

# **Applied Science: Double Award**

General Certificate of Secondary Education

Unit **B482/02**: Science for the needs of Society

## **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
	benefit of doubt
	contradiction
	incorrect response
	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
	no benefit of doubt

	reject
	correct response
	draw attention to particular part of candidate's response
	information omitted

Question			Expected Answers	Marks	Additional Guidance															
1	(a)	(i)	poly(ethene)	1	<b>accept</b> glue <b>do not allow</b> 'ethene' alone <b>ignore</b> 'gloves' <b>ignore</b> 'wood'															
		(ii)	aluminium	1	<b>do not accept</b> steel															
	(b)		<table border="1"> <thead> <tr> <th></th> <th>true (✓)</th> <th>false (✓)</th> </tr> </thead> <tbody> <tr> <td>all the atoms in a composite are the same</td> <td></td> <td>✓</td> </tr> <tr> <td>one example of a composite is glass reinforced plastic</td> <td>✓</td> <td></td> </tr> <tr> <td>the properties of a composite are a combination of the properties of the materials used to make it</td> <td>✓</td> <td></td> </tr> <tr> <td>materials used to make composites are always arranged in layers</td> <td></td> <td>✓</td> </tr> </tbody> </table>		true (✓)	false (✓)	all the atoms in a composite are the same		✓	one example of a composite is glass reinforced plastic	✓		the properties of a composite are a combination of the properties of the materials used to make it	✓		materials used to make composites are always arranged in layers		✓	2	all correct = 2 marks 2/3 correct = 1 mark 1 correct = 0 marks
	true (✓)	false (✓)																		
all the atoms in a composite are the same		✓																		
one example of a composite is glass reinforced plastic	✓																			
the properties of a composite are a combination of the properties of the materials used to make it	✓																			
materials used to make composites are always arranged in layers		✓																		
	(c)	(i)	<b>any 2 from</b> (ceramic bearings....) do not expand (when hot); less likely to stick; lighter / less dense; do not rust / corrode	2	<b>ignore</b> references to 'friction' / 'get hot' alone <b>ignore</b> 'erode' <b>accept</b> reverse argument i.e. <u>steel</u> bearings....															
		(ii)	<p>can be drawn into wires <input type="checkbox"/></p> <p>conduct electricity <input type="checkbox"/></p> <p>do not melt when heated <input checked="" type="checkbox"/></p> <p>flexible <input type="checkbox"/></p> <p>hard <input checked="" type="checkbox"/></p>	1	both required															

Question		Expected Answers	Marks	Additional Guidance
	(iii)	glass; cement	2	
	(d)	idea of separation (of the components)	1	<b>ignore</b> 'it costs more'
		<b>Total</b>	<b>10</b>	

Question		Expected Answers	Marks	Additional Guidance								
2	(a)	(i) oxygen	1	<b>accept</b> O <sub>2</sub> but <b>ignore</b> O or incorrect formula e.g. O <sup>2</sup> etc								
		(ii) carbon dioxide	1	<b>accept</b> water vapour <b>accept</b> correct formula, <b>ignore</b> incorrect formulae <b>ignore</b> methane / other correct greenhouse gas								
		(iii) nitrogen	1	<b>accept</b> correct formula, <b>ignore</b> incorrect formulae								
	(b)	carbon monoxide sulphur dioxide	2									
	(c)	(i) increase in carbon dioxide (concentration) / increase in concentration (1)  increase in carbon dioxide (concentration) over the years/ linked to <u>time</u> (2)	2	' <u>it</u> ' is not enough for 'carbon dioxide'  <b>ignore</b> 'it goes up and down / zigzags'  'positive correlation' must mention both variables to gain marks.								
		(ii) photosynthesis / plants take in carbon dioxide (1)  idea of different seasons/light levels/temperature (1)	2	<b>assume</b> 'it' refers to carbon dioxide								
	(d)	<table border="1"> <tbody> <tr> <td>looking at temperature records</td> <td></td> </tr> <tr> <td>measuring the amount of oxygen and assumed the rest was carbon dioxide</td> <td></td> </tr> <tr> <td>examining ice cores</td> <td>✓</td> </tr> <tr> <td>examining igneous rocks</td> <td></td> </tr> </tbody> </table>	looking at temperature records		measuring the amount of oxygen and assumed the rest was carbon dioxide		examining ice cores	✓	examining igneous rocks		1	
looking at temperature records												
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examining ice cores	✓											
examining igneous rocks												
		<b>Total</b>	<b>10</b>									

