

GCSE

Science A

Session: 2010 June
Type: Mark scheme
Code: J630
Units: A211; A212; A231; A214

Science A

General Certificate of Secondary Education **A211/01**

Unit 1: Modules B1, C1, P1

Mark Scheme for June 2010

Archives &
Heritage

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of pupils of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support which keep pace with the changing needs of today's society.

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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NG15 0DL

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Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

Question		Expected Answers	Marks	Additional Guidance
1	a	<p>... a nucleus. <input type="checkbox"/></p> <p>... DNA. <input type="checkbox"/></p> <p>... a protein. <input checked="" type="checkbox"/> (1)</p> <p>... a fat. <input type="checkbox"/></p>	[1]	more than 1 tick = 0 marks
	b	<p>... accurate and reliable? <input checked="" type="checkbox"/></p> <p>... all the genesbeen identified? <input checked="" type="checkbox"/></p> <p>... to have the results ... <input type="checkbox"/></p> <p>... Government pay ... <input type="checkbox"/></p>	[1]	two correct ticks and two blanks for 1 mark one correct tick = 0 marks
	c	<p>any two from: Colin knows his children may get this; Colin knows he may get this; Colin can change his lifestyle; Colin can take preventative medicine eg aspirin; Colin might worry/panic; cost of test; false positive/test (result) might be wrong/inaccurate; insurance issue/employment issue;</p>	[2]	<p>allow 'pass on to his children' but not 'pass on' alone not Colin has heart disease or Colin has it ignore 'make decisions for future' not his heart disease can be treated or it can be treated/medicated. accept 'be relieved if test is negative' as alternative to worry (if positive) not it's wrong to do the test/immoral/unnatural</p>
Total			[4]	

Question		Expected Answers	Marks	Additional Guidance
2	a	breathlessness and digestion problems (1)	[1]	both needed accept any indication of correct answers
	b	<p>... dominant allele for CF. <input type="checkbox"/></p> <p>... recessive allele for CF. <input checked="" type="checkbox"/> (1)</p> <p>... no symptoms ... <input checked="" type="checkbox"/> (1)</p> <p>... can develop symptoms ... <input type="checkbox"/></p> <p>... 50% chance of passing on ... <input checked="" type="checkbox"/> (1)</p> <p>... can not pass on ... <input type="checkbox"/></p>	[3]	one mark for each tick in the correct box if four ticks given deduct 1 mark if five ticks given deduct 2 marks six ticks = 0 marks
	c	<p>any three from: could produce cure; benefits/helps people; immoral / it's wrong/unnatural/ religious reasons / embryo is human; kills (human) embryo;</p>	[3]	<p>ignore 'treat' and answers which imply the embryo is cured e.g. the child will not be born with cystic fibrosis allow examples of benefits eg saves lives/allows normal life ignore answers referring to cloning people/embryos or the consequences of this</p>
Total			[7]	

Question		Expected Answers	Marks	Additional Guidance												
3	a	One egg one sperm. <input type="checkbox"/> Two eggs one sperm. <input type="checkbox"/> One egg two different sperm. <input type="checkbox"/> Two eggstwo different sperms. <input checked="" type="checkbox"/> (1)	[1]	more than 1 tick = 0 marks												
	b	<table style="width: 100%; border: none;"> <tr> <td></td> <td style="text-align: center;">similar</td> <td style="text-align: center;">different</td> </tr> <tr> <td>... same parents.</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>... unique combination ...</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>... different alleles ...</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table>		similar	different	... same parents.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	... unique combination ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	... different alleles ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	[1]	all three rows correct for 1 mark any additional ticks = 0 marks
	similar	different														
... same parents.	<input checked="" type="checkbox"/>	<input type="checkbox"/>														
... unique combination ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>														
... different alleles ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>														
	c	Y (1)	[1]													
Total			[3]													

Question		Expected Answers	Marks	Additional Guidance								
4	a	1% argon 21% oxygen 78% nitrogen	[2]	all three correct = 2 marks two correct = 1 mark one or zero correct = 0 marks								
	b	i hydrocarbons (1)	[1]	Accept any indication of correct answer								
		ii <table border="0" style="margin-left: 20px;"> <tr> <td style="border: 1px solid black; padding: 2px;">particulate carbon</td> <td style="border: 1px solid black; padding: 2px;">complete ...</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">carbon dioxide</td> <td style="border: 1px solid black; padding: 2px;">incomplete ...</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">carbon monoxide</td> <td style="border: 1px solid black; padding: 2px;">reaction ...</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">nitrogen oxides</td> <td></td> </tr> </table>	particulate carbon	complete ...	carbon dioxide	incomplete ...	carbon monoxide	reaction ...	nitrogen oxides		[2]	all four lines correct = 2 marks three or two lines correct = 1 mark one correct line = 0 marks any left-hand box with more than one line coming from it is incorrect for that box
particulate carbon	complete ...											
carbon dioxide	incomplete ...											
carbon monoxide	reaction ...											
nitrogen oxides												
		iii sulfur in/from the fuel/coal (1) reacts with/burns in oxygen (1)	[2]	the mark is for the idea that the sulfur is from the coal not from the burning process allow 'from burning coal' not 'from burning the coal' or 'from the coal-burning' not 'mixes with oxygen' allow 'combines with oxygen'								
		Total	[7]									

Question			Expected Answers	Marks	Additional Guidance															
5	a	i	No cars ... <input type="checkbox"/> No electricity ... <input type="checkbox"/> Some factories ... <input checked="" type="checkbox"/> (1) People drove ... <input type="checkbox"/>	[1]	More than 1 tick = 0 marks															
		ii	... not harmed ... <input type="checkbox"/> ... use data ... <input checked="" type="checkbox"/> (1) ... detects change ... <input checked="" type="checkbox"/> (1) ... ride bicycles. <input type="checkbox"/> ... only by traffic. <input type="checkbox"/>	[2]	one mark for each tick in the correct box if three ticks deduct 1 mark four or five ticks = 0 marks															
		iii	pollution dissolves/reacts with rain (water) (1) (reacts with)/(washed into) rivers/ground/sea/ buildings (1)	[2]	accept combines/absorbed/mixes accept 'forms acid rain' not is diluted by the rain (water) not washed away alone															
	b		<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 10%; text-align: center;">true</th> <th style="width: 10%; text-align: center;">false</th> </tr> </thead> <tbody> <tr> <td>... WHO limit ... $150 \mu\text{g}/\text{m}^3$.</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>... always lower ...</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>... greater than $250 \mu\text{g}/\text{m}^3$...</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>... lowest level ...</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	... WHO limit ... $150 \mu\text{g}/\text{m}^3$.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	... always lower ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	... greater than $250 \mu\text{g}/\text{m}^3$...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	... lowest level ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	[2]	all four correct = 2 marks two or three correct = 1 mark
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... lowest level ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>																		
Total				[7]																

