OCR
RECOGNISING ACHIEVEMENT

GCSE

Science A

General Certificate of Secondary Education

Unit **A212/02:** Unit 2: Modules B2, C2, P2 (Higher Tier)

Mark Scheme for January 2012

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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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Annotations

Used in the detailed Mark Scheme:

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
not/reject	answers which are not worthy of credit
ignore	statements which are irrelevant - applies to neutral answers
allow/accept	answers that can be accepted
(words)	words which are not essential to gain credit
words	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	alternative wording
ORA	or reverse argument

Available in scoris to annotate scripts

	indicate uncertainty or ambiguity
BOD	benefit of doubt
CON	contradiction
	incorrect response
ECF	error carried forward
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
NBOD	no benefit of doubt

R	reject
✓	correct response
≈	draw attention to particular part of candidate's response
^	information omitted

Subject-specific Marking Instructions

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

b. 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.

☐
☐
☒
☒
☐

This would be worth 1 mark.

Put ticks (✓) in the two correct boxes.

☐
☐
✓
☒
☐

This would be worth 0 marks.

Put ticks (✓) in the two correct boxes.

☒
☒
✓
✓
☐

This would be worth 1 mark.

c. 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.

d. 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

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third <u>should be blank</u> (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	×	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	×		✓		✓	✓		✓	
Score:	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**NR**

Question			Answer	Mark	Guidance
1	(a)		**sentence 1:** stiffness, strength cost/more expensive (1) **sentence 2:** melting point strength/stiffness (1) **sentence 3:** stretch, stiffness, cost (1)	3	**accept** stiffness and strength in either order all three for one mark both for one mark all three for one mark; any order
	(b)	(i)	*similarity:* contain (only) C and H atoms / hydrocarbons (1) *difference:* are different sizes / different lengths / some branched / different molecular structures (1)	2	
		(ii)	(small molecules/monomers) joined together (1) to make polymer / long molecules / chains (1)	2	polymerisation with no explanation = 1 mark
	(c)		Recycling plastics into new products uses energy: ( ) Energy released from incinerating plastics is used to generate electricity: (✓) (1) Carbon dioxide is made when plastics burn: ( ) Fuel is used when transporting plastics: ( ) Plastics take up a lot of space in landfill: (✓) (1)	2	two correct ticks = 2 marks one correct tick plus one incorrect = 1 mark three ticks = max 1 mark four or more ticks = 0 marks
			Total	**9**	

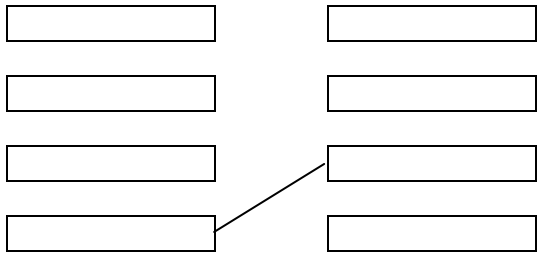
<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>2</td><td>(a)</td><td></td><td>
<table>
<tr><th></th><th>true</th><th>false</th></tr>
<tr><td>The strength of polyethene made with 100 repeated units is 10 times that made with 50</td><td></td><td>✓</td></tr>
<tr><td>The maximum strength is 20.5MPa</td><td>✓</td><td></td></tr>
<tr><td>Polyethene made with 100 repeated units has the same strength as that made with 150</td><td></td><td>✓</td></tr>
<tr><td>The minimum number of repeated units for maximum tensile strength is 120</td><td>✓</td><td></td></tr>
</table>
</td><td>3</td><td>all four correct = 3 marks
three correct = 2 marks
two correct = 1 mark</td></tr>
<tr><td></td><td>(b)</td><td></td><td>
<table>
<tr><td>Longer chains are held further apart than shorter ones.</td><td></td><td></td></tr>
<tr><td>The atoms are held together more strongly in long chains.</td><td></td><td></td></tr>
<tr><td>Longer chains need more energy to separate them.</td><td>✓</td><td>(1)</td></tr>
<tr><td>There are larger forces inside the chains.</td><td></td><td></td></tr>
<tr><td>There are larger forces between the chains</td><td>✓</td><td>(1)</td></tr>
</table>
</td><td>2</td><td>two correct ticks = 2 marks
one correct tick plus one incorrect = 1 mark
three ticks = max 1 mark
four or more ticks = 0 marks</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>5</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
3	(a)		Amy ✓ (1) Betty Clive ✓ (1) David Erica	2	two correct ticks = 2 marks one correct tick plus one incorrect = 1 mark three ticks = max 1 mark four or more ticks = 0 marks
	(b)		Amy Betty ✓ (1) Clive David Erica	1	one correct tick = 1 mark more than one tick = 0 marks
	(c)		Amy Betty Clive David ✓ (1) Erica	1	one correct tick = 1 mark more than one tick = 0 marks
			Total	**4**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>4</td><td>(a)</td><td></td><td>any three from:
radiation from Sun is absorbed by Earth (and warms it);
Earth emits (infrared/less energetic) radiation;
which is absorbed by gases in the atmosphere;
outgoing is less than incoming so Earth heats up (3)</td><td>3</td><td>max three marks
do not accept 'takes' for 'absorbs'
do not accept unqualified ‘energy’ for 'radiation'</td></tr>
<tr><td></td><td>(b)</td><td></td><td><table><tr><td>drop in the sea level</td><td></td></tr><tr><td>floods in some areas</td><td>✓</td></tr><tr><td>inability to grow some crops</td><td>✓</td></tr><tr><td>less water vapour in the atmosphere</td><td></td></tr><tr><td>some areas would become colder</td><td>✓</td></tr></table>(1)</td><td>1</td><td>three correct ticks = 1 mark
four or five ticks = 0 marks</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>4</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
5	(a)		<table><tr><td>A photon of red light has less energy than a photon of blue light</td><td>✓</td></tr><tr><td>Intensity depends only on how many photons each lamp gives out each second</td><td></td></tr><tr><td>The blue lamp gives out more energy per second than the red lamp</td><td></td></tr><tr><td>The red lamp emits more photons per second than the blue lamp</td><td>✓</td></tr><tr><td>The red lamp is switched on for longer than the blue lamp</td><td></td></tr></table> (1) (1)	2	two correct ticks = 2 marks one correct tick plus one incorrect = 1 mark three ticks = max 1 mark four or more ticks = 0 marks
	(b)		ultraviolet, X-rays and gamma rays (1) break atoms/molecules into bits (called ions) **or** can remove electrons from atoms/molecules (1)	2	
	(c)		**any two from:** killed; become cancerous; mutate/damage/harmed (1)	2	**ignore** any actual radiation types listed by the candidate (just mark effects) **allow** divide uncontrollably for 'cancer' **allow** changes DNA **ignore** burned/deformed/weakened/denatured
			Total	**6**	

