

Applied Science: Double Award

General Certificate of Secondary Education

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

Mark Scheme for June 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		Answer	Marks	Guidance
1	(a)	<p>advantage: no noise / less traffic / lose eyesore / more land available for development</p> <p>disadvantage: no jobs / less money available (locally)</p>	2	ignore CO ₂ / pollution
	(b)	<p>research and development of new processes <input checked="" type="checkbox"/></p> <p>selling the steel to customers <input type="checkbox"/></p> <p>checking the quality of the steel <input checked="" type="checkbox"/></p> <p>interviewing new office employees <input type="checkbox"/></p> <p>arranging the transport of the steel around the country <input type="checkbox"/></p>	1	both needed
	(c)	<p>element: iron / carbon / calcium</p> <p>compound: carbon monoxide / carbon dioxide / calcium carbonate / iron oxide</p> <p>mixture: air / slag / limestone / iron ore / gases / coke</p>	1	one example of each required
	(d)	mixture of mineral with waste rock	1	
	(e) (i)	carbon dioxide	1	accept CO ₂
	(ii)	iron oxide + carbon monoxide → iron + carbon dioxide	1	allow ecf from (i)

Question	Answer	Marks	Guidance												
(f)	<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; width: 50%;">name</td> <td style="text-align: center; width: 50%;">formula</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">iron</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">CaCO₃</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">calcium carbonate</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">Fe₂O₃</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">iron oxide</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">CO₂</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">carbon dioxide</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">CO</td> </tr> <tr> <td></td> <td style="border: 1px solid black; padding: 2px; text-align: center;">Fe</td> </tr> </table>	name	formula	iron	CaCO ₃	calcium carbonate	Fe ₂ O ₃	iron oxide	CO ₂	carbon dioxide	CO		Fe	2	all correct = 2 marks 3 correct = 1 marks 0,1 or 2 correct = 0 marks
name	formula														
iron	CaCO ₃														
calcium carbonate	Fe ₂ O ₃														
iron oxide	CO ₂														
carbon dioxide	CO														
	Fe														
(g)	lead	1													
Total		10													

Question			Answer	Marks	Guidance
2	(a)	(i)	radio visible light	2	allow microwave
		(ii)	any two of: IR / infrared UV / ultraviolet x-ray gamma (rays) / γ	2	allow microwave
		(iii)	ultraviolet / uv	1	
		(iv)	radio waves have a longer wavelength than ultraviolet waves <input checked="" type="checkbox"/> radio waves can be seen by the human eye, ultraviolet waves cannot <input type="checkbox"/> ultraviolet waves have a higher frequency than radio waves <input checked="" type="checkbox"/> ultraviolet waves have a larger wavelength than radio waves <input type="checkbox"/> radio waves don't have a frequency, ultraviolet waves do <input type="checkbox"/> radio waves and ultraviolet waves travel at different speeds through space <input type="checkbox"/>	2	
	(b)	(i)	stars / named star / type of star (1) galaxies / named galaxies / type of galaxy (1)	2	accept other correct examples e.g. black-hole, nebula
		(ii)	brightness <input type="checkbox"/> distance <input checked="" type="checkbox"/> spectrum <input type="checkbox"/> time <input type="checkbox"/>	1	
Total				10	

Question			Answer	Marks	Guidance																									
3	(a)	(i)	glucose: $C_6H_{12}O_6$ ethanol: C_2H_6O / C_2H_5OH balanced: $C_6H_{12}O_6 \rightarrow 2 C_2H_5OH + 2 CO_2$	3	no mark for CO_2																									
		(ii)	no oxygen - so no <u>aerobic</u> respiration / allows <u>anaerobic</u> respiration any 2 warm temp - best/optimum for <u>enzymes</u> reactions happen faster <u>enzymes</u> denature above $50^\circ C$ /high temperatures	1 2	 allow yeast killed above $50^\circ C$																									
	(b)		<table border="1"> <thead> <tr> <th></th> <th>mitosis</th> <th>meiosis</th> <th>both</th> <th>neither</th> </tr> </thead> <tbody> <tr> <td>produces two daughter cells</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>produces cells with chromosomes</td> <td></td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>produces gametes</td> <td></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>produces cloned cells</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		mitosis	meiosis	both	neither	produces two daughter cells	✓				produces cells with chromosomes			✓		produces gametes		✓			produces cloned cells	✓				4	 accept ✓ in both mitosis and meiosis boxes for 'produces cells with chromosomes'
	mitosis	meiosis	both	neither																										
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			Total	10																										

