

# Mark Scheme for June 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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## 1. Annotations

Used in the detailed Mark Scheme:

Annotation	Meaning
/	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
words	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	alternative wording
ORA	or reverse argument

Available in scoris to annotate scripts

Annotation	Meaning
	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

Annotation	Meaning
	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

2. **Subject-specific Marking Instructions**

- a. If a candidate alters his/her response, examiners should accept the alteration.
- 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 boxes 3 and 4 are required for the mark:

Put ticks (✓) in the two correct boxes.

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

This would be worth 1 mark.

Put ticks (✓) in the two correct boxes.

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

This would be worth 0 marks.

Put ticks (✓) in the two correct boxes.

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

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 boxes:

Always check the additional guidance.

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. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses.

Credit should be given for each box correctly ticked. 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 a city in England, then in the boxes

<b>Edinburgh</b>	
<b>Manchester</b>	
<b>Paris</b>	
<b>Southampton</b>	

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).

<b>Edinburgh</b>			✓			✓	✓	✓	✓	
<b>Manchester</b>	✓	x	✓	✓	✓				✓	
<b>Paris</b>				✓	✓		✓	✓	✓	
<b>Southampton</b>	✓	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>

Question		Answer	Marks	Guidance												
1	(a)	$2 / 144 \times 100 = 1.38 / 1.39\%$ ; $19 / 27500 \times 100 = 0.06(9) / 0.07\%$	2	Allow two correct ratios for (1) Allow: 1 in 72 (chance); 1 in 1447 (chance);												
	(b)	any 2 from: claim that scientific studies do not agree; too few cases; people are exposed to other sources of radiation;/ there are other causes of cancer idea that there are a significant number of cancer cases not near the tower	2	not a cluster at the tower / map shows even distribution of cancer case												
	(c)	goes up and down; but falls overall; FM falls to 0 / stops at 3km UHF does not fall to zero	3													
	(d)	<table border="1"> <thead> <tr> <th></th> <th>true</th> <th>false</th> </tr> </thead> <tbody> <tr> <td>lower risk</td> <td></td> <td>✓</td> </tr> <tr> <td>correlation</td> <td>✓</td> <td></td> </tr> <tr> <td>proves</td> <td></td> <td>✓</td> </tr> </tbody> </table>		true	false	lower risk		✓	correlation	✓		proves		✓	2	3 correct =2 2 correct =1
	true	false														
lower risk		✓														
correlation	✓															
proves		✓														
	(e)	DNA / chromosomes / genes; are damaged	2	Damages genetic material 1 mark												
	(f)	same type of study / looked at same problem idea; findings are similar / supports the study	2													
	(g)	<table border="1"> <tbody> <tr> <td>equipment</td> <td>✓</td> </tr> <tr> <td>understand</td> <td></td> </tr> <tr> <td>30 years</td> <td></td> </tr> <tr> <td>publish</td> <td></td> </tr> <tr> <td>new techniques</td> <td>✓</td> </tr> </tbody> </table>	equipment	✓	understand		30 years		publish		new techniques	✓	2			
equipment	✓															
understand																
30 years																
publish																
new techniques	✓															
<b>Total</b>			<b>15</b>													

Question		Answer	Marks	Guidance								
2	(a)	D	1									
	(b) (i)	must have been a sea shore/ beach / sea / water/ because the rock contains fish / shells / sand;	2									
	(ii)	any 2 from: no shells in some layers; mud / animals in other layers; so not a beach / sea ; must have been some land	2									
	(c)		2	LHS correct = 1 RHS correct = 1								
	(d)	<table border="1"> <tr> <td></td> <td></td> </tr> <tr> <td>natural selection</td> <td>✓</td> </tr> <tr> <td>evolution</td> <td>✓</td> </tr> <tr> <td></td> <td></td> </tr> </table>			natural selection	✓	evolution	✓			2	
natural selection	✓											
evolution	✓											
<b>Total</b>			<b>9</b>									

