

Mark Scheme for January 2011

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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, eg 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
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	= alternative wording
ORA	= or reverse argument

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

The example on the next page illustrates how to apply this principle to an objective question.

eg for a one mark question, where ticks in boxes 3 and 4 are required for the mark

Put ticks (✓) in the two correct boxes.

✓
✗

This would be worth zero marks.

Put ticks (✓) in the two correct boxes.

✗
✗

This would be worth one mark.

Put ticks (✓) in the two correct boxes.

✗
✗
✓
✓

This would be worth one mark.

7. 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, eg 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.

8. 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, eg 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.

eg if a question requires candidates to identify a city in England, then in the boxes

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

Question		Expected Answers	Marks	Additional Guidance
1	(a)	nucleus (1) DNA (1) gene (1)	[3]	
	(b)	<div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> ... more identical alleles <input checked="" type="checkbox"/> (1) <input type="checkbox"/> </div>	[1]	
	(c)	X (1) Y (1)	[2]	One mark for each correct answer. Allow either upper case or lower case letters, i.e. the first answer could be X or x.
Total			[6]	

Question		Expected Answers				Marks	Additional Guidance																
2	(a)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="4">combination of alleles present in</th> </tr> <tr> <th>disorder</th> <th>an individual without the disorder</th> <th>an individual with the disorder</th> <th>a carrier of the disorder</th> </tr> </thead> <tbody> <tr> <td>HD</td> <td>hh</td> <td>or HH</td> <td>no carriers</td> </tr> <tr> <td>CF</td> <td>or BB</td> <td>bb</td> <td>Bb / bB</td> </tr> </tbody> </table>				combination of alleles present in				disorder	an individual without the disorder	an individual with the disorder	a carrier of the disorder	HD	hh	or HH	no carriers	CF	or BB	bb	Bb / bB	[2]	one mark for each correct row. Case of each letter must be correct, unlike Q 1(c).
combination of alleles present in																							
disorder	an individual without the disorder	an individual with the disorder	a carrier of the disorder																				
HD	hh	or HH	no carriers																				
CF	or BB	bb	Bb / bB																				
	(b)	for – (may) cure CF (1) against – side effects (1)				[2]	'Replace faulty gene' or similar is not enough without 'cure' or similar																
Total			[4]																				

Question			Expected Answers	Marks	Additional Guidance
3	(a)	(i)	<div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ...each other <input checked="" type="checkbox"/> (1) </div>	[1]	
		(ii)	<div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ... an unspecialised cell... <input checked="" type="checkbox"/> (1) </div>	[1]	
	(b)		any two from: benefit men/couples/people with fertility problems; may not work / unproven; wrong to use human embryos;	[2]	eg problems having children. 'couples who want children' by itself is not enough. 'Women with fertility problems' not acceptable. Not just a quote 'fully developed sperm not made' without consequence Allow unnatural but not 'not normal' Allow religious issues only if linked to embryo use
Total				[4]	

Question	Expected Answers	Marks	Additional Guidance					
4 (a)		[2]	three links correct = 2 marks two or one link correct = 1 mark If any box has more than one link to another box going to it, or coming from it, do not count that box. Marking here is: <ul style="list-style-type: none"> • One mark for one or two correct • Two marks for all correct 					
(b) (i)	2000 (1)	[1]						
(ii)	44 (1)	[1]	allow 41 to 46					
(iii)	As the percentage ... air decreases. <table style="margin-left: 200px;"> <tr><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/> (1)</td></tr> <tr><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> </table>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> (1)	<input type="checkbox"/>	<input type="checkbox"/>	[1]	
<input type="checkbox"/>								
<input type="checkbox"/>								
<input checked="" type="checkbox"/> (1)								
<input type="checkbox"/>								
<input type="checkbox"/>								
(iv)	Factories, power stations... <table style="margin-left: 200px;"> <tr><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/> (1)</td></tr> <tr><td><input type="checkbox"/></td></tr> </table>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> (1)	<input type="checkbox"/>	[1]		
<input type="checkbox"/>								
<input type="checkbox"/>								
<input checked="" type="checkbox"/> (1)								
<input type="checkbox"/>								
Total		[6]						

Question		Expected Answers	Marks	Additional Guidance
5	(a)	oxygen carbon dioxide water	[2]	all three correct = 2 marks one or two correct = 1 mark Marking here is the same as in 4(a): <ul style="list-style-type: none"> • One mark for one or two correct • Two marks for all correct
	(b) (i)	value is very different / much higher / an outlier/an anomaly (1) than the other results/doesn't fit the pattern (1)	[2]	'Highest' by itself is not enough – it needs to be significantly different Comparison with rest for the second mark
	(ii)	133 (1)	[1]	ring around any other number(s) = 0
	(iii)	131 to 136 (1)	[1]	ring around any other answer(s) = 0
	(c)	dissolves in rain water (1); making acid rain (1); harms plants/animals/damages buildings, statues,etc/pollutes lakes or ponds or streams or water (1)	[2]	Any two points 'breathing problems (for asthmatics)' is OK as 'harms animals' Last mark is a consequence and does not rely on 'acid rain' as the causal agent
Total			[8]	

Question		Expected Answers	Marks	Additional Guidance
6	(a)	<div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> Some African fossils ... <input checked="" type="checkbox"/> (1) Rock layers on some ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> </div>	[2]	two correct ticks and three blanks = 2 marks two correct ticks and two blanks = 1 mark one correct tick and at least three blanks = 1 mark no other combination gains marks
	(b)	any three from: continental movement not detectable (1); no known mechanism (1); Wegener an outsider/not a geologist/he was a meteorologist(weatherman) (1); (too big an idea on) limited evidence (1); other explanations e.g. land bridges did as well (1)	[3]	allow tendency to stick with accepted ideas allow work not peer-reviewed / no-one could replicate findings reject 'not a scientist' reject 'no evidence'
Total			[5]	

Question		Expected Answers	Marks	Additional Guidance
7	(a)	0 (1)	[1]	
	(b)	beginning: started at one point / 'Big Bang' / galaxies/space moving outwards since / about 14 000 million years ago (1) unpredictable end: observations not good enough yet / mass of Universe not known (1)	[2]	for two marks, should have one 'beginning' mark and one 'unpredictable' mark Do not give first mark if Big Bang theory described wrongly eg solar system formation Allow 13 000 million years to 15 000 years Should refer to inadequate data/evidence or poor model
Total			[3]	

Question		Expected Answers	Marks	Additional Guidance
8	(a)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ...two tectonic plates meet. <input checked="" type="checkbox"/> (1)	[1]	
	(b)	<input type="checkbox"/> <input type="checkbox"/> mountains <input checked="" type="checkbox"/> (1) <input type="checkbox"/> volcanoes <input checked="" type="checkbox"/> (1)	[2]	two correct ticks and three blanks = 2 marks two correct ticks and two blanks = 1 mark one correct tick and at least three blanks = 1 mark no other combination gains marks
	(c) (i)	much more (radon) given out recently (1)	[1]	allow any clear reference to his second sentence, eg 'the amount of radon gas' or 'how much gas' NOT a quote from the first sentence, i.e. NOT 'measuring radon gas'
	(ii)	rocks moving (1)	[1]	allow any clear reference to his third sentence, NOT the third i.e. NOT 'earthquake'
	(d)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Radon levels often change... <input checked="" type="checkbox"/> (1)	[1]	
Total			[6]	
Total			[42]	

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