

Additional Science A

General Certificate of Secondary Education **A216/02**

Unit 2: Modules B5, C5, P5 (Higher Tier)

Mark Scheme for June 2010

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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.

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Question		Expected Answers	Marks	Additional Guidance
1	a	<p><u>Where is the salt?</u> Realises that the rocks/ mountains / ground / lithosphere contain the salt or salts or minerals (1)</p> <p><u>How does [the salt] get into the water?</u> Describes <u>extraction</u> of material <u>from</u> rocks by water e.g. salt dissolves / chemicals washed out of rocks (1)</p> <p><u>What happens to the sea?</u> links evaporation to water or evaporation to salt left behind /salt doesn't evaporate [any context must be suitable] (1)</p>	[3]	<p>'Chemicals' not enough for the 'salt' marking point.</p> <p>Must strongly infer that the salt is in the ground to start with. If ground not mentioned, allow any mention of salt in streams/rivers – assume from ground unless candidate contradicts that assumption. allow "Rivers pick up salt" for salt in ground. not "salt travels down rivers", "rain picks up salt" - not enough</p> <p>The extraction must be discussed, however briefly. "The water flows over salty ground", "rains onto cliffs and picks up salts" both only get the first mark</p> <p>Any context must imply that water evaporates FROM the sea. ignore 'Sea evaporates'</p> <p>we are NOT looking for a description of the water cycle The second marking point will often include the first, and be worth two marks "salt washed out of rocks" = 2 "chemicals washed out of rocks" = 1 ie not 'chemicals'</p>

Question		Expected Answers	Marks	Additional Guidance
1	b	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">small molecules</div> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 2px;"></div> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 2px;"></div> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 2px;"></div> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 2px;"></div> </div> <div style="border: 1px solid black; padding: 2px; margin-left: 20px; margin-top: 10px;">weak forces of attraction</div>	[2]	<p>mark each column separately, 1 mark for each correct column</p> <p>A column is correct if the correct box, and no other, is indicated, though it may have more than one line attached to it</p>
	c	CH ₄ (1)	[1]	
Total			[6]	

2	a	Danielle (1) Andy (1)	[2]	either order accept if marked on the diagram										
	b	realises the <u>major</u> factor is weight/mass	[1]	accept "Aluminium/cable is lighter" accept "twice the conductivity for the same weight" If the candidate gives several reasons, look where the emphasis lies. If in doubt, lighter should be the first in the list. So ignore " <u>and</u> it is lighter"										
	c	40% (1)	[1]											
	d	<p>...to melt a compound <input type="checkbox"/></p> <p>...to purify a compound <input type="checkbox"/></p> <p>...to make a compound <input type="checkbox"/></p> <p>... to decompose a compound <input checked="" type="checkbox"/> (1)</p>	[1]											
	e	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; height: 25px;"></td> <td style="width: 50%; height: 25px;"></td> </tr> <tr> <td style="height: 25px;"></td> <td style="text-align: center;">Oxygen...positive...</td> </tr> <tr> <td style="height: 25px;"></td> <td style="height: 25px;"></td> </tr> <tr> <td style="text-align: center;">...formed...positive...</td> <td style="height: 25px;"></td> </tr> <tr> <td style="height: 25px;"></td> <td style="height: 25px;"></td> </tr> </table>				Oxygen...positive...			...formed...positive...				[2]	mark each column separately A column is correct if the correct box, and no other, is indicated, though it may have more than one line attached to it
	Oxygen...positive...													
...formed...positive...														

Question		Expected Answers	Marks	Additional Guidance								
2	f		[1]									
		<table border="1"> <tr> <td></td> <td></td> </tr> <tr> <td>$\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$</td> <td>✓</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table>					$\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$	✓				
		$\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$			✓							
Total			[8]									
3	a	resistance (1) temperature (1)	[2]									
	b	9 Ω (1)	[1]									
	c		[1]	<p>look for V in a circle [not a square] with lines to either end of thermistor [accept the 'V' on its side] one end connected anywhere between A and B the other end connect anywhere between C and D The voltmeter maybe 'inside' the circuit</p> <p>accept diagram at bottom of page If there is an answer in both positions, neither crossed out, mark the top one only.</p> <p>Candidates answer should be on the printed diagram. IF NOT, they may have drawn another diagram which can score the marks.</p>								
Total			[4]									

Question		Expected Answers	Marks	Additional Guidance						
4	a	voltage (1) ... current (1) [in that order]	[2]	allow resistance for the second answer						
	b	<table border="1"> <thead> <tr> <th>switch</th> <th>ammeter reading</th> </tr> </thead> <tbody> <tr> <td>open</td> <td>1</td> </tr> <tr> <td>closed</td> <td>2</td> </tr> </tbody> </table>	switch	ammeter reading	open	1	closed	2	[1]	beware – BOTH responses needed for the mark
switch	ammeter reading									
open	1									
closed	2									
	c	<p>First marking point Calculation, independent of reasoning