Question		Answer	Marks	Guidance
3	(a)	<p><b>Level 3 (5–6 marks)</b> Gives <b>explanations</b> for the data about Alex and Ben. Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks)</b> Makes some points about <b>body temperature</b> and makes points about both <b>Alex and Ben</b>. Quality of written communication partly impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks)</b> Makes some points about <b>body temperature</b> or makes points about <b>Alex and/or Ben</b>. Quality of written communication impedes communication of the science at this level.</p> <p><b>Level 0 (0 marks)</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades up to M</b></p> <p><b>Indicative scientific points may include:</b></p> <p><b>Body temperature</b></p> <ul style="list-style-type: none"> <li>• Alex sweats to cool body back down</li> <li>• Ben shivers to warm body back up</li> <li>• Idea that temperature regulation keeps body temperature normal.</li> </ul> <p><b>Alex and Ben</b></p> <ul style="list-style-type: none"> <li>• Alex skin temperature is above core temperature</li> <li>• Ben skin temperature is below core temperature</li> <li>• Both core temperatures are the same.</li> </ul> <p><b>Explanations</b></p> <ul style="list-style-type: none"> <li>• Body keeps core temperature constant</li> <li>• Sweating cools by evaporation</li> <li>• Shivering keeps warm by muscle contraction</li> <li>• Idea that shivering and sweating keep temperature constant</li> <li>• Normal temperature is 37°C.</li> </ul> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p> <p><b>Accept L2 answers e.g. vasoconstriction, references to hypothalamus etc.</b></p>

Question		Answer	Marks	Guidance												
	(b) (i)	increases; then falls	2													
	(ii)	<table border="1"> <tr> <td>pattern</td> <td>✓</td> </tr> <tr> <td>decimal place</td> <td></td> </tr> <tr> <td>carefully</td> <td></td> </tr> <tr> <td>not change</td> <td></td> </tr> </table>	pattern	✓	decimal place		carefully		not change		1					
pattern	✓															
decimal place																
carefully																
not change																
	(c) (i)	goes up again / twice	1													
	(ii)	<table border="1"> <tr> <td>snack</td> <td>✓</td> </tr> <tr> <td>more often</td> <td></td> </tr> <tr> <td>no meal</td> <td></td> </tr> <tr> <td>later</td> <td></td> </tr> <tr> <td>read wrongly</td> <td>✓</td> </tr> </table>	snack	✓	more often		no meal		later		read wrongly	✓	2			
snack	✓															
more often																
no meal																
later																
read wrongly	✓															
	(d)	<table border="1"> <tr> <td></td> <td></td> <td>reproductive</td> </tr> <tr> <td>glucose</td> <td></td> <td>endocrine</td> </tr> <tr> <td>temperature</td> <td></td> <td>binomial</td> </tr> <tr> <td></td> <td></td> <td>nervous</td> </tr> </table>			reproductive	glucose		endocrine	temperature		binomial			nervous	2	
		reproductive														
glucose		endocrine														
temperature		binomial														
		nervous														
<b>Total</b>			<b>14</b>													

Question		Answer	Marks	Guidance										
4	(a) (i)	both have circular or elliptical orbits / go round idea	1											
	(ii)	Any <b>two</b> from: Earth goes round the sun; Earth has a larger orbit / moon has a smaller orbit Moon goes round the Earth;  QWC: Answer is clear and easy to understand at first reading.	3											
	(b)	<table border="1"> <tr> <td>invisible spheres</td> <td></td> </tr> <tr> <td>big bang</td> <td>✓</td> </tr> <tr> <td>gravity</td> <td></td> </tr> <tr> <td>expanding</td> <td>✓</td> </tr> <tr> <td>centre</td> <td></td> </tr> </table>	invisible spheres		big bang	✓	gravity		expanding	✓	centre		2	
invisible spheres														
big bang	✓													
gravity														
expanding	✓													
centre														
	(c)	<table border="1"> <tr> <td>vary</td> <td></td> </tr> <tr> <td>slowly</td> <td></td> </tr> <tr> <td>give out light</td> <td>✓</td> </tr> <tr> <td>same speed</td> <td>✓</td> </tr> <tr> <td>shine light</td> <td></td> </tr> </table>	vary		slowly		give out light	✓	same speed	✓	shine light		2	
vary														
slowly														
give out light	✓													
same speed	✓													
shine light														
<b>Total</b>			<b>8</b>											

