

# **Mark Scheme for June 2010**

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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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## Guidance for Examiners

Additional Guidance within any mark scheme takes precedence over the following guidance.

1. Mark strictly to the mark scheme.
2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
3. Accept any clear, unambiguous response which is correct, e.g. mis-spellings if phonetically correct (but check additional guidance).
4. Abbreviations, annotations and conventions used in the detailed mark scheme:

/	= 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	= alternative wording
ORA	= or reverse argument

E.g. mark scheme shows 'work done in lifting / (change in) gravitational potential energy' (1)

work done = 0 marks  
work done lifting = 1 mark  
change in potential energy = 0 marks  
gravitational potential energy = 1 mark

5. Annotations:  
The following annotations are available on SCORIS.

✓	= correct response
✗	= incorrect response
bod	= benefit of the doubt
nbod	= benefit of the doubt <b>not</b> given
ECF	= error carried forward
^	= information omitted
I	= ignore
R	= reject

6. If a candidate alters his/her response, examiners should accept the alteration.
7. 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 0 marks.

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 one mark.

Put ticks (✓) in the two correct boxes.

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

This would be worth one mark.

8. 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.

9. 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			Expected Answers	Marks	Additional Guidance												
1	a	i	<p>... negative electrical charge ... <input type="checkbox"/></p> <p>... positive electrical charge ... <input type="checkbox"/></p> <p>Beta ... .. less ionising ... .. alpha ... <input type="checkbox"/></p> <p>Beta ... .. more penetrating ... .. alpha ... <input checked="" type="checkbox"/> (1)</p> <p>... electromagnetic spectrum ... <input type="checkbox"/></p> <p>Gamma ... .. not absorbed ... .. beta ... <input checked="" type="checkbox"/> (1)</p>	[2]	<p>two correct ticks and four blanks = 2 marks</p> <p>two correct ticks, one incorrect tick and three blanks = 1 mark</p> <p>one correct tick and at least four blanks = 1 mark</p> <p><b>allow</b> any other indication of correct response eg underlining, cross, shading</p>												
		ii	<table border="1"> <tr> <td>2 mg</td> <td>5 days</td> <td></td> </tr> <tr> <td>2 mg</td> <td>20 days</td> <td>✓</td> </tr> <tr> <td>4 mg</td> <td>5 days</td> <td></td> </tr> <tr> <td>4 mg</td> <td>20 days</td> <td></td> </tr> </table> <p>(1)</p>	2 mg	5 days		2 mg	20 days	✓	4 mg	5 days		4 mg	20 days		[1]	<p>no extra ticks allowed</p> <p><b>allow</b> any other indication of correct response eg underlining, cross, shading</p>
2 mg	5 days																
2 mg	20 days	✓															
4 mg	5 days																
4 mg	20 days																
	b		<p>ALARA = as low as reasonably achievable / owtte (1)</p> <p><b>plus any two from:</b></p> <p>limit time near radioactives;</p> <p>monitor dose;</p> <p>changes surgeon's rota to avoid radioactives if dose excessive;</p> <p>use of protective clothing;</p> <p>encasing syringes and patient in dense shielding;</p> <p>explanation for suggestion;</p>	[3]	<p>needs to state or imply both 'reasonably' (eg within the context of the work they are doing) and 'achievable' (eg possible or acceptable)</p> <p>either two suggestions or one suggestion plus explanation</p>												
			<b>Total</b>	[6]													

Question			Expected Answers	Marks	Additional Guidance
2	a	i	nuclear (fuel) (1)	[1]	
		ii	1999 (1)	[1]	
		iii	gas and coal (1)	[1]	either order both required and <b>no others</b> for the mark
		iv	nuclear (fuel) and oil (1)	[1]	either order both required and <b>no others</b> for the mark
	b		... renewable energy sources. <input type="checkbox"/> ... more efficient ... <input checked="" type="checkbox"/> ... produce less heat ... <input type="checkbox"/> ... more useful in a town ... <input checked="" type="checkbox"/> ... produce more electricity ... <input type="checkbox"/>	[1]	<b>both</b> needed for the mark. no extra ticks allowed <b>allow</b> any other indication of correct response eg underlining, cross, shading
			<b>Total</b>	<b>[5]</b>	
3	a		A only <input type="checkbox"/> N only <input type="checkbox"/> Z only <input checked="" type="checkbox"/> (1) A, N and Z <input type="checkbox"/>	[1]	no extra ticks allowed  <b>allow</b> any other indication of correct response e.g. underlining, cross, shading
		b	evidence of halving over 15 days (1) 16 to 1 is 4 half lives so answer = $4 \times 15 = 60$ days (1)	[2]	can be deduced from calculations  bald '60 days' gets both marks
					<b>Total</b>

