

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

- 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:

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

*This would be worth
1 mark.*

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

*This would be worth
0 marks.*

<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.*

- 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	
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

- 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:

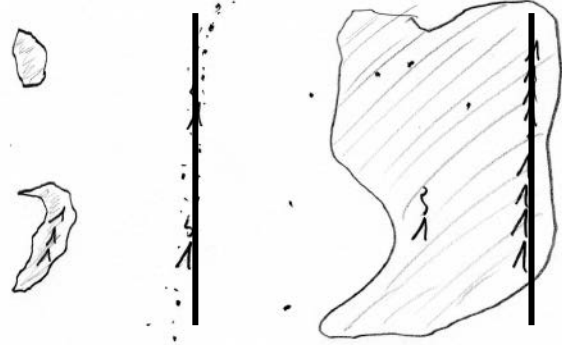
Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

- 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>This explanation accounts for the observations in the list.</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px;"></div> </div>	1	accept any clear and unambiguous response
	(b)	<p>There are other observations which do not fit with this explanation.</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; text-align: center;">✓</div> </div>	1	accept any clear and unambiguous response
	(c)	<p>Iridium is a metallic element often found near asteroid impacts.</p> <p>65 million year old layer of Iridium in Italy.</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px; text-align: center;">✓</div> <div style="border: 1px solid black; width: 30px; height: 30px;"></div> </div>	2	<p>1 mark for each correct if 3 boxes ticked deduct one mark 4 ticks = 0 marks</p> <p>accept any clear and unambiguous response</p>
Total			4	

Question		Answer	Marks	Guidance
2	(a)	fossils (1) rock types (1)	2	
	(b)	<p>The theory linked things previously thought unrelated.</p> <p>The evidence did not prove his theory correct.</p>	2	
	(c) (i)	 <p>The diagrams show two mountain ranges. The left range is represented by two irregular shapes with small arrows pointing towards each other. The right range is a larger, shaded area with a vertical line through its center and several small arrows pointing towards the line. A vertical line with a wavy arrow points to the boundary between the two ranges.</p>	2	<p>note: diagram is reversed (left-right) on exam paper</p> <p>overlay on Scoris shows acceptable limits</p> <p>one mark for identifying rows of mountains as a boundary and one mark for identifying earthquakes as a boundary</p> <p>list principle applies if extra lines drawn outside limits.</p>

Question		Answer	Marks	Guidance
	(ii)		1	<p>Note: Map is reflected on paper any one arrow in the correct direction perpendicular to boundary or horizontal by eye</p> <p>list principle applies</p>
Total			7	

Question		Answer	Marks	Guidance
3	(a)	4000 5000 5000 14 000 100	4	all five correct = 4 marks four correct = 3 marks three correct = 2 marks two correct = 1 mark one correct = no mark
Total			4	

Question		Answer	Marks	Guidance
4		source – sunlight/bulb/a light/named source emits light (1) idea of light travelling/air is transparent/no absorbed by air/transmitted through air (1) idea of paper reflects light/absorbed by ink/writing (1) eye/retina is the detector. Eye/retina absorbs light/photons (1)	4	maximum of 2 marks only can be scored for an incorrect sequence of events (correct sequence is ‘source – paper – eye’) marks may be obtained from a suitably annotated diagram allow receptors as meaning detector
Total			4	