Question		Answer	Marks	Guidance
5	(a)	<p><b>Level 3 (5–6 marks)</b> Gives some similarities and identifies differences between all three models. Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks)</b> Gives some similarities and identifies differences between two models. Quality of written communication partly impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks)</b> Describes models without comparisons or gives some similarities between the models. Quality of written communication impedes communication of the science at this level.</p> <p><b>Level 0 (0 marks)</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades up to D</b></p> <p><b>Indicative scientific points may include:</b></p> <p><b>Similarities</b></p> <ul style="list-style-type: none"> <li>• all models have sugar</li> <li>• all have phosphate</li> <li>• all have chains</li> <li>• all have bases.</li> </ul> <p><b>Differences</b></p> <p>Model 1:</p> <ul style="list-style-type: none"> <li>• bases on the outside</li> <li>• held together with magnesium</li> <li>• three chains.</li> </ul> <p>Model 2:</p> <ul style="list-style-type: none"> <li>• bases on the outside</li> <li>• has hydrogen atoms</li> <li>• three chains.</li> </ul> <p>Model 3:</p> <ul style="list-style-type: none"> <li>• two chains</li> <li>• double helix</li> <li>• bases on the inside</li> <li>• bases hold helix together.</li> </ul> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>

Question	Answer	Marks	Guidance															
(b)	<table border="1" data-bbox="309 212 792 485"> <tr> <td>explained</td> <td>✓</td> </tr> <tr> <td>did not fit</td> <td></td> </tr> <tr> <td>did not agree</td> <td></td> </tr> <tr> <td>too quickly</td> <td></td> </tr> <tr> <td>change their ideas</td> <td>✓</td> </tr> </table>	explained	✓	did not fit		did not agree		too quickly		change their ideas	✓	2						
explained	✓																	
did not fit																		
did not agree																		
too quickly																		
change their ideas	✓																	
(c)	any 2 from: examine DNA <u>structure</u> ; shows where bases / chains are; evidence against (Pauling's) structure; evidence for double helix;	2																
(d)	<table border="1" data-bbox="309 754 792 1027"> <tr> <td>recheck data</td> <td>✓</td> </tr> <tr> <td>same team</td> <td>✓</td> </tr> <tr> <td>other projects</td> <td></td> </tr> <tr> <td>do not share</td> <td></td> </tr> <tr> <td>not important</td> <td></td> </tr> </table>	recheck data	✓	same team	✓	other projects		do not share		not important		2						
recheck data	✓																	
same team	✓																	
other projects																		
do not share																		
not important																		
(e)	<table border="1" data-bbox="309 1094 808 1273"> <thead> <tr> <th></th> <th>true</th> <th>false</th> </tr> </thead> <tbody> <tr> <td>groups of three</td> <td></td> <td>✓</td> </tr> <tr> <td>AT &amp; CG</td> <td>✓</td> <td></td> </tr> <tr> <td>Genes</td> <td>✓</td> <td></td> </tr> <tr> <td>bases not joined</td> <td></td> <td>✓</td> </tr> </tbody> </table>		true	false	groups of three		✓	AT & CG	✓		Genes	✓		bases not joined		✓	2	All correct = 2 2/3 correct = (1)
	true	false																
groups of three		✓																
AT & CG	✓																	
Genes	✓																	
bases not joined		✓																
	<b>Total</b>	<b>14</b>																

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