

# **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
<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

*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 below 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		✓		✓	✓		✓	
<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)	<table border="1"> <thead> <tr> <th>material</th> <th>single chemical</th> <th colspan="2">mixture</th> </tr> </thead> <tbody> <tr> <td>crude oil</td> <td></td> <td colspan="2">✓</td> </tr> <tr> <td>ethene</td> <td>✓</td> <td colspan="2"></td> </tr> <tr> <td>iron</td> <td>✓</td> <td colspan="2"></td> </tr> <tr> <td>wood</td> <td></td> <td colspan="2">✓</td> </tr> </tbody> </table>			material	single chemical	mixture		crude oil		✓		ethene	✓			iron	✓			wood		✓		[2]	all 4 rows correct = 2 marks 3 or 2 rows correct =1 mark
	material	single chemical	mixture																							
crude oil		✓																								
ethene	✓																									
iron	✓																									
wood		✓																								
	(b)	<table border="1"> <thead> <tr> <th></th> <th>better ...</th> <th>worse ...</th> <th>no different ...</th> </tr> </thead> <tbody> <tr> <td>does not break</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>transparent</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>less dense</td> <td>✓</td> <td></td> <td></td> </tr> </tbody> </table>				better ...	worse ...	no different ...	does not break	✓			transparent			✓	less dense	✓			[2]	all 3 rows correct = 2 marks 2 rows correct =1 mark				
	better ...	worse ...	no different ...																							
does not break	✓																									
transparent			✓																							
less dense	✓																									

Question	Expected Answers	Marks	Additional Guidance
1 (c)	any correct example and use  property with explanation relevant to example.	[1]  [2]	if the material is glass, 0 marks for whole question  first mark is for both the material <u>and</u> the use  must be a material, not the name of an object. material being replaced must not be a plastic eg polystyrene cups = 0 marks cardboard box = 1 mark  reasons must be correct for context given eg iron used in buckets(1) lighter to carry(1) and does not rust(1)  examples of possible reasons  easier to make                      stronger                      transparent doesn't tear                      cost                      waterproof plastic rots less easily [even for chairs!]  even though there may be 0 marks for the first point, credit may still be given for reasons if they make sense – but they must have made some partial suggestion for the material+use  eg “metal used for coke cans” loses first mark, but may get the rest eg blank line, then ‘plastic bags’ then ‘weigh less & more flexible’ = 2 marks <b>allow</b> ‘plastic easier to recycle than pottery’ [but see ignore section for others]  <b>ignore</b> plastic chairs stronger than wooden ones plastic is easier to recycle than metal/paper/wood volume of plastic is less reference to biodegradable plastics safety unless suitably qualified plastic lighter than cardboard saves trees
	<b>Total</b>	<b>[7]</b>	

Question			Expected Answers	Marks	Additional Guidance
2	(a)	(i)	<p>Less than half</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p>	[1]	tick in any other box = 0 marks
		(ii)	<p>We cannot process anymore</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p>	[1]	tick in any other box = 0 marks
		(iii)	<p>Build more recycling plants</p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p>Make less waste</p> <p><input checked="" type="checkbox"/></p>	[2]	1 mark for each correct tick if 3 ticks deduct 1 mark 4 ticks = 0 marks

Question			Expected Answers	Marks	Additional Guidance
2	(a)	(iv)	<p>Energy is used to transport ... China</p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p>	[1]	tick in any other box = 0 marks
2	(b)		<p>any two reasonable points OR one valid point plus explanation</p>	[2]	<p>examples</p> <p>lowers the need for fuel/crude oil/fossil fuels; that is a non-renewable resource; less need for landfill - as waste is removed by burning it; no need to send it to China / energy of transport waste is a <b>renewable</b> resource [but ignore waste is an energy source]</p> <p><b>ignore</b></p> <p>cost, "eco friendly", less recycling, less pollution, reduces amount of waste, waste would be an energy source increase the energy in Britain global warming related to CO<sub>2</sub>, less CO<sub>2</sub> [including for transportation]</p>
<b>Total</b>				[7]	



Question		Expected Answers	Marks	Additional Guidance
3	(a)	<p>absorbed by food</p> <p><input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p>	[1]	tick in any other box = 0 marks
	(b)	<p>More photons per second</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p>	[1]	tick in any other box = 0 marks
	(c) (i)	<p>Donna</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/> (1)</p>	[1]	tick in any other box = 0 marks

Question			Expected Answers	Marks	Additional Guidance
3	(c)	(ii)	Anne <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	[1]	tick in any other box = 0 marks
<b>Total</b>				<b>[4]</b>	

Question			Expected Answers	Marks	Additional Guidance
4			animals respire / give off CO <sub>2</sub> / take in O <sub>2</sub>  plants photosynthesise / take in CO <sub>2</sub> / give off O <sub>2</sub>	[2]	process must be correctly tied to plant or animal.  unqualified "it" refers to carbon dioxide [in the context of this question]  <b>allow</b> plants 'breathe', on this occasion we are not testing a detailed understanding of photosynthesis.  <b>allow</b> animals decay to give off CO <sub>2</sub>  "plants and animals photosynthesise" = 0 for the whole question <b>ignore</b> - plants respiring / giving off CO <sub>2</sub> - eating references, - references to methane
<b>Total</b>				<b>[2]</b>	

Question			Expected Answers	Marks	Additional Guidance
5	(a)	(i)	10°C (1)	[1]	
		(ii)	17°C (1)	[1]	accept 17 to 17.2
	(b)		qualitative comparison of the two graphs (1) with both variables mentioned by name (1)	[2]	eg patterns match / the two graphs look the same = 1 mark temperature and CO <sub>2</sub> levels go up at the same time = 2 marks ignore "there is a correlation"
			<b>Total</b>	<b>[4]</b>	