Question			Answer	Mark	Guidance
6	(a)	(i)	40 000 people /lots of people/big sample size **or** over 13 years/long time (1) published in a <u>peer review</u> journal (1)	2	**do not accept** unqualified number or amount **do not accept** "published" or "scientific journal" alone
		(ii)	a mechanism that explains how coffee and tea can prevent heart disease (1)	1	
	(b)		graph **B** (1)	1	
	(c)		**any three from:** high fat diet; high salt diet; obesity/overweight; lack of exercise; stress; drinking (alcohol) (1)	1	any three = 1 mark **allow** eating fatty food/eating too much fat **ignore** junk food/bad diet/unhealthy diet/unbalanced diet **do not allow** exercise unqualified **ignore** smoking **ignore** ref to drugs **do not allow** genetics/inherited
	(d)		It makes us less certain of the… ; It makes us more certain of the… ; One case does not provide convincing… ✓ ; There is no correlation between… (1)	1	one correct tick = 1 mark more than one tick = 0 marks

Question			Answer	Mark	Guidance
6	(e)		 (1)	1	an artery carrying blood to the heart muscle is blocked by fat (with) decreased supply of oxygen and glucose
			Total	**7**	

Question			Answer	Mark	Guidance
7	(a)		<table><tr><td>…can reproduce asexually</td><td></td></tr><tr><td>…contain antibodies</td><td></td></tr><tr><td>…produce poisons</td><td>✓</td></tr><tr><td>…are very small</td><td></td></tr><tr><td>…can damage cells</td><td>✓</td></tr></table> (1)	1	two correct ticks = 1 mark one correct tick plus one incorrect = 0 marks three or more ticks = 0 marks
	(b)		<table><tr><td>Antibiotics do not kill viruses.</td><td>✓</td></tr><tr><td>Using antibiotics unnecessarily…</td><td>✓</td></tr><tr><td>Using antibiotics will make the…</td><td></td></tr><tr><td>Antibiotics encourage bacterial…</td><td></td></tr></table> (1)	1	two correct ticks = 1 mark one correct tick plus one incorrect = 0 marks three or more ticks = 0 marks
	(c)		5 (1) 6 (1)	2	
	(d)		HIV has a high mutation rate/antigens change/surface proteins change rapidly (1) so vaccine would quickly become ineffective/need to keep making new vaccines (1) HIV affects/damages/attacks/destroys part of the immune system/white blood cells (1)	3	**do not accept** HIV changes/keeps changing
			Total	**7**	

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