Question		Expected Answers	Marks	Additional Guidance
6	a	<p>... crashed in to the ground. <input type="checkbox"/></p> <p>... exploded high in the air. <input checked="" type="checkbox"/> (1)</p> <p>... passed near the Earth. <input type="checkbox"/></p> <p>... hit the moon. <input type="checkbox"/></p>	[1]	more than 1 tick = 0 marks
	b	<p>... orbit the Earth, <input type="checkbox"/></p> <p>... orbit the sun. <input checked="" type="checkbox"/> (1)</p> <p>... smaller than a planet. <input checked="" type="checkbox"/> (1)</p> <p>... come from other planets. <input type="checkbox"/></p> <p>... come from the moon. <input type="checkbox"/></p>	[2]	one mark for each tick in the correct box if three ticks deduct 1 mark four or five ticks = 0 marks
	c i	<p>any two from: dust thrown into air; travels around world; blocks sunlight; climate cooling; idea of mass extinction; tsunami/massive flooding;</p>	[2]	must have global effects not just local to strike not earthquakes/movement of plates/shock waves/new orbit
	ii	probability of asteroid hitting the earth is very small (1)	[1]	
Total			[6]	

Question			Expected Answers	Marks	Additional Guidance
7	a	i	the Sun (1)	[1]	
		ii	the Earth (1)	[1]	
	b		<p>... had always worked well. <input checked="" type="checkbox"/> (1)</p> <p>... too old-fashioned. <input type="checkbox"/></p> <p>... friends of Ptolemy. <input type="checkbox"/></p> <p>... good at persuading ... <input type="checkbox"/></p>	[1]	more than one tick = 0 marks
			Total	[3]	

Archives &
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Question		Expected Answers	Marks	Additional Guidance
8	a	<p>... a poor country. <input type="checkbox"/></p> <p>... a small country. <input type="checkbox"/></p> <p>... edge of a tectonic plate. <input checked="" type="checkbox"/> (1)</p> <p>Hurricanes are very common ... <input type="checkbox"/></p>	[1]	more than one tick = 0 marks
	b	<p>cities <input type="checkbox"/></p> <p>deserts <input type="checkbox"/></p> <p>forests <input type="checkbox"/></p> <p>mountains <input checked="" type="checkbox"/> (1)</p> <p>volcanoes <input checked="" type="checkbox"/> (1)</p>	[2]	one mark for each tick in the correct box if three ticks deduct 1 mark four or five ticks = 0 marks
	c	<p>Build taller buildings. <input type="checkbox"/></p> <p>Educate people ... <input checked="" type="checkbox"/> (1)</p> <p>Move everyone ... <input type="checkbox"/></p> <p>Prepare emergency plans ... <input checked="" type="checkbox"/> (1)</p> <p>Build wider roads. <input type="checkbox"/></p>	[2]	one mark for each tick in the correct box if three ticks deduct 1 mark four or five ticks = 0 marks
Total			[5]	

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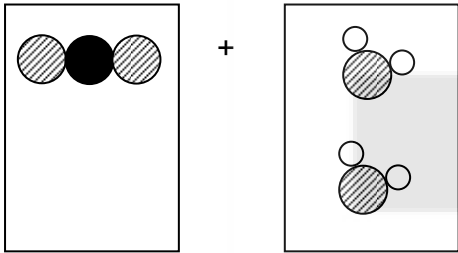








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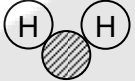
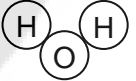
Question	Expected Answers	Marks	Additional Guidance
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b	<p>... accurate and reliable? <input checked="" type="checkbox"/></p> <p>... all the genes been identified? <input checked="" type="checkbox"/></p> <p>... to have the results ... <input type="checkbox"/></p> <p>... Government pay ... <input type="checkbox"/></p>	[1]	two correct ticks and two blanks for 1 mark one correct tick = 0 marks
c	<p>insurance company (1) may refuse to insure him or charge more for premium (1)</p> <p>or</p> <p>employer (1) may not employ him as risk too high/may not promote him (1)</p> <p>or</p> <p>family (1) cause worry to other members of his family (1)</p>	[2]	one mark for identifying the person/agency who might get the information and one for the consequences accept unhappiness for worry.
	Total	[4]	

Question		Expected Answers	Marks	Additional Guidance															
2	a	<table border="1"> <thead> <tr> <th>symptom</th> <th>Huntington's disorder</th> <th>cystic fibrosis</th> </tr> </thead> <tbody> <tr> <td>breathlessness</td> <td></td> <td>✓</td> </tr> <tr> <td>digestive problems</td> <td></td> <td>✓</td> </tr> <tr> <td>forgetfulness</td> <td>✓</td> <td></td> </tr> <tr> <td>twitching muscles</td> <td>✓</td> <td></td> </tr> </tbody> </table>	symptom	Huntington's disorder	cystic fibrosis	breathlessness		✓	digestive problems		✓	forgetfulness	✓		twitching muscles	✓		[1]	all correct for 1 mark any additional ticks = 0 marks
symptom	Huntington's disorder	cystic fibrosis																	
breathlessness		✓																	
digestive problems		✓																	
forgetfulness	✓																		
twitching muscles	✓																		
	b	<p>any three from: CF caused by a recessive allele; need two recessive alleles to show symptoms; one recessive inherited from each parent; both parents must be carriers; 25% chance of two carriers having a CF child;</p>	[3]	can also refer to the effect of the dominant allele allow recessive gene rather than allele															
	c	i	50% / 0.5 / 1 in 2/ a half/ 2/4/even chance (1)	[1]															
		ii	Jen Tt / tT Mykel tt	[1]	both must be correct														
			Total	[6]															

Question		Expected Answers	Marks	Additional Guidance																				
3	a	<table style="width: 100%; border: none;"> <tr> <td></td> <td style="text-align: center;">similar</td> <td style="text-align: center;">different</td> <td></td> </tr> <tr> <td>... same parents.</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> <tr> <td>... unique combination ...</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td></td> </tr> <tr> <td>... different alleles ...</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td></td> </tr> </table>		similar	different		... same parents.	<input checked="" type="checkbox"/>	<input type="checkbox"/>		... unique combination ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>		... different alleles ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>		[1]	all three rows correct for 1 mark any additional ticks = 0 marks				
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	b	<table style="width: 100%; border: none;"> <tr> <td></td> <td style="text-align: center;">true</td> <td style="text-align: center;">false</td> <td></td> </tr> <tr> <td>Clones can be produced ..</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> <tr> <td>... to their parents.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td></td> </tr> <tr> <td>... to each other.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td></td> </tr> <tr> <td>... caused by the environment.</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> </table>		true	false		Clones can be produced ..	<input checked="" type="checkbox"/>	<input type="checkbox"/>		... to their parents.	<input type="checkbox"/>	<input checked="" type="checkbox"/>		... to each other.	<input type="checkbox"/>	<input checked="" type="checkbox"/>		... caused by the environment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>		[1]	all four rows correct for 1 mark any additional ticks = 0 marks
	true	false																						
Clones can be produced ..	<input checked="" type="checkbox"/>	<input type="checkbox"/>																						
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... to each other.	<input type="checkbox"/>	<input checked="" type="checkbox"/>																						
... caused by the environment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>																						
	c	i	unspecialised (1)	[1] accept totipotent/pleuripotent																				
		ii	<table style="width: 100%; border: none;"> <tr> <td>... fertilised ...</td> <td>... adult cell.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> <tr> <td>... fertilised ...</td> <td>... embryonic cell.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> <tr> <td>... unfertilised ...</td> <td>... adult cell.</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>(1)</td> </tr> <tr> <td>... unfertilised ...</td> <td>... embryonic cell.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> </table>	... fertilised adult cell.	<input type="checkbox"/>		... fertilised embryonic cell.	<input type="checkbox"/>		... unfertilised adult cell.	<input checked="" type="checkbox"/>	(1)	... unfertilised embryonic cell.	<input type="checkbox"/>		[1]	any additional ticks = 0 marks			
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... unfertilised embryonic cell.	<input type="checkbox"/>																						
			Total	[4]																				

