

# **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:

<b>Annotation</b>	<b>Meaning</b>
/	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:
- 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)	plutonium	1	
		(ii)	xenon is a gas (1); blown away / would spread out (1)	2	
	(b)		factor responsible (1); explaining why it went further (1)	2	wind (1) stronger than expected / blown toward Rongelap(1) height of cloud was greater (1) so took longer to fall (1) size of particles (1) were smaller so took longer to fall (1) ocean currents (1) in unexpected direction / speed (1) powerful explosion (1) more energy / speed / more radiation(1) <b>allow</b> also two independent factors, eg 'wind was strong and the bomb blew the waste further up' would get (2)
	(c)		<i>any two from:</i> body puts strontium into bones / teeth (1); children have more bone / teeth growing (1); damage / harmful to cells (1) cause cancer (1)	2	<b>Ignore</b> reference to dangerous

Question		Answer	Marks	Guidance
	(d)	<p>any two points;</p> <p><b>Safe:</b>            monitor radioactive emissions (1);            keep more radioactive places out of bounds / bury under coral (1);            limit time of exposure of divers (to reduce dose) (1)            nothing need be done as the background radiation is the same as the rest of the world (1)</p> <p><b>Sustainable:</b>            monitor damage to environment caused by divers (1);            limit numbers who have access to diving at any time (1);            exclude most sensitive regions from diving (1)</p>	2 + 1	<p><b>ignore</b> any reference to nuclear weapons / testing, or power stations</p> <p>any other reasonable sustainable action such as stop people removing coral, destroying animals, fishing etc.</p> <p><b>QWC mark</b> is awarded if there is (at least) one attempt to address safety <b>and</b> sustainability.</p>
	(e) (i)	5 cm	1	
	(ii)	16%	1	<b>allow</b> 16% - 17%
	(iii)	22.5 cm	1	<b>accept</b> any figure $\geq 22$ cm and $\leq 23$ cm
	(iv)	For any depth, coral always absorbs more radiation than sand ORA.	1	<p>The curve for coral is (consistently) below that for sand.</p> <p><b>allow</b> goes down quicker</p>
<b>Total</b>			<b>14</b>	



Question			Answer	Marks	Guidance
2	(a)	(i)	it is colourless (1) it is odourless (1)	2	<b>allow</b> you cannot see it <b>allow</b> you cannot smell it <b>ignore</b> taste / invisible
		(ii)	1 hour	1	
	(b)		increased ... decreased (1)	1	<b>allow</b> went up ... went down etc
	(c)		they used oil or gas / use less coal (1)	1	
	(d)	(i)	atoms; molecules; carbon; oxygen;	3	all four in correct positions = 3 two or three in correct positions = 2 one in correct position = 1
		(ii)	reduce air movement; (1)	1	<b>allow</b> prevent wind taking carbon monoxide away / gets trapped
		(iii)	<i>any two from:</i> fewer vehicles / cars on road (1) each bus/train takes more people (1) buses/trains use less fuel / run on electricity (1)	2	<b>allow</b> any reasonable explanation
		(iv)	<i>any two from:</i> buses/trains do not pick you up from home/take you to the exact place you want (1) buses/trains do not leave/arrive at the time you want (1) buses/trains are more expensive (1) take longer / slower (1) inconvenient / uncomfortable (1)	2	<b>allow</b> any reasonable answer  e.g. carry shopping / standing / controlling children / overcrowded
			<b>Total</b>	<b>13</b>	

Question		Answer	Marks	Guidance
3	(a)	not based on scientific method / not proper medicine (1)	1	OWTTE
	(b)	<i>Any one from:</i> conventional medicine says it does not work; (1) prevents scientifically proved treatment; (1) gives false hope to patients; (1)	1	OWTTE
	(c)	Bee stings	1	
	(d) (i)	10 000 000	1	
	(ii)	0	1	
	(e) (i)	Ranjit AND Stella; (1)	1	
	(ii)	Jane AND Stella; (1)	1	
	(f)	has memory of diluted substance; (1) which stimulates bodies own healing powers; (1)	2	OWTTE
	(g) (i)	70 (1)	1	
	(ii)	greater sample size / more people; (1) more accurate result; (1)	2	
	(h)	placebo effect / got better anyway	1	
		<b>Total</b>	<b>13</b>	

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