Question		Answer	Marks	Guidance															
4	(a)	cheaper than <u>silver</u> ; good/high electrical conductivity	2	do not accept <u>highest</u> electrical conductivity															
	(b)	higher atomic mass does correlate to a higher density (1) the higher the atomic mass, does not relate to a higher the melting (1)	2	no mark for whether Ben correct or not allow specific example of an exception to the trend															
	(c) (i)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>copper</th> <th>PVC</th> </tr> </thead> <tbody> <tr> <td>Has a higher melting point</td> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td>Is more dense</td> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td>Does not corrode</td> <td></td> <td style="text-align: center;">✓</td> </tr> <tr> <td>Can catch fire and burn</td> <td></td> <td style="text-align: center;">✓</td> </tr> </tbody> </table>		copper	PVC	Has a higher melting point	✓		Is more dense	✓		Does not corrode		✓	Can catch fire and burn		✓	2	all correct = 2 2/3 correct = 1 1 correct = 0
	copper	PVC																	
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	(ii)	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;"></th> <th style="width: 30%; text-align: center;">type of bonding</th> <th style="width: 50%; text-align: center;">description</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">copper</td> <td style="text-align: center;">ionic</td> <td style="border: 1px solid black; padding: 5px;">atoms held together by shared electrons</td> </tr> <tr> <td style="text-align: center;">polymer</td> <td style="text-align: center;">covalent</td> <td style="border: 1px solid black; padding: 5px;">atoms transfer electrons and are held together by opposite charges</td> </tr> <tr> <td></td> <td style="text-align: center;">metallic</td> <td style="border: 1px solid black; padding: 5px;">positive ions in a 'sea' of electrons</td> </tr> </tbody> </table>		type of bonding	description	copper	ionic	atoms held together by shared electrons	polymer	covalent	atoms transfer electrons and are held together by opposite charges		metallic	positive ions in a 'sea' of electrons	2	LHS = 1 RHS = 1 accept line drawn from ionic to 2 nd description box			
	type of bonding	description																	
copper	ionic	atoms held together by shared electrons																	
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	metallic	positive ions in a 'sea' of electrons																	
Total			8																

Question			Answer	Marks	Guidance
5	(a)	(i)	<p>any three from: renewable/ they do not run out / less CO₂</p> <p>do not need to lay wires to the mains supply / no power cuts</p> <p>no/very little running costs / cheaper</p> <p>because may be sunny and not windy and v.v.</p>	3	<p>ignore environmentally friendly / pollution</p> <p>do not allow 'no cost'</p>
		(ii)	<p>store energy / battery can be charged</p> <p>(because) energy not produced all the time</p>	2	<p>allow stores electricity</p> <p>allow specific examples</p>
		(iii)	idea of saving energy	1	allow saving electricity
	(b)	(i)	use less energy than other types of light / low energy	1	accept longer life / uses less electricity
		(ii)	<p>rearrange: energy = power x time</p> <p>substitute: 30 x 15</p> <p>evaluate: 450</p>	3	3 marks for correct numerical answer
		(iii)	<p>recall: power = voltage x current</p> <p>rearrange current = power ÷ voltage</p> <p>substitute/evaluate: 30 ÷ 12 = 2.5</p>	3	<p>ignore triangles</p> <p>3 marks for correct numerical answer</p> <p>allow 2 marks if a follow on of x100 to give 250</p>
		(iv)	some energy is lost (as heat) / efficiency is not 100%	1	
Total				14	

Question			Answer	Marks	Guidance
6	(a)	(i)	bacteria	1	
		(ii)	antibiotics do not kill viruses	1	allow cure viruses
	(b)		droplets (of water) / saliva / spit carry bacteria/microorganisms / bacteria in air breathed into (lungs of other people)	3	ignore infection ignore washing / touching
	(c)		any 3 from: injection dead/weakened bacteria antibodies produced by white blood cells antibodies remain (in the blood) a new infection is quickly recognised/destroyed	3	'the body knows what to do' is insufficient
			Total	8	

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