Question		Expected Answers	Marks	Additional Guidance
4	a	1% argon/Ar 21% oxygen/O/O ₂ 78% nitrogen/N/N ₂	[2]	all three correct = 2 marks two correct = 1 mark one or zero correct = 0 marks
	b	i hydrocarbons (1)	[1]	
		ii <div style="display: flex; flex-direction: column; align-items: flex-start; margin-top: 10px;"> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 2px 10px; margin-right: 10px;">particulate carbon</div> <div style="border: 1px solid black; padding: 2px 10px; margin-left: 10px;">complete ...</div> </div> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 2px 10px; margin-right: 10px;">carbon dioxide</div> <div style="border: 1px solid black; padding: 2px 10px; margin-left: 10px;">incomplete ...</div> </div> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 2px 10px; margin-right: 10px;">carbon monoxide</div> <div style="border: 1px solid black; padding: 2px 10px; margin-left: 10px;">reaction ...</div> </div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 10px; margin-right: 10px;">nitrogen oxides</div> </div> </div>	[2]	all four lines correct = 2 marks three or two lines correct = 1 mark one correct line = 0 marks any left-hand box with more than one line coming from it is incorrect for that box

Question	Expected Answers	Marks	Additional Guidance
4 c	 <p>carbon dioxide</p> <p>water</p>	[3]	<p>1 mark for correct carbon dioxide molecule 1 mark for correct water molecule 1 mark for one carbon dioxide molecule and two water molecules</p> <p>ignore size of circles ignore whether circles are joined in line or at an angle circles must be joined in correct order eg OOC is wrong for carbon dioxide and HHO is wrong for water</p> <p>accept alternative representations of molecules:</p> <p>for carbon dioxide, molecule must include one carbon atom and two oxygen atoms</p> <p>accept for carbon:</p> <p> or </p> <p>accept for oxygen:</p> <p> or </p> <p>eg for carbon dioxide this could be any of:</p> <p> </p> <p> </p>

Question		Expected Answers	Marks	Additional Guidance
4	c			<p>continued:</p> <p>for water, molecule must include one oxygen atom and two hydrogen atoms</p> <p>accept for oxygen:</p> <p> or </p> <p>accept for hydrogen:</p> <p> or  or </p> <p>ignore size of circles</p> <p>eg for water this could be any of:</p> <p> </p> <p> </p> <p> </p>
		Total	[8]	

Question		Expected Answers	Marks	Additional Guidance																				
5	a	<p>... not harmed ... <input type="checkbox"/></p> <p>... use data ... <input checked="" type="checkbox"/> (1)</p> <p>... detects change ... <input checked="" type="checkbox"/> (1)</p> <p>... ride bicycles. <input type="checkbox"/></p> <p>... only by traffic. <input type="checkbox"/></p>	[2]	1 mark for each tick in the correct box if three ticks deduct 1 mark four or five ticks = 0 marks																				
	b	rain dissolves/washes away pollutants / windy conditions blow pollutants away (1)	[1]	condition and effect (1)																				
	c	<table border="0"> <tr> <td></td> <td>i</td> <td></td> <td>true</td> <td>false</td> </tr> <tr> <td></td> <td></td> <td>... go down steadily ...</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td></td> <td></td> <td>... exceeded toe WHO limit ...</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td></td> <td></td> <td>... over twice the WHO limit ...</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table>		i		true	false			... go down steadily ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>			... exceeded toe WHO limit ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>			... over twice the WHO limit ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	[1]	all three rows correct = 1 mark two or one rows correct = 0 marks more than one tick per row no credit for that row
	i		true	false																				
		... go down steadily ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>																				
		... exceeded toe WHO limit ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>																				
		... over twice the WHO limit ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>																				
		ii any two from: dust thrown into air; travels around world; blocks sunlight; climate cooling; idea of mass extinction; tsunami/massive flooding;	[2]	must have global effects not just local to strike not earthquakes/movement of plates/shock waves/new orbit																				
		Total	[6]																					

Question		Expected Answers	Marks	Additional Guidance
6	a	uses 'structure' and/or 'hardness' to explain lack of impact crater for a comet (1) uses 'made of' column to argue that comet fragments are ephemeral whilst those of asteroids are persistent (1)	[2]	accept reverse arguments
	b	i any two from: dust thrown into air; travels around world; blocks sunlight; effect on plants and animal life/temperature;	[2]	must have effects not local to strike allow marks for strike on sea: ie any two from: tsunami caused; drowning and direct devastation of tsunami; flooding of affected land;
		ii probability is very small (1)	[1]	
Total			[5]	

Question			Expected Answers	Marks	Additional Guidance
7	a	i	Earth, Sun, Mars (1)	[1]	correct order
		ii	Sun, Earth, Mars (1)	[1]	correct order
	b	i	<p>... had worked well ... <input checked="" type="checkbox"/></p> <p>... made better predictions. <input type="checkbox"/></p> <p>... good at persuading ... <input type="checkbox"/></p> <p>... new and different. <input checked="" type="checkbox"/></p>	[1]	both needed for the mark two correct ticks and two blanks for 1 mark one correct tick = 0 marks more than two ticks = 0 marks
		ii	<p>The moon goes around ... <input checked="" type="checkbox"/></p> <p>Most planets have moons ... <input type="checkbox"/></p> <p>... Venus ... <input checked="" type="checkbox"/></p> <p>Spaceflight calculation ... <input type="checkbox"/></p>	[2]	one mark for each correct tick two correct ticks and two blanks for = 2 marks one correct tick and at least two blanks = 1 mark
			Total	[5]	

Question		Expected Answers	Marks	Additional Guidance																				
8	a	<p>...active volcanoes. <input checked="" type="checkbox"/> (1)</p> <p>A mountain chain... <input checked="" type="checkbox"/> (1)</p> <p>Hurricanes are very common ... <input type="checkbox"/></p> <p>... near the equator. <input type="checkbox"/></p> <p>... where South and North...join. <input type="checkbox"/></p>	[2]	two correct ticks and three blanks for = 2 marks one correct tick and at least three blanks = 1 mark																				
	b	<table border="0"> <tr> <td></td> <td>damage</td> <td>deaths</td> <td>both</td> </tr> <tr> <td>... building regulations.</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>Educate ...</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>Prepare plans ...</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>Improve predictions ...</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>		damage	deaths	both	... building regulations.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Educate ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Prepare plans ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Improve predictions ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	[2]	<p>all four rows correct = 2 marks two or three correct = 1 mark</p> <p>accept as correct all three boxes in first row ticked, but not if only two boxes ticked</p>
	damage	deaths	both																					
... building regulations.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>																					
Educate ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>																					
Prepare plans ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>																					
Improve predictions ...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>																					
		Total	[4]																					

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Science A

General Certificate of Secondary Education **A212/01**

Unit 2: Modules B2, C2, P2 (Foundation Tier)

Mark Scheme for June 2010



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Question		Expected Answers	Marks	Additional Guidance
1	a	<p>cost <input type="checkbox"/></p> <p>heat insulation <input checked="" type="checkbox"/> (1)</p> <p>melting point <input checked="" type="checkbox"/> (1)</p> <p>strength <input type="checkbox"/></p>	[2]	accept any clear and unambiguous response.
	b		[2]	both lines correct on LHS = 1 mark both lines correct on RHS = 1 mark
	c	<p>...is made from wood... <input checked="" type="checkbox"/> (1)</p> <p>...is more flexible... <input type="checkbox"/></p> <p>Both...can be recycled. <input type="checkbox"/></p> <p>...rots... <input checked="" type="checkbox"/> (1)</p> <p>...was used for many years... <input type="checkbox"/></p>	[2]	accept any clear and unambiguous response.

