

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:
- 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>statement</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; width: 150px;">The stars look younger than they are.</div> <div style="border: 1px solid black; padding: 5px; width: 150px;">Space is empty.</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="border: 1px solid black; padding: 5px; width: 150px;">All stars are equally bright.</div> <div style="border: 1px solid black; padding: 5px; width: 150px;">Stars look very small.</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="border: 1px solid black; padding: 5px; width: 150px;">All stars orbit the Sun.</div> <div style="border: 1px solid black; padding: 5px; width: 150px;">It takes time for light to.</div> </div>	2	Correct box on LHS (1) If more than one line drawn 0 mark					
	(b)	<div style="display: flex; justify-content: space-between;"> <div style="width: 60%;"> <p>time for the earth to orbit the sun</p> <p>diameter of the Earth</p> <p>distance to the moon</p> <p>distances to far galaxies</p> <p>age of the universe</p> </div> <div style="width: 30%; text-align: center;"> <table border="1" style="border-collapse: collapse; width: 100%;"> <tr><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td></tr> <tr><td style="height: 20px; text-align: center;">✓</td></tr> <tr><td style="height: 20px; text-align: center;">✓</td></tr> </table> </div> </div>				✓	✓	2	
✓									
✓									
	(c)	<p>star is hot ball of gas (1);</p> <p>galaxy is collection of many stars (1);</p> <p>universe is all stars and galaxies / everything (1);</p>	3	glows / gives out light					
Total			7						

Question		Answer	Marks	Guidance
2		top – mantle (1) middle – core (1) bottom – crust (1)	3	
		Total	3	

Question		Answer	Marks	Guidance
3	(a)	<p>This explanation accounts for these 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; margin-right: 5px; text-align: center;">✓</div> </div>	1	accept any clear and unambiguous response
	(c)	<p>Iridium is a metallic element often found near asteroid impacts. There is a 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
4			carbon dioxide (1) global warming (1) ultraviolet (1) cancer (1)	4	
			Total	4	

Question		Answer	Marks	Guidance
5	(a)	<p>The longer the exposure to ultraviolet radiation the greater the chance of burns</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; margin-right: 5px;">✓</div> </div>	1	accept any clear and unambiguous response
	(b)	<p>(radiation) absorbed (1) heats up cells / tissue / body (1)</p>	2	accept burning for 'heats up' must be a clear process for the 2 nd mark
	(c)	<p>Ultra Violet is an ionising radiation.</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; text-align: center; 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>	1	accept any clear and unambiguous response
	(d)	<p>There is only one example.</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 30px; text-align: center; 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; margin-right: 5px;">✓</div> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 5px;"></div> </div> <p>The boy did not use the sunbed in the same way as other sunbed users.</p>	2	accept any clear and unambiguous response
Total			6	

Question		Answer	Marks	Guidance
6		<p>source – sunlight / bulb / a light / named source emits light (1)</p> <p>idea of light travelling / air is transparent / not absorbed by air / transmitted through air (1)</p> <p>idea of paper reflects light / absorbed by ink / writing (1)</p> <p>eye / retina is the detector. Eye / retina absorbs light/photons (1)</p>	4	<p>maximum of 2 marks only can be scored for an incorrect sequence of events (correct sequence is 'source – paper – eye')</p> <p>marks may be obtained from a suitably annotated diagram</p> <p>allow receptors as meaning detector.</p>
		Total	4	

Question			Answer	Marks	Guidance															
7	(a)	(i)	£140 million	1																
		(ii)	Maintenance and operating costs <div style="display: flex; align-items: center; justify-content: 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	no extra ticks allowed															
	(b)		<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Lance</th> <th>Eva</th> <th>Neither</th> </tr> </thead> <tbody> <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> </tbody> </table>	Lance	Eva	Neither	✓					✓	✓				✓		4	one mark per correct row
Lance	Eva	Neither																		
✓																				
		✓																		
✓																				
	✓																			
Total				6																

Question			Answer	Marks	Guidance
8	(a)		beta (1) alpha (1) gamma (1)	3	
	(b)		gamma	1	accept ecf as bottom answer in table in part (a)
Total				4	

Question	Answer	Marks	Guidance
9	<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	

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