Question		Expected Answers	Marks	Additional Guidance																					
4	a	DNA (1)	[1]	order of letters important, but case not, eg <b>not</b> ADN but <b>accept</b> dNa																					
	b	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 15%; text-align: center;">agrees</th> <th style="width: 15%; text-align: center;">disagrees</th> </tr> </thead> <tbody> <tr> <td>... changed over time ...</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Differences ...</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>... on to the next generation.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>Mutations occur by chance.</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>... changes to proteins.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>... sex cell ...</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </tbody> </table>		agrees	disagrees	... changed over time ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Differences ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	... on to the next generation.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Mutations occur by chance.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	... changes to proteins.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	... sex cell ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	[3]	all correct = 3 marks five correct = 2 marks (i.e. one mistake) three or four correct = 1 mark (ie two or three mistakes) count the mistakes to see how many marks to allocate  <b>allow</b> any other indication of correct response eg underlining, cross, shading
	agrees	disagrees																							
... changed over time ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>																							
Differences ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>																							
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... changes to proteins.	<input type="checkbox"/>	<input checked="" type="checkbox"/>																							
... sex cell ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>																							
<b>Total</b>			[4]																						
5	a	hormonal/hormone/endocrine <b>and</b> nerve/nervous/central nervous (system) (1)	[1]	<b>both</b> needed for the mark but can be in either order <b>accept</b> mis-spelled words if meaning is clear.																					
	b	receptor/sensory (1) response (1) effector / muscle / gland (1)	[3]	<b>do not accept</b> nerve <b>accept</b> reaction in place of response																					
	c	homeostasis (1)	[1]	<b>accept</b> mis-spelled word if meaning is clear																					
<b>Total</b>			[5]																						

Question		Expected Answers	Marks	Additional Guidance
6		<b>any two from:</b> religious conviction; natural selection/evolution is too slow to observe; did not like the idea that they were evolved from 'apes'; insufficient evidence; lack of knowledge of a genetic mechanism;	[2]	two clearly distinct arguments  <b>allow</b> 'not enough time for it to have happened'  <b>accept</b> already had an explanation they were satisfied with;
		<b>Total</b>	[2]	
7	a	<b>any two from:</b> established theories had worked well; reluctant to abandon old explanation; (big change suggested from) small amount of data / data limited to one place; needs verification/replication / not peer reviewed;	[1]	
	b	<b>any two from:</b> new disease; reduction of food; loss of shelter; climate/environment/habitat change; natural disaster eg meteorite; lack of reproductive success;	[2]	<b>ignore</b> competition ideas for food or habitat watch out for restatement from 5a and from question – <b>ignore</b> died in the Ice Age (but <b>accept</b> 'too cold' or 'too hot') <b>accept</b> 'new predators' <b>ignore</b> ref to brain size or intelligence  <b>accept</b> could not find a mate
		<b>Total</b>	[3]	



Question			Expected Answers	Marks	Additional Guidance															
8	a	i	sugar <input type="checkbox"/> water <input checked="" type="checkbox"/> (1) vegetable oil <input checked="" type="checkbox"/> (1) colouring <input type="checkbox"/> flavouring <input type="checkbox"/>	[2]	each correct answer = 1 mark if three ticks made deduct 1 mark four or five ticks = 0 marks  <b>allow</b> any other indication of correct response eg underlining, cross, shading															
		ii	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 20%; text-align: center;">true</th> <th style="width: 20%; text-align: center;">false</th> </tr> </thead> <tbody> <tr> <td>... supply energy ...</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>... passed a safety text ...</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>... approved for use ...</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>... never harmful.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </tbody> </table>		true	false	... supply energy ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	... passed a safety text ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	... approved for use ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	... never harmful.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	[2]	all four boxes correct = 2 marks three or two correct = 1 mark  <b>allow</b> any other indication of correct response eg underlining, cross, shading
	true	false																		
... supply energy ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>																		
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... never harmful.	<input type="checkbox"/>	<input checked="" type="checkbox"/>																		
	b	i	polymers (1) sugars (1) oxygen (1)	[3]	must be these examples <b>ignore</b> mis-spelling if it is clear which word is intended															
		ii	glucose small soluble molecules absorbed into the blood	[1]	all correct for the mark															
<b>Total</b>				[8]																

Question		Expected Answers	Marks	Additional Guidance
9	a	<p>Harry <input type="checkbox"/></p> <p>Anwar <input type="checkbox"/></p> <p>Rachel <input type="checkbox"/></p> <p>Tessa <input checked="" type="checkbox"/> (1)</p> <p>Dominic <input type="checkbox"/></p>	[1]	<b>allow</b> any other indication of correct response eg underlining, cross, shading
	b	benefit of enjoying eggs / eating them for protein (1) outweighs risk of getting diabetes (1)	[2]	
	c	<p><b>any three from:</b> the risk of getting diabetes with no eggs; increase in risk from eating eggs; consequences of getting diabetes;</p> <p>other factors that may be credited – genetic factors: could be family or community/ethnic group; lifestyle factors: diet / exercise / obesity / smoking / alcohol; sample discrepancies: age / gender / home / job / egg types; lack of a suggested causal mechanism; pre-existing medical condition may increase risk of getting type 2 diabetes;</p>	[3]	<p>must specify a lifestyle factor to get this mark.</p> <p>egg types: eg size, species, battery/free range ie Dominic needs an explanation for how eggs can actually cause diabetes.</p>
		<b>Total</b>	<b>[6]</b>	

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