Question		Expected Answers	Marks	Additional Guidance															
1	d	<table border="0"> <tr> <td>...hydrocarbon molecules.</td> <td>true</td> <td>false</td> </tr> <tr> <td></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>...water and oxygen only.</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>...contains polymers.</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>Small molecules...</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	...hydrocarbon molecules.	true	false		<input checked="" type="checkbox"/>	<input type="checkbox"/>	...water and oxygen only.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	...contains polymers.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Small molecules...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	[2]	<p>accept any clear and unambiguous response.</p> <p>all four correct = 2 marks three or two correct = 1 mark</p>
...hydrocarbon molecules.	true	false																	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>																	
...water and oxygen only.	<input type="checkbox"/>	<input checked="" type="checkbox"/>																	
...contains polymers.	<input type="checkbox"/>	<input checked="" type="checkbox"/>																	
Small molecules...	<input checked="" type="checkbox"/>	<input type="checkbox"/>																	
Total			[8]																
2	a	cotton (1)	[1]	accept any clear and unambiguous response.															
	b	<p>i Thickness / time weights left on fibre / method of placing weight on fibre are factors that will change the outcome of the test (1)</p> <p>thicker will need greater force / longer time makes breaking more likely / dropping weight on fibre causes bigger force (in the fibre) owtte (1)</p>	[2]	<p>allow 1 mark for any well-reasoned factors, e.g. batch of material used in the repeats for a single fibre type</p> <p>allow 1 mark for the reason for that factor.</p>															
		ii 0.60 to 1.45/1.45 to 0.60 (1)	[1]																
		<p>iii more reliable (1)</p> <p>idea of smaller range (1)</p>	[2]	<p>ignore 'accurate' or 'fair test'</p> <p>allow 'George's results are closer to each other' / 'Mary's results have outliers'</p> <p>allow correct numerical values of ranges 0.60-1.45 and 0.80-1.00 or 0.85 and 0.2</p>															
Total			[6]																

Question			Expected Answers	Marks	Additional Guidance
3	a	i	light (1)	[1]	
		ii	radio (waves) (1)	[1]	
		iii	any two from: radio (waves); microwaves; infrared; light	[1]	2 correct for 1 mark.
	b		emits reflects absorbs	[2]	all correct = 2 marks one or two correct = 1 mark
			Total	[5]	

Question			Expected Answers	Marks	Additional Guidance
4	a	i	E B C D F A	[2]	all correct = 2 marks (E)BCxxx gets 1 mark
		ii	flooding (1) idea of a consequence, e.g. drowning, loss of homes or farmland, damage to infrastructure, etc. (1)	[2]	
	b	i	John <input type="checkbox"/> Kate <input checked="" type="checkbox"/> Nora <input type="checkbox"/> Mike <input checked="" type="checkbox"/>	[1]	both required for 1 mark. accept any clear and unambiguous response.
		ii	John <input type="checkbox"/> Kate <input checked="" type="checkbox"/> (1) Nora <input type="checkbox"/> Mike <input type="checkbox"/>	[1]	accept any clear and unambiguous response.
		iii	John <input type="checkbox"/> Kate <input type="checkbox"/> Nora <input type="checkbox"/> Mike <input checked="" type="checkbox"/> (1)	[1]	Tick for John or Kate scores 0 marks accept any clear and unambiguous response. allow Nora for 1 mark. allow Nora and Mike for 1 mark.
Total				[7]	

Question	Expected Answers	Marks	Additional Guidance													
5	<p>benefit: idea of looking good, feeling good, vitamin D production,</p> <p>risk: recognition of risk,</p>	[2]	<p>max 1 mark for benefit, 1 mark for risk.</p> <p>accept 'get a tan' for benefit mark.</p> <p>recognition of risk might be e.g. they do not feel that (Skin) cancer/ sun burn will effect them/ they are not worried about sunburn/(skin) cancer</p>													
	Total	[2]														
6	a	virus (1)	[1] accept any clear and unambiguous response.													
	b	skin rapidly poisons symptoms	[3] all four correct = 3 marks three correct = 2 marks one or two correct = 1 mark													
	c	i	<table border="0"> <tr> <td></td> <td>true</td> <td>false</td> </tr> <tr> <td>...every three years.</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>...10 times more cases...</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>The number of cases halved...</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>		true	false	...every three years.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	...10 times more cases...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The number of cases halved...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	[2] all three correct = 2 marks two correct = 1 mark
	true	false														
...every three years.	<input type="checkbox"/>	<input checked="" type="checkbox"/>														
...10 times more cases...	<input checked="" type="checkbox"/>	<input type="checkbox"/>														
The number of cases halved...	<input checked="" type="checkbox"/>	<input type="checkbox"/>														
		ii	<p>advantage: idea of not getting ill with measles; idea of not spreading measles (1)</p> <p>disadvantage: idea of side effects ; not 100% effective (1)</p>	[2] max 1 advantage, 1 disadvantage allow 'not get measles'												
			<p>accept a named/suggested side effect. allow named effect of vaccination process, e.g. 'sore arm', 'high temperature'</p>													

Question		Expected Answers	Marks	Additional Guidance
6	d	<p>Red blood cells... <input type="checkbox"/></p> <p>...antibodies...very quickly. <input checked="" type="checkbox"/> (1)</p> <p>...confusing the measles... <input type="checkbox"/></p> <p>The body's natural barriers... <input type="checkbox"/></p> <p>...produce antibodies... <input checked="" type="checkbox"/> (1)</p>	[2]	if 3 ticks deduct 1 mark 4 or 5 ticks = 0 marks
		Total	[10]	
7	a	<p>smoking <input type="checkbox"/></p> <p>stress <input type="checkbox"/></p> <p>regular exercise <input checked="" type="checkbox"/> (1)</p> <p>excessive alcohol drinking <input type="checkbox"/></p>	[1]	accept any clear and unambiguous response.
	b	<p>any two from:</p> <p>risk of stomach bleeds;</p> <p>study showed no benefit to taking aspirins;</p> <p>study is reliable;</p> <p>no history of heart attacks (in the family)</p>	[2]	allow ' it is peer reviewed/ it was a major long term study' as implying reliability.
	c	oxygen (1)	[1]	accept any clear and unambiguous response.
		Total	[4]	