Question		Expected Answers		Marks	Additional Guidance								
3	(a)			2	4 correct = 2 marks 2 or 3 correct = 1 mark 0 or 1 correct = 0 marks								
			<b>intensive</b>			<b>organic</b>							
		high efficiency in energy transfers	✓										
		biological control of pests				✓							
		higher yields	✓										
		more humane conditions for animals		✓									
	(b)	(i)	P – phosphorus; K – potassium	2									
		(ii)	needed to make proteins; used in <u>cell</u> growth	2									
		(iii)	<table border="1"> <tr> <td>active transport</td> <td>✓</td> </tr> <tr> <td>diffusion</td> <td></td> </tr> <tr> <td>inspiration</td> <td></td> </tr> <tr> <td>osmosis</td> <td></td> </tr> </table>	active transport	✓	diffusion		inspiration		osmosis		1	
active transport	✓												
diffusion													
inspiration													
osmosis													
	(c)	(i)	toxic; passed along food chains / kills animals higher up food chain; concentrated through food chain / bioaccumulation	2	any two affects food chains is insufficient								
		(ii)	passing on diseases (from material used as food);  BSE/CJD/Mad Cow disease	2	<b>ignore</b> 'inhumane' or 'cannibalism' arguments								
			<b>Total</b>	<b>11</b>									



Question			Expected Answers	Marks	Additional Guidance
4	(a)	(i)	6 (protons); (6) neutrons	2	
		(ii)	organic	1	
		(iii)	synthetic fertilisers; ceramics	1	
	(b)	(i)	fractional distillation	1	
		(ii)	propane and butane have the lowest boiling point / are gases; bitumen has the highest melting point / is a solid; propane and butane have the smallest molecules / smallest particles; propane and butane have the fewest carbon atoms in the molecules	2	any two  <b>accept RA</b>  <b>accept RA</b>
		(iii)	bitumen	1	
		(iv)	<b>any two from</b>  petrol sells for a higher price / more demand for petrol;  idea of no waste products / can sell all of output;  less crude oil needed to be used / no excess to dispose of	2	'more petrol' alone is insufficient
			<b>Total</b>	<b>10</b>	

Question			Expected Answers	Marks	Additional Guidance																
5	(a)	(i)	seismometer	1																	
		(ii)	measures period – 15s frequency (= 1/period) – 0.067 unit = Hz	3	<b>allow</b> 0.06 to 0.07 inclusive 2 marks for correct numerical answer																
		(iii)	speed = frequency x wavelength = 0.5 x 100;  50	2	2 marks for correct numerical answer																
	(b)		<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>liquid</th> <th>solid</th> <th>cannot tell</th> </tr> </thead> <tbody> <tr> <td><b>mantle</b></td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td><b>outer core</b></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td><b>inner core</b></td> <td></td> <td></td> <td>✓</td> </tr> </tbody> </table>		liquid	solid	cannot tell	<b>mantle</b>		✓		<b>outer core</b>	✓			<b>inner core</b>			✓	3	1 for each correct row
	liquid	solid	cannot tell																		
<b>mantle</b>		✓																			
<b>outer core</b>	✓																				
<b>inner core</b>			✓																		
	(c)	(i)	destructive margin both arrows pointing horizontally to the centre (1) constructive margin both arrows pointing horizontally away from centre (1)	2																	
		(ii)	<b>any two from</b> convection currents; gravity; thermal plumes	2	<b>ignore</b> friction																
			<b>Total</b>	<b>13</b>																	

Question		Expected Answers	Marks	Additional Guidance
6	(a)	<b>B</b> not included  <b>E A F D C</b>	2	
	(b) (i)	the brain	1	
	(ii)	vasodilatation linked with more heat loss/lowering temperature; blood vessels dilate; controls amount of blood to skin; controls diameter of blood vessels; controlled by nervous system	3	if consistent vasoconstriction answer given maximum 2 marks any three
		<b>Total</b>	<b>6</b>	

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