Question		Expected Answers	Marks	Additional Guidance							
6	(a)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>(radio)</td> <td></td> <td>(IR)</td> <td>(light)</td> <td></td> <td><b>X- Rays</b></td> <td>(gam ma)</td> </tr> </table>	(radio)		(IR)	(light)		<b>X- Rays</b>	(gam ma)	[1]	check to see that X-rays has not been written in more than one position, if so = 0 marks apart from that, <b>ignore</b> anything else written in the other boxes
(radio)		(IR)	(light)		<b>X- Rays</b>	(gam ma)					
	(b)	<p style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input checked="" type="checkbox"/> </p> <p>X-rays are transmitted (1)</p>	[1]	tick in any other box = 0 marks							
	(c)	<p style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input checked="" type="checkbox"/> </p> <p>benefit outweighs risk (1)</p>	[1]	tick in any other box = 0 marks							
	(d)	<p style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>  <input checked="" type="checkbox"/>  <input type="checkbox"/> </p> <p>weaker further from tube (1)</p>	[1]	tick in any other box = 0 marks							
<b>Total</b>			<b>[4]</b>								

Question			Expected Answers	Marks	Additional Guidance
7	(a)	(i)	1972 and lower (1)	[1]	both needed for the mark
		(ii)	<p><b>any two reasonable suggestions, eg:</b>            fewer people smoke;            (improvement in) diet;            (men take more) exercise;            (men drink less) alcohol;</p>	[2]	<p>max 2            reasons must be plausible to the candidate – we are not after precise historical knowledge <b>accept</b> any reasonable ideas.</p> <p>ideas must be different “Men do more sport and take more exercise” = 1 only</p> <p><b>ignore</b> <i>general</i> statements about healthy lifestyle – “they would be more healthy”, “more fitness”, “cleaner lifestyle”</p> <p>direction of change not needed eg “change in diet”            if direction given, it must be correct.</p> <p>medical arguments must be about lifestyle, eg “more men are vaccinated” not ‘more doctors’</p> <p>treat food as different from alcohol</p> <p>“they do different jobs” – not enough unless more detail given</p>
	(b)		1(1) and 3 (1)	[2]	either order
<b>Total</b>				[5]	

Question			Expected Answers	Marks	Additional Guidance
8	(a)	(i)	<div style="text-align: right;"> <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  vaccines trigger ... antibodies <input checked="" type="checkbox"/> (1) </div>	[1]	tick in any other box = 0 marks
		(ii)	antibiotics don't kill viruses <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	[1]	tick in any other box = 0 marks

Question			Expected Answers	Marks	Additional Guidance																							
8	(a)	(iii)	<p><b>one from for stopping</b>  cost too great;  risk of side effects is too great compared to getting flu;  vaccinated people run the risk to protect others which is not fair;</p> <p><b>one from against stopping</b>  vaccination would stop an epidemic, benefiting everyone;  flu is a dangerous disease;  less than 1 in 100 000 affected by side effects;  Individuals should have been able to decide for themselves;</p>	[2]	<p>if the statement is copied out from the text but not amplified in any way, treat as follows</p> <p><u>for stopping</u>  it would cost \$137 million  side effects occurred [in 500]  some people died</p> <p><u>against stopping</u>  side effects in less than 1 in 100 000  most people recovered [from side effects]</p> <p><u>neutral</u>  most recovered but some died  less than a quarter had been vaccinated</p> <p>“only less than a quarter had been vaccinated” is a point against stopping</p>																							
8	(b)	(i)	<table border="1"> <thead> <tr> <th rowspan="2">stage</th> <th colspan="3">test used to check .....</th> </tr> <tr> <th>effectiveness</th> <th>safety</th> <th>both</th> </tr> </thead> <tbody> <tr> <td>human cells grown in the laboratory</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>animals</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>healthy volunteers</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>people with the illness</td> <td></td> <td></td> <td>✓</td> </tr> </tbody> </table>	stage	test used to check .....			effectiveness	safety	both	human cells grown in the laboratory			✓	animals			✓	healthy volunteers		✓		people with the illness			✓	[2]	<p>all 4 correct = 2 marks  3 or 2 correct = 1 mark  1 correct = 0 marks</p>
stage	test used to check .....																											
	effectiveness	safety	both																									
human cells grown in the laboratory			✓																									
animals			✓																									
healthy volunteers		✓																										
people with the illness			✓																									

Question			Expected Answers	Marks	Additional Guidance
8	(b)	(ii)	The claim has been checked ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	[1]	tick in any other box = 0 marks
8	(c)		<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; justify-content: space-between; width: 100%;"> <div style="border: 1px solid black; padding: 5px; width: 20%;">only use antibiotics ...</div> <div style="border: 1px solid black; padding: 5px; width: 20%;">... important to kill all ... bacteria</div> </div> <div style="display: flex; justify-content: space-between; width: 100%; margin-top: 10px;"> <div style="border: 1px solid black; width: 20%; height: 20px;"></div> <div style="border: 1px solid black; width: 20%; height: 20px;"></div> </div> <div style="display: flex; justify-content: space-between; width: 100%; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; width: 20%;">always finish a course ...</div> <div style="border: 1px solid black; padding: 5px; width: 20%;">... more often antibiotics ...</div> </div> <div style="display: flex; justify-content: space-between; width: 100%; margin-top: 10px;"> <div style="border: 1px solid black; width: 20%; height: 20px;"></div> <div style="border: 1px solid black; width: 20%; height: 20px;"></div> </div> </div>	[2]	more than one line from a left hand box = 0 for that box
<b>Total</b>				[9]	



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