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Question		Expected Answers	Marks	Additional Guidance
1	a	<p>...cheaper...not be melted... <input type="checkbox"/></p> <p>...less dense...not be melted... <input checked="" type="checkbox"/></p> <p>...cheaper and less dense. <input checked="" type="checkbox"/></p> <p>...weaker...lower melting point. <input type="checkbox"/></p>	[1]	both ticks needed for 1 mark
	b	<p>...farther apart... <input type="checkbox"/></p> <p>...out of its solid structure... <input checked="" type="checkbox"/> (1)</p> <p>...break the molecules... <input type="checkbox"/></p> <p>...more tangled... <input type="checkbox"/></p> <p>...higher crystallinity... <input checked="" type="checkbox"/> (1)</p>	[2]	if 3 ticks deduct 1 mark 4 or 5 ticks = 0 marks
	c	<p>any three from: cardboard made from wood / recycled paper and polystyrene from oil; wood is renewable / can be grown and oil is non-renewable / will run out; cardboard is <u>easier</u> to recycle (than polystyrene); cardboard is biodegradable / breaks down / rots / decomposes and polystyrene does not / takes much longer;</p>	[3]	
Total			[6]	

Question		Expected Answers	Marks	Additional Guidance
2	a	Thickness / time weights left on fibre / method of placing weight on fibre are factors that will change the outcome of the test (1) thicker will need greater force / longer time makes breaking more likely / dropping weight on fibre causes bigger force (in the fibre) owtte (1)	[2]	allow 1 mark for any well-reasoned factors, e.g. batch of material used in the repeats for a single fibre type allow 1 mark for the reason for that factor.
	b	more reliable (1) idea of smaller range (1)	[2]	ignore 'accurate' or 'fair test' allow 'George's results are closer to each other' / 'Mary's results have outliers' allow correct numerical values of ranges. 0.60-1.45 and 0.80 – 1.00 or 0.85 and 0.2
	c	0.9 (1)	[1]	
Total			[5]	

Question		Expected Answers	Marks	Additional Guidance
3	a	...to make poly(propene)... <input type="checkbox"/>	[2]	if 3 ticks given deduct 1 mark 4 or 5 ticks = 0 marks
		...to make the product... <input checked="" type="checkbox"/> (1)		
		the sustainability of crude oil <input type="checkbox"/>		
		the useful lifetime of the product <input checked="" type="checkbox"/> (1)		
		...impact of disposing... <input type="checkbox"/>		

Question		Expected Answers	Marks	Additional Guidance												
3	b	<div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; width: 100px; height: 20px;"></div> <div style="border: 1px solid black; padding: 2px;">...so less energy is needed...</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px;">...forces between polymer chains...</div> <div style="border: 1px solid black; width: 100px; height: 20px;"></div> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="border: 1px solid black; width: 100px; height: 20px;"></div> <div style="border: 1px solid black; width: 100px; height: 20px;"></div> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="border: 1px solid black; width: 100px; height: 20px;"></div> <div style="border: 1px solid black; width: 100px; height: 20px;"></div> </div>	[1]													
		Total	[3]													
4	a	<table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td style="background-color: #cccccc;">E</td> <td>B</td> <td>C</td> <td>D</td> <td>F</td> <td>A</td> </tr> </table>	E	B	C	D	F	A	[2]	all correct = 2 marks (E)BCxxx gets 1 mark						
		E	B	C	D	F	A									
b	i	<table style="width: 100%;"> <tr> <td style="width: 50%;">John</td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> <tr> <td>Kate</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: right;">(1)</td> </tr> <tr> <td>Nora</td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> <tr> <td>Mike</td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> </table>	John	<input type="checkbox"/>		Kate	<input checked="" type="checkbox"/>	(1)	Nora	<input type="checkbox"/>		Mike	<input type="checkbox"/>		[1]	tick in any other box = 0
		John	<input type="checkbox"/>													
Kate	<input checked="" type="checkbox"/>	(1)														
Nora	<input type="checkbox"/>															
Mike	<input type="checkbox"/>															
	ii	<table style="width: 100%;"> <tr> <td style="width: 50%;">John</td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> <tr> <td>Kate</td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> <tr> <td>Nora</td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> <tr> <td>Mike</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: right;">(1)</td> </tr> </table>	John	<input type="checkbox"/>		Kate	<input type="checkbox"/>		Nora	<input type="checkbox"/>		Mike	<input checked="" type="checkbox"/>	(1)	[1]	Tick for John or Kate scores 0 marks accept any clear and unambiguous response. allow Nora for 1 mark. allow Nora and Mike for 1 mark.
John	<input type="checkbox"/>															
Kate	<input type="checkbox"/>															
Nora	<input type="checkbox"/>															
Mike	<input checked="" type="checkbox"/>	(1)														
		Total	[4]													

Question		Expected Answers	Marks	Additional Guidance	
5	a	Natural chemicals... <input type="checkbox"/>	[2]	if 3 ticks given deduct 1 mark 4, 5 or 6 ticks = 0 marks	
		Ozone absorbs ultraviolet... <input type="checkbox"/>			
		Pollutant chemicals... <input checked="" type="checkbox"/> (1)			
		Ultraviolet radiation breaks up... <input type="checkbox"/>			
		...are not reversible. <input checked="" type="checkbox"/> (1)			
		...protects living things... <input type="checkbox"/>			
	b	stated benefit: look good, feel good, get a tan, helps relaxing, vitamin <u>D</u> (1) benefit outweighs risk (1)	[2]	second mark here must have a judgement on benefit and risk, and why the benefit is greater	
Total			[4]		
6	a	i	E (1)	[1]	
		ii	D, E and F (1)	[1]	all 3 needed accept names (ultraviolet, X-ray, gamma) allow mis-spellings
		iii	A, B(1)	[1]	either order allow also C as an option accept names of regions (radio, infrared, light) allow mis-spellings

Question		Expected Answers	Marks	Additional Guidance
6	b	Bone absorbs... <input checked="" type="checkbox"/> (1)	[2]	if 3 ticks given deduct 1 mark 4 or 5 ticks = 0 marks
		Bone reflects... <input type="checkbox"/>		
		Bone transmits... <input type="checkbox"/>		
		High intensity... <input type="checkbox"/>		
		Light parts of the film... <input checked="" type="checkbox"/> (1)		
		Total	[5]	
7	a	Virus (1)	[1]	
	b	skin / sweat / tears rapidly/quickly/fast toxins/poisons symptoms/signs	[3]	all four correct = 3 marks three correct = 2 marks two correct = 1 mark no marks for only one correct allow mis-spellings