Question		Answer	Marks	Guidance					
5	(a)	<p>combustion</p> <p>dissolving</p> <p>photosynthesis</p> <p>respiration</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>E</td></tr> <tr><td>A</td></tr> <tr><td>C</td></tr> <tr><td>B</td><td>D</td></tr> </table>	E	A	C	B	D	3	<p>all correct 3 marks</p> <p>3 or 4 correct 2 marks</p> <p>2 correct 1 mark</p> <p>0 or 1 correct 0 marks</p> <p>B & D may be in either order</p>
E									
A									
C									
B	D								
	(b) (i)	<p>The carbon dioxide going into the atmosphere was taken out again by plants and the oceans.</p> <p>There was no carbon dioxide produced before people built factories.</p> <p>Carbon dioxide was absorbed by forest fires.</p> <p>The atmosphere was already full of carbon dioxide, so no more could fit in.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td style="text-align: center;">✓</td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> </table>	✓				1		
✓									
	(ii)	<p>There are more factories now than in the past, as more countries have become developed.</p> <p>Forests have been burnt down to clear land for farming and new buildings.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td style="text-align: center;">✓</td></tr> <tr><td style="text-align: center;">✓</td></tr> <tr><td> </td></tr> </table>			✓	✓		2	
✓									
✓									

Question		Answer	Marks	Guidance
	(c)	<p>Low lying lands could be at risk of flooding.</p> <p>Some parts of the world will find it more difficult to grow crops.</p>	1	NB only 1 mark for both correct
	(d)	<p>water vapour</p> <p>methane</p>	2	
Total			9	

Question	Answer	Marks	Guidance
6	<p>any four from (max three from each group):</p> <p>effects: damages/kills living cells; can lead to cancer; produces ions/causes ionisation/causes unwanted chemical reactions in cells/removes electrons from atoms; mutations/DNA/genes altered;</p> <p>factors: type of radiation (alpha/beta/gamma); idea of irradiation/contamination; intensity/activity/level/strength of radiation/dose; half-life; time of exposure; distance from source; amount of radioactive material;</p>	4	<p>at least one from each group of ideas is required for 4 marks</p> <p>ignore changes living cells/kills you/damages eyes/any heating effect eg burns or blisters/cells ionised ignore radiation poisoning/sickness ignore damage to foetus</p> <p>eg breathe in and become contaminated</p> <p>accept how much radiation you get</p>
	Total	4	

Question		Answer	Marks	Guidance				
7	(a)	X-ray and ultraviolet	1	either order both needed				
	(b)	rings around rocks ; cosmic radiation ;	2	any clear and unambiguous response				
	(c)	...the time it takes for the activity of the material to fall by half. <table border="1" style="float: right; margin-left: 20px;"> <tr><td style="text-align: center;">✓</td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> </table>	✓				1	tick in top box any clear and unambiguous response
✓								
	(d)	<table border="0" style="width: 100%;"> <tr> <td style="text-align: center; width: 50%;">source and use</td> <td style="text-align: center; width: 50%;">reason</td> </tr> <tr> <td style="vertical-align: top;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">technetium 99 used to image the inside of humans</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">strontium 90 used to measure thickness</div> <div style="border: 1px solid black; padding: 5px;">americium 241 used in smoke alarms</div> </td> <td style="vertical-align: top;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">long half life and medium penetration</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">long half life and short range radiation</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">short half life and very penetrating radiation</div> <div style="border: 1px solid black; padding: 5px;">short half live and short range radiation</div> </td> </tr> </table>	source and use	reason	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">technetium 99 used to image the inside of humans</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">strontium 90 used to measure thickness</div> <div style="border: 1px solid black; padding: 5px;">americium 241 used in smoke alarms</div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">long half life and medium penetration</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">long half life and short range radiation</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">short half life and very penetrating radiation</div> <div style="border: 1px solid black; padding: 5px;">short half live and short range radiation</div>	3	one mark per line
source and use	reason							
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Total			7					

Question		Answer	Marks	Guidance
8	(a)	<p>1 mark for correct use of each term eg</p> <p>chain reaction – energy producing reaction/description of chain reaction including neutrons;</p> <p>fuel rod – contains radioactive material/atoms that undergo fission/chain reaction;</p> <p>control rod – absorbs neutrons/idea of movement of control rods altering chain reaction/energy production;</p> <p>coolant – idea of heat/energy transfer;</p>	3	<p>'Gives energy' is insufficient</p> <p>ignore cools it down/lowers temperature/stops overheating</p>
		Total	3	

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