)	94–103	1	ring around any other answer = 0 marks								
		(ii)	<p>any two from:</p> <p>variations in material;</p> <p>differences in size;</p> <p>conditions of immersion e.g. time in water;</p> <p>method of hanging (effect on dripping);</p> <p>amount of evaporation;</p> <p>differences in temp/wind/ weather;</p> <p>errors from the balance;</p>	2	<p>ignore different materials/different absorbencies/time unqualified allow examples of material variation e.g. thickness, weave, edge etc.</p> <p>allow change in environment allow either misuse of balance or instrument error</p>								
Total				6									

Question		Answer	Marks	Guidance
3	(a)	crust; (1) hydrogen; (1) polymers; (1)	3	allow hydrogen atoms but not symbols
	(b)	<p>Level 3 Chooses A (only) and compares most of the properties from the table with at least one other plastic, explaining the application of some of these properties to food wrapping. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>Level 2 Chooses A (only) and gives two reasons out of flexibility, stretch and strength with either some reference to data in table or comparison of properties with those of the other plastics. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>Level 1 Chooses A, B or C and gives one appropriate or explained reason. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>Level 0 Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to C</p> <p>Indicative scientific points at Level 3 may include:</p> <ul style="list-style-type: none"> • film has to stretch over food • film must not break too easily • A more flexible than C • A is stronger than B • A has most stretch <p>Indicative scientific points at Level 2 may include:</p> <ul style="list-style-type: none"> • A is flexible • A has strength of 9 (Nm⁻²) • A can stretch to 5 times its length before breaking <p>Indicative scientific points at Level 1 may include:</p> <ul style="list-style-type: none"> • C has high melting point so can be used for hot food • A/B is flexible • A/C is strong • C is stiff so food protected • A has low density so light to carry • B is cheapest
Total			9	

Question		Answer	Marks	Guidance
4	(a)	emitted (1) reflected (1) transmitted (1)	3	
	(b) (i)	all 3 points correctly plotted (1) smooth curve (1)	2	point at 33 should be between lines points at 24 and 18 should be on the lines mark given for smooth curve through all points; ecf slight plotting errors
	(ii)	yes because: checking at least one pair of values (1) repeated with another pair (1)	2	no credit for 'yes' marks for checking values
Total			7	

Question			Answer	Marks	Guidance	
5	(a)	(i)	Amy Barry Chris Donna	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	1	
		(ii)	Amy Barry Chris Donna	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	1	
		(iii)	Amy Barry Chris Donna	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1	
		(iv)	Amy Barry Chris Donna	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1	
	(b)	(i)	image has (very much) more information /bytes / details/data (1) so it takes longer (for it all to go) owtte (1)	2	allow reverse argument ignore bigger 2 nd mark dependent on the 1st allow more bytes/information/details takes longer for 2 marks	
		(ii)	(higher quality means) more detail / pixels resolution	1	ignore more bytes	
Total				7		

Question	Answer	Marks	Guidance
6	<p>Level 3 Gives a description of how an increase both in burning fossil fuels and deforestation caused the increase in CO₂ and a description of some of the ways that this may affect human life. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>Level 2 Gives a description of how an increase in either burning fossil fuels or deforestation caused the increase in CO₂ and some idea of how this may affect human life. Alternatively gives a description of both causes of increased CO₂ levels or a description of some of the ways that this may affect human life. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>Level 1 Either states a human activity which caused an increase in CO₂ and a consequence of increased CO₂ levels or gives a description of one of these Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>Level 0 Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to E</p> <p>Relevant points include: CO₂ changes</p> <ul style="list-style-type: none"> • increased due to burning fossil fuels • increased due to deforestation • increased demand for energy • increase in cars etc • increase in fossil fuels <p>effect on human life</p> <ul style="list-style-type: none"> • CO₂ is a greenhouse gas and so ‘traps heat’. • global warming (over same time scale) • climate change/extreme weather • possibly drought/floods • agriculture threatened/food shortages • cities threatened/population displacement • melting icecaps/sea levels rising • habitat loss • CO₂ is a greenhouse gas <p>accept discussion of uncertainty in effect due to noisy data/correlation not cause accept possible role of Sun’s variability in contributing to global warming</p>
	Total	6	

Question		Answer	Marks	Guidance										
7	(a)	<p>Antibiotics are a type of antimicrobial. Antimicrobials produce memory cells. Antimicrobials are chemicals. Antimicrobials are all risk free.</p> <table border="1"> <thead> <tr> <th>True</th> <th>False</th> </tr> </thead> <tbody> <tr> <td>✓</td> <td></td> </tr> <tr> <td></td> <td>✓</td> </tr> <tr> <td>✓</td> <td></td> </tr> <tr> <td></td> <td>✓</td> </tr> </tbody> </table>	True	False	✓			✓	✓			✓	2	all correct = 2 marks 3 or 2 correct = 1 mark
True	False													
✓														
	✓													
✓														
	✓													
	(b) (i)	<p>decreases over time (1) steeper decrease between 1940 and 1950/ after 1950 the rate of decrease lower (1)</p>	2	award first mark for any correct description of decrease, including correct use of figures										
	(ii)	bacteria have become resistant to / immune to / unaffected by (penicillin) (1)	1	allow new strains of bacteria that penicillin cannot touch reject people have become immune to this antibiotic ignore bacteria have become stronger										
	(iii)	B	1											
	(iv)	penicillin has no effect on viruses (1)	1	allow viruses immune to antibiotics/penicillin										
		Total	7											

Question		Answer	Marks	Guidance
8	(a)	increases increases (1)	1	accept decreases decreases accept alternative wording, eg goes up
	(b)	<p>[Level 3] Answer clearly identifies candidate's choice of someone at highest and lowest risk of heart disease. These suggestions are supported by detailed evidence from the table to show why the decision was made. Candidate reviews most factors in the table and justifies the decision either by comparison with another person or by using correct science. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Answer identifies candidate's choice of someone at highest and lowest risk of heart disease. Both suggestions are supported by some evidence from the table to show why the decision was made. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Answer identifies candidate's choice of someone at highest and lowest risk of heart disease or identifies one of these with some evidence from the table to show why the decision was made. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to C</p> <p>Indicative scientific points may include:</p> <ul style="list-style-type: none"> • high risk choice likely to be Norman or Olive • low risk choice likely to be Anne or Polly <p>Highest risk:</p> <ul style="list-style-type: none"> • male • older • less active • smoker • high fat diet • drinks alcohol <p>Lowest risk:</p> <ul style="list-style-type: none"> • female • younger • more active • non-smoker • low fat diet • does not drink alcohol <ul style="list-style-type: none"> • fatty deposits in blood vessels supplying the heart muscle can produce a heart attack
Total			7	

Question		Answer	Marks	Guidance
9	(a)	to check they're safe (1) to check they work/are effective (1)	2	allow don't hurt/harm/have side effects allow reverse argument
	(b)	<i>benefit:</i> could cure (their) cancer; could extend their life expectancy; better quality of life; could help others <i>risk:</i> has side effects/may make them feel worse; may die sooner; may miss out on another treatment	2	award one mark for a benefit and one for a risk allow see if it works allow may harm them allow may kill them
	(c)	any two from: patients are very ill (1) they will not get better with a placebo (1) would be unfair/unethical not to give all of them treatment / an equal chance of getting better (1) unethical if other treatments are available to be used for comparison (1)	2	allow cancer is aggressive/terminal/serious/fatal allow placebo will not work/is fake ignore patients faking
Total			6	

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