Question			Expected Answers	Marks	Additional Guidance																
7	c	i	<table border="0"> <tr> <td>...every three years.</td> <td> <table border="1"> <tr> <td>true</td> <td>false</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table> </td> </tr> <tr> <td>...10 times more cases...</td> <td> <table border="1"> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table> </td> </tr> <tr> <td>The number of cases halved...</td> <td> <table border="1"> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table> </td> </tr> </table>	...every three years.	<table border="1"> <tr> <td>true</td> <td>false</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table>	true	false	<input type="checkbox"/>	<input checked="" type="checkbox"/>	...10 times more cases...	<table border="1"> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The number of cases halved...	<table border="1"> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	[2]	all three correct = 2 marks two correct = 1 mark		
...every three years.	<table border="1"> <tr> <td>true</td> <td>false</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table>	true	false	<input type="checkbox"/>	<input checked="" type="checkbox"/>																
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		ii	<p>Any two from: measles is contagious / infectious / spreads (1)</p> <p>to reduce the chances of measles spreading to a susceptible individual / making children seriously ill (1)</p> <p>virus more likely to mutate (1)</p> <p>So vaccinated individuals may get disease / vaccine no longer works (1)</p>	[2]	ignore catching do not allow just ill this point must link to mutation of virus																
		iii	<table border="1"> <tr> <td>... suffer from a mild fever</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>... against the flu virus</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>... not ... vaccinated</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>... 95% of children are vaccinated</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	... suffer from a mild fever	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	... against the flu virus	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	... not ... vaccinated	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	... 95% of children are vaccinated	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	[2]	all four correct = 2 marks two or three correct = 1 mark
... suffer from a mild fever	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>																		
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Question		Expected Answers	Marks	Additional Guidance
7	d	Red blood cells... <input type="checkbox"/>	[2]	if 3 ticks given deduct 1 mark 4 or 5 ticks = 0 marks
		...antibodies...very quickly. <input checked="" type="checkbox"/> (1)		
		...confusing the measles... <input type="checkbox"/>		
		The body's natural barriers... <input type="checkbox"/>		
		...produce antibodies... <input checked="" type="checkbox"/> (1)		
		Total	[12]	
8		Doctor / scientist knows who is taking the placebo (1)	[3]	allow 1 mark for 'neither doctor nor patient knows' 'ethical' and 'morally wrong' need qualification
		patient does not know who has placebo (1) wrong to withhold treatment from patient / won't cure patient / false hope (1)		
		Total	[3]	

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Science A

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

Unit 3: Modules B3, C3, P3

Mark Scheme for June 2010

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

work done = 0 marks
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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"/>

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<input checked="" type="checkbox"/>
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E.g. 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	<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 allow 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 allow 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 allow 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 any two from: shielding – protective clothing; screen/barrier; storage of source; time – minimise exposure time / job rotation; distance – increase; monitoring – eg regular checks (to ensure dose not excessive) / wearing of badges;	[3]	can describe job eg person giving injection not just 'operator' but do not accept job references to X-rays NB first marking point is independent of the rest treat X-rays as neutral for risk reduction only one mark for various aspects of clothing/goggles accept leave the room during treatment (for distance idea)
		Total	[7]	

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

Question		Expected Answers	Marks	Additional Guidance
3	a	<p>the internet <input type="checkbox"/></p> <p>photographs <input type="checkbox"/></p> <p>DNA analysis <input checked="" type="checkbox"/> (1)</p> <p>TV programmes <input type="checkbox"/></p>	[1]	if more than one box ticked, no mark allow any other indication of correct response eg underlining, cross, shading
	b	<p>They may not believe ... <input type="checkbox"/></p> <p>... do not like new ideas. <input type="checkbox"/></p> <p>... few complete skulls ... <input checked="" type="checkbox"/> (1)</p> <p>... breeding experiments ... <input type="checkbox"/></p>	[1]	if more than one box ticked, no mark allow any other indication of correct response eg underlining, cross, shading
Total			[2]	
4	a	<p>hormonal (1)</p> <p>nervous (1)</p>	[2]	one mark each – deduct one mark for each extra choice allow any other indication of correct response eg underlining
	b	<p>receptor</p> <p>response</p> <p>effector</p>	[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
Total			[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>allow any other indication of correct response eg underlining, cross, shading</p>
	b	<p>any two from:</p> <p>new disease;</p> <p>reduction of food;</p> <p>loss of shelter;</p> <p>climate/environment/habitat change;</p> <p>natural disaster eg meteorite;</p> <p>lack of reproductive success;</p>	[2]	<p>ignore competition ideas for food or habitat</p> <p>watch out for restatement from 5a and from question – ignore died in the Ice Age (but accept 'too cold' or 'too hot')</p> <p>accept 'new predators'</p> <p>ignore ref to brain size or intelligence</p> <p>accept could not find a mate</p>
Total			[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>allow any other indication of correct response eg underlining, cross, shading</p>
	b	<p>any two from:</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>allow 'not enough time for it to have happened'</p> <p>accept already had an explanation they were satisfied with;</p>
		Total	[4]	

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

Question			Expected Answers		Marks	Additional Guidance	
7	b	ii	<p>... supply energy ... <input type="checkbox"/></p> <p>... passed a safety text ... <input checked="" type="checkbox"/></p> <p>... approved for use ... <input checked="" type="checkbox"/></p> <p>... never harmful. <input type="checkbox"/></p>	<p>true</p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/></p> <p><input checked="" type="checkbox"/></p> <p><input type="checkbox"/></p>	<p>false</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>allow any other indication of correct response eg underlining, cross, shading</p>
7	c		<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px; display: flex; align-items: center; justify-content: center;">carbohydrate</div> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px; display: flex; align-items: center; justify-content: center;">protein</div> <div style="border: 1px solid black; width: 100px; height: 20px;"></div> </div> <div style="display: flex; flex-direction: column; align-items: flex-start; margin-left: 20px;"> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px; display: flex; align-items: center; justify-content: center;">only C, O and H</div> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px; display: flex; align-items: center; justify-content: center;">C, O, N and H</div> </div>			[2]	<p>1 mark for each correct line</p> <p>if two lines drawn from left hand box = 0 marks for that box</p>
Total					[8]		

Question		Expected Answers	Marks	Additional Guidance
8		any two from: 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]	accept cook thoroughly/properly ignore 'keep at high temperatures' accept keep at low temperatures / keep cool ignore cover food allow 'eat by sell-by date' or equivalent allow use of radiation to kill bacteria
		Total	[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]	not just 'exercise'
		Total	[4]	

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

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<input checked="" type="checkbox"/>
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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	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Manchester	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Paris	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Southampton	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Score:	2	2	1	1	1	1	0	0	0	NR

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>allow 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><input type="checkbox"/></td> </tr> <tr> <td>2 mg</td> <td>20 days</td> <td><input checked="" type="checkbox"/> (1)</td> </tr> <tr> <td>4 mg</td> <td>5 days</td> <td><input type="checkbox"/></td> </tr> <tr> <td>4 mg</td> <td>20 days</td> <td><input type="checkbox"/></td> </tr> </table>	2 mg	5 days	<input type="checkbox"/>	2 mg	20 days	<input checked="" type="checkbox"/> (1)	4 mg	5 days	<input type="checkbox"/>	4 mg	20 days	<input type="checkbox"/>	[1]	<p>no extra ticks allowed</p> <p>allow any other indication of correct response eg underlining, cross, shading</p>
2 mg	5 days	<input type="checkbox"/>															
2 mg	20 days	<input checked="" type="checkbox"/> (1)															
4 mg	5 days	<input type="checkbox"/>															
4 mg	20 days	<input type="checkbox"/>															
	b		<p>ALARA = as low as reasonably achievable / owtte (1)</p> <p>plus any two from:</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>												
			Total	[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 no others for the mark
		iv	nuclear (fuel) and oil (1)	[1]	either order both required and no others 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]	both needed for the mark. no extra ticks allowed allow any other indication of correct response eg underlining, cross, shading
			Total	[5]	
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 allow 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
					Total

