

**Science A**

General Certificate of Secondary Education **A213/01**

Unit 3: Modules B3, C3, P3

**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	<p>It kills cancer cells. <input checked="" type="checkbox"/> (1)</p> <p>It kills healthy cells. <input type="checkbox"/></p> <p>It makes healthy cells cancerous. <input type="checkbox"/></p> <p>It makes cancerous cells healthy. <input type="checkbox"/></p>	[1]	if more than one box ticked, no mark <b>allow</b> any other indication of correct response eg underlining, cross, shading
	b	<p>... more ionising than beta ... <input type="checkbox"/></p> <p>... not given out ... <input type="checkbox"/></p> <p>... absorb beta radiation more ... <input checked="" type="checkbox"/> (1)</p> <p>... absorb beta radiation less ... <input type="checkbox"/></p>	[1]	if more than one box ticked, no mark <b>allow</b> any other indication of correct response eg underlining, cross, shading
	c	<p>... 5 days instead of 10 days <input type="checkbox"/></p> <p>... 15 days instead of 10 days <input checked="" type="checkbox"/> (1)</p> <p>... farther away ... <input type="checkbox"/></p> <p>... less radioactive material ... <input type="checkbox"/></p> <p>... more radioactive material ... <input checked="" type="checkbox"/> (1)</p>	[2]	if more than two boxes ticked, deduct one mark for each incorrect answer <b>allow</b> any other indication of correct response eg underlining, cross, shading

Question		Expected Answers	Marks	Additional Guidance
1	d	job (1) eg radiographer, surgeon, doctor, nurse, porter  two ways to reduce risk <b>any two from:</b>  <b>shielding</b> – protective clothing; screen/barrier; storage of source;  <b>time</b> – minimise exposure time / job rotation;  <b>distance</b> – increase;  <b>monitoring</b> – eg regular checks (to ensure dose not excessive) / wearing of badges;	[3]	can describe job eg person giving injection not just ‘operator’ but do <b>not</b> accept job references to X-rays <b>NB first marking point is independent of the rest</b>  treat X-rays as neutral for risk reduction  only one mark for various aspects of clothing/goggles  <b>accept</b> leave the room during treatment (for distance idea)
		<b>Total</b>	[7]	

Question			Expected Answers	Marks	Additional Guidance
2	a	i	<p>... used in many ways. <input checked="" type="checkbox"/> (1)</p> <p>Only ... .. for lighting. <input type="checkbox"/></p> <p>... easy to transmit ... <input checked="" type="checkbox"/> (1)</p> <p>... can be dangerous. <input type="checkbox"/></p> <p>Most power stations ... <input type="checkbox"/></p>	[2]	<p>if more than two boxes ticked, deduct one mark for each incorrect answer</p> <p><b>allow</b> any other indication of correct response eg underlining, cross, shading</p>
		ii	<p>... fossil fuel. <input type="checkbox"/></p> <p>... primary energy source. <input type="checkbox"/></p> <p>... renewable energy source. <input type="checkbox"/></p> <p>... secondary energy source. <input checked="" type="checkbox"/> (1)</p>	[1]	<p>if more than one box ticked, no mark</p> <p><b>allow</b> any other indication of correct response eg underlining, cross, shading</p>
	<b>b</b>	i	nuclear (fuel) (1)	[1]	
		ii	1999 (1)	[1]	
		iii	gas and coal (1)	[1]	<b>either order</b> both required and <b>no others</b> for the mark
		iv	nuclear (fuel) and oil (1)	[1]	<b>either order</b> both required and <b>no others</b> for the mark
			<b>Total</b>	[7]	

Question		Expected Answers	Marks	Additional Guidance
3	a	the internet <input type="checkbox"/> photographs <input type="checkbox"/> DNA analysis <input checked="" type="checkbox"/> (1) TV programmes <input type="checkbox"/>	[1]	if more than one box ticked, no mark <b>allow</b> any other indication of correct response eg underlining, cross, shading
	b	They may not believe ... <input type="checkbox"/> ... do not like new ideas. <input type="checkbox"/> ... few complete skulls ... <input checked="" type="checkbox"/> (1) ... breeding experiments ... <input type="checkbox"/>	[1]	if more than one box ticked, no mark <b>allow</b> any other indication of correct response eg underlining, cross, shading
<b>Total</b>			[2]	
4	a	hormonal (1) nervous (1)	[2]	one mark each – deduct one mark for each extra choice <b>allow</b> any other indication of correct response eg underlining
	b	receptor response effector	[2]	all correct = 2 marks one or two correct = 1 mark  if no answer on lines, watch out for other indications of choice e.g. lines to words, numbered key
<b>Total</b>			[4]	