Question		Expected Answers	Marks	Additional Guidance																												
4	a	DNA (1)	[1]	order of letters important, but case not, eg not ADN but accept dNa																												
	b	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 10%; text-align: center;">agrees</th> <th style="width: 10%; text-align: center;">disagrees</th> <th style="width: 20%;"></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> <td></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> <td></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> <td></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> <td></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> <td></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> <td></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]	<p>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</p> <p>allow any other indication of correct response eg underlining, cross, shading</p>
	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"/>																														
		Total	[4]																													
5	a	hormonal/hormone/endocrine and nerve/nervous/central nervous (system) (1)	[1]	both needed for the mark but can be in either order accept mis-spelled words if meaning is clear.																												
	b	receptor/sensory (1) response (1) effector / muscle / gland (1)	[3]	do not accept nerve accept reaction in place of response																												
	c	homeostasis (1)	[1]	accept mis-spelled word if meaning is clear																												
		Total	[5]																													

Question		Expected Answers	Marks	Additional Guidance
6		any two from: 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 allow 'not enough time for it to have happened' accept already had an explanation they were satisfied with;
		Total	[2]	
7	a	any two from: 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	any two from: new disease; reduction of food; loss of shelter; climate/environment/habitat change; natural disaster eg meteorite; lack of reproductive success;	[2]	ignore competition ideas for food or habitat watch out for restatement from 5a and from question – ignore died in the Ice Age (but accept 'too cold' or 'too hot') accept 'new predators' ignore ref to brain size or intelligence accept could not find a mate
		Total	[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 allow any other indication of correct response eg underlining, cross, shading															
		ii	<table style="width: 100%; border: none;"> <tr> <td style="width: 60%;"></td> <td style="text-align: center;">true</td> <td style="text-align: center;">false</td> </tr> <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> </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 allow any other indication of correct response eg underlining, cross, shading
	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"/>																		
	b	i	polymers (1) sugars (1) oxygen (1)	[3]	must be these examples ignore 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															
Total				[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]	allow 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>any three from: 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>
		Total	[6]	

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Science A

General Certificate of Secondary Education **A214/01**

Unit 4: Ideas in Context

Mark Scheme for June 2010

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Question		Expected Answers	Marks	Additional Guidance	
1	a	<p>any two from: antibiotic resistant strains of TB appearing (1) <u>few(er) / less</u> people are being vaccinated (1) people have come from countries <u>where they do not vaccinate</u> (1) idea that vaccine is not 100% (successful / effective) (1) vaccine does not give immunity for life (1) idea that badgers and / or cattle act as possible reservoir of infection (1)</p>	[2]	<p>ignore idea of going away on holiday and bringing it back.</p> <p>ignore reference to other animals</p>	
	b	<p>any two from: (vaccine) not 100% (successful) / idea that TB becomes resistant / mutation (1) may not provide life time immunity (1) all cattle may not be vaccinated (1)</p>	[2]	<p>must relate to the vaccine not badgers / cattle / antibiotics references to viruses are neutral</p>	
	c	<p>Peter (1) Ranjit (1)</p>	[2]		
	d	i	Peter (1)	[1]	
		ii	Ranjit (1)	[1]	
	e	<p>any two from: the results will vary / there will be a range of results (1) the average will be a more reliable/accurate/best estimate (1) idea of outliers/idea of combining results (1)</p>	[2]	<p>accept more likely to be right</p> <p>procedural point</p>	

Question		Expected Answers	Marks	Additional Guidance
1	f	when more badgers culled/killed the number of TB cases in cattle increases (1)	[1]	reject more badgers means more TB accept when badgers move more the number of TB cases in cattle increases
	g	any two from: less movement of cattle (1) test cattle prior to movement (1) quarantining cattle (1) more / frequent / regular TB tests (1)	[2]	ignore better cattle control ignore vaccine for badgers ignore keep cattle separate
		Total	[13]	

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Heritage

Question			Expected Answers				Marks	Additional Guidance																														
2	a	i	<table border="1"> <tr> <td>americium</td> <td>✓</td> <td></td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>caesium</td> <td></td> <td></td> <td>✓</td> <td></td> <td>✓</td> </tr> <tr> <td>plutonium</td> <td>✓</td> <td></td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>strontium</td> <td></td> <td></td> <td>✓</td> <td></td> <td>✓</td> </tr> <tr> <td></td> <td>(1)</td> <td></td> <td>(1)</td> <td></td> <td>(1)</td> </tr> </table>				americium	✓			✓		caesium			✓		✓	plutonium	✓			✓		strontium			✓		✓		(1)		(1)		(1)	[3]	one mark per column
		americium	✓			✓																																
caesium			✓		✓																																	
plutonium	✓			✓																																		
strontium			✓		✓																																	
	(1)		(1)		(1)																																	
		ii	any two from: killed; become cancerous; mutate / damage / harmed;				[2]	answers must be about effect on cells allow more detail, eg create ions in cell (1) which take place in chemical reactions (1) if clear not cells ionised ignore 'burned'																														
2	b		any two from: radiation / radioactivity / fallout; cancer; mutations; radiation poisoning / radiation sickness / damage to named area of body / hair fall out; death;				[2]	answers must be about humans and not cells reject extreme alarmist eg blow up world reject direct harm caused by blast etc ignore just 'damage' or 'illness' or 'sickness' on its own or 'poisoning'																														
	c		describe benefit: eg unspoiled sea / tropical climate / not crowded (1) idea of risk being small: eg close to background radiation / only a little will have leached from rocks into sea / radiation diluted / only spend a little time in sea (1) QWC is given for mention of benefit and risk qualified or unqualified (1)				[3]	any mention of benefit and risk will gain QWC 'benefit outweighs risk' by itself = QWC mark only																														

Question			Expected Answers	Marks	Additional Guidance
	d	i	sand 20% (1) coral 14% (1)	[2]	
		ii	(at 20 cm), <u>10%</u> (penetrates) (1) this is 10 times/x smaller / 10% of 100 (1)	[2]	
			Total	[14]	

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Question		Expected Answers	Marks	Additional Guidance
3	a	any two from: inability to concentrate; excessive activity / hyperactivity (1); impulsive behaviour;	[2]	reject any other symptoms
	b	make them look more attractive/colourful/want to drink it / make people buy them / easier to sell / replace natural colours / make colour match the flavour (1)	[1]	ignore reference to taste or smell
	c	i sodium benzoate / E211 (1)	[1]	allow just "benzoate" reject just "sodium"
		ii sunset yellow / E110 (1) carmoisine / E122 (1)	[2]	for each additional answer reduce mark by one
		iii idea of a control / to allow comparison / to see if water has same effect / to see what effect water has / placebo effect (1)	[1]	ignore fair testing
	d	any two from: it is a small study / not many children were in the study; the study only included children / only 3-year olds and 8-year olds; idea that study carried out in only one area;	[2]	accept additives were not tested separately ignore 'needs more research' or 'not enough information'

Question			Expected Answers	Marks	Additional Guidance
3	e	i	<p>any two from: do not know about the risks / consider the risks to be small / FSA say its safe / not enough evidence; these drinks are cheaper; their children prefer these drinks; idea of badgering / pestering by / pandering to children; longer shelf life;</p>	[2]	
		ii	<p>any two from: allergy ideas / some children may have bad reaction / effect; contamination ideas eg pesticides, plasticizers; example of effect of named ingredient; unknown long-term effects (of named ingredient); could choke;</p>	[2]	<p>eg drink may be OK for nearly all people but may cause harm to a few answer must state or imply that only some children are affected and the effect is bad.</p> <p>problems caused eg sugar rots teeth / sugar affects diabetes / sugar causes obesity / acids dissolve teeth ignore answers about hyperactivity or impulsive behaviour. accept any plausible example</p>
			Total	[13]	

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Question		Expected Answers	Marks	Additional Guidance
1	a	badgers (carry TB/act as reservoir of infection) / cattle infected as they are moved around (1)	[1]	
	b	any two from: (vaccine) not 100% (successful) / idea that TB becomes resistant / mutates; may not provide life time immunity; all cattle may not be vaccinated;	[2]	must relate to the vaccine not badgers/cattle/antibiotics references to viruses are neutral
	c	any two from: vaccinated cow does not catch TB; this stops the disease from spreading in cattle; further detail on the second point, eg because less chance of infected animal coming into contact with a non-infected one; less chance of infecting badgers;	[2]	second mark is about other cows catching it
	d	any two from: hard to catch/vaccinate badgers / not all badgers will be vaccinated / badgers spend all day underground; vaccine likely to be less than 100% effective / TB may become resistant; cannot tell if a badger has been vaccinated; badgers produce non-vaccinated young;	[2]	answer must be about the badger population, not cattle accept 'cannot vaccinate all badgers' idea "roaming around" not enough by itself, needs to link to inability to vaccinate
	e	any named variable eg numbers of badgers / different movement of badgers / susceptibility of different cattle (varieties) / amount of cattle movement / whether the countryside is good badger habitat or not / cattle enclosed or free to roam (1)	[1]	not numbers of cattle
	f	when there are fewer badgers there is a lower incidence of TB in cattle (1)	[1]	reject 'killing badgers stops cows getting TB' must have comparative aspect, eg more badgers killed then fewer cattle will contract TB allow reverse arguments give the mark for the description of the link ignore reference to 'negative/positive correlation'

Question		Expected Answers	Marks	Additional Guidance
1	g	<p>any two from: the results will vary / there will be a range of results (1) the average will be a more reliable/accurate/best estimate (1) idea of outliers/idea of combining results (1)</p>	[2]	<p>'More likely to be right' Procedural point</p>
	h	<p>No (1); any one from: May be other factors involved (1); not enough data/more experimental evidence needed/not reliable/can be interpreted in more than one way (1); "Badgers roaming further" is only a suggested explanation, not proven (1);</p>	[2]	<p>Second mark is independent of the first. eg other animals may spread TB Candidates who do not answer 'No' or 'Yes' can get both marks for two correct explanations. The insert says that badgers roaming is only one POSSIBLE explanation, so NOT a proof as required by the question.</p>
		Total	[13]	

Question		Expected Answers	Marks	Additional Guidance
2	a	<p>any two from: killed; become cancerous; mutate/damage/harmed;</p>	[2]	<p>answers must be about effect on cells allow more detail if clear, eg create ions in cell (1) which take place in chemical reactions (1) not cells ionised ignore 'burned'</p>
	b i	<p>any two from: most of island not inhabited; difficult to excavate/transport; difficult to dispose of so much contaminated soil; not all of soil is significantly contaminated; significant risk only from contaminated soil in populated areas; plants would not grow if all soil was removed; covering radioactive soil with coral is enough to reduce dose;</p>	[2]	<p>not just coral soaks up radiation, or just putting coral down, this mark needs 'cover the soil instead of removing it' idea</p>

Question			Expected Answers	Marks	Additional Guidance
2	b	ii	any two from: islanders held in low esteem (prejudice/xenophobia); Islanders disenfranchised (no votes); Islanders not aware of real risk; greater population in UK; England has closer neighbouring countries than Rongelap (1); could not evacuate (everyone in that area) in UK; more influence of pressure groups in UK; more money available in UK; more difficult to prevent publicity in UK; equipment on site in UK;	[2]	any two points related to ethical or practical issues
	c		evidence of halving every 6 cm (1) 3 lots of 6 cm therefore $100/2/2/2 = 12.5\%$ (1)	[2]	'12.5' by itself gets both marks
	d	i	washed out of ground/into ocean / plants absorb it from the ground (1)	[1]	'soluble' by itself is worth the mark
		ii	any two from: soluble; absorbed by plants; (plants absorb) caesium instead of potassium; enters food chain / eaten by people;	[2]	so 'plants absorb caesium instead of potassium' is 2 marks
	e		describe benefit: eg unspoiled sea / tropical climate / not crowded (1) idea of risk being small: eg close to background radiation / only a little will have leached from rocks into sea / radiation diluted / only spend a little time in sea (1) QWC is given for mention of benefit and risk qualified or unqualified (1)	[3]	any mention of benefit and risk will gain QWC 'benefit outweighs risk' by itself = QWC mark only
Total				[14]	

Question		Expected Answers	Marks	Additional Guidance
3	a	drink (C) with no additive was a control/to allow comparison (1) to find out whether different combinations of colourings (drinks A & B) have different effects (1)	[2]	the word 'placebo' is neutral and worth no marks without further explanation allow 'additive' for 'colouring' in this question, and also allow sodium benzoate as constituent part of mixture need to recognise that drink A and drink B are mixtures containing more than one different colouring
	b	any two from: it is a small study / not many children were in the study; the study only included children/only 3-year olds and 8-year olds; idea that study carried out in only one area;	[2]	accept additives were not tested separately ignore 'needs more research' or 'not enough information'
	c	any two from: appeal: to make the drinks look more attractive; money: sell/buy more drinks / make more profit; safety: manufacturers consider them to be safe / approved by FSA; longer shelf life: these colourings are more stable than others; alternatives: alternative colours are more expensive;	[2]	ignore references to taste

Question		Expected Answers	Marks	Additional Guidance
3	d	<p>any three points from:</p> <p>list 1: idea of producing drinks without added colours; but they would be less attractive / sell less; use natural/alternative colourings; but they are more expensive;</p> <p>list 2: more research should be carried out to find the effect of colourings; colourings may/may not cause ill effects; people should have the right to choose what they drink; clearly label drinks with their contents;</p>	[3]	<p>no more than two marks from either list</p> <p>allow 'remove (some) colours' for 'not adding colours' allow 'less colours' idea</p> <p>watch out for rephrasing the command line, eg 'this is/is not a sensible idea' which is neutral and needs more to earn a mark</p>
	e i	<p>they do not know whether there is a risk / they do not know how big the risk is / they do not know if their children will be affected / they do not know how bad the consequences would be (1) it is better to err on the side of caution / do not allow drinks with these food colourings (until we know more about them) (1)</p>	2	<p>first marking point is for acknowledging that the risk is unknown.</p> <p>second marking point is for 'better to be safe than sorry' idea</p>

Question			Expected Answers	Marks	Additional Guidance
3	e	ii	<p>any two from: allergy ideas / some children may have bad reaction / effect;</p> <p>contamination ideas eg pesticides, plasticizers; example of effect of named ingredient;</p> <p>unknown long-term effects (of named ingredient); could choke;</p>	[2]	<p>eg drink may be OK for nearly all people but may cause harm to a few answer must state or imply that only some children are affected and the effect is bad.</p> <p>problems caused eg sugar rots teeth / sugar affects diabetes / sugar causes obesity / acids dissolve teeth ignore answers about hyperactivity or impulsive behaviour. accept any plausible example</p>
			Total	13	

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