Question		Expected Answers	Marks	Additional Guidance
5	a	<p>... lived in caves. <input type="checkbox"/></p> <p>... used fire and flint stone tools. <input type="checkbox"/></p> <p>... ate a greater variety of foods. <input checked="" type="checkbox"/> (1)</p> <p>... became extinct ... <input type="checkbox"/></p> <p>... lived at the same time ... <input checked="" type="checkbox"/> (1)</p>	[2]	<p>if more than two boxes ticked, deduct one mark for each incorrect answer</p> <p><b>allow</b> any other indication of correct response eg underlining, cross, shading</p>
	b	<p><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;</p>	[2]	<p><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</p>
<b>Total</b>			[4]	

Question		Expected Answers	Marks	Additional Guidance
6	a	<p>... in many countries. <input type="checkbox"/></p> <p>... can be inherited. <input checked="" type="checkbox"/> (1)</p> <p>Variation exists ... <input checked="" type="checkbox"/> (1)</p> <p>Sexual reproduction ... <input type="checkbox"/></p> <p>Asexual reproduction ... <input type="checkbox"/></p>	[2]	<p>if more than two boxes ticked, deduct one mark for each incorrect answer</p> <p><b>allow</b> any other indication of correct response eg underlining, cross, shading</p>
	b	<p><b>any two from:</b></p> <p>religious conviction;</p> <p>natural selection/evolution is too slow to observe;</p> <p>did not like the idea that they were evolved from 'apes';</p> <p>insufficient evidence;</p> <p>lack of knowledge of a genetic mechanism;</p>	[2]	<p>two clearly distinct arguments</p> <p><b>allow</b> 'not enough time for it to have happened'</p> <p><b>accept</b> already had an explanation they were satisfied with;</p>
<b>Total</b>			[4]	

Question		Expected Answers	Marks	Additional Guidance
7	a	<p>sugar <input type="checkbox"/></p> <p>water <input checked="" type="checkbox"/> (1)</p> <p>vegetable oil <input checked="" type="checkbox"/> (1)</p> <p>colouring <input type="checkbox"/></p> <p>flavouring <input type="checkbox"/></p>	[2]	<p>each correct answer = 1 mark if three ticks made deduct 1 mark four or five ticks = 0 marks</p> <p><b>allow</b> any other indication of correct response eg underlining, cross, shading</p>
	b i	<p><b>any one additive and explanation from:</b></p> <p>sweetener (1) reduce amount of sugar (1)</p> <p>preservative (1) keep food safe (1)</p> <p>antioxidant (1) stop reaction with oxygen (1)</p> <p>colouring (1) make more attractive / replace colours lost (in processing) (1)</p> <p>stabilisers (1) maintain the consistency of the food (1)</p> <p>flavourings (1) improve the taste (1)</p>	[2]	<p>one additive plus one mark for clear explanation of its use <b>(ignore</b> ref to emulsifiers) explanation must be linked to additive <b>ignore</b> references to named substances eg salt, E numbers (the only exception is E162) <b>allow</b> other descriptions of use – eg for preservative ‘stops it going mouldy’ or ‘stops it going off’ <b>reject</b> explanations using the word from the additive eg preservatives – preserves food</p>

Question			Expected Answers		Marks	Additional Guidance	
7	b	ii	<p>... supply energy ...</p> <p>... passed a safety text ...</p> <p>... approved for use ...</p> <p>... never harmful.</p>	<p><b>true</b></p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/></p> <p><input checked="" type="checkbox"/></p> <p><input type="checkbox"/></p>	<p><b>false</b></p> <p><input checked="" type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/></p>	[2]	<p>all four boxes correct = 2 marks</p> <p>three or two boxes correct = 1 mark</p> <p><b>allow</b> any other indication of correct response eg underlining, cross, shading</p>
7	c		<p>The diagram consists of four boxes on the left and two on the right. The left boxes are: an empty box, 'carbohydrate', 'protein', and another empty box. The right boxes are: an empty box, 'only C, O and H', and 'C, O, N and H'. A line connects the 'carbohydrate' box to the 'only C, O and H' box. Another line connects the 'protein' box to the 'C, O, N and H' box.</p>			[2]	<p>1 mark for each correct line</p> <p>if two lines drawn from left hand box = 0 marks for that box</p>
<b>Total</b>					[8]		

Question		Expected Answers	Marks	Additional Guidance
8		<b>any two from:</b> cook at high temperatures / heat up to high temperatures; keep food in fridge/freezer before use; use preservatives eg salt/vinegar; references to preparation eg wash food / wash hands / clean surfaces; keep foods separate (to avoid cross-contamination);	[2]	<b>accept</b> cook thoroughly/properly <b>ignore</b> 'keep at high temperatures'  <b>accept</b> keep at low temperatures / keep cool  <b>ignore</b> cover food  <b>allow</b> 'eat by sell-by date' or equivalent <b>allow</b> use of radiation to kill bacteria
		<b>Total</b>	[2]	
9	a	Tessa (1)	[1]	
	b	Anwar (1) Harry (1)	[2]	either order
	c	no/little exercise / being obese / alcohol (consumption) / smoking / stress / medications (not just drugs) (1)	[1]	<b>not</b> just 'exercise'
		<b>Total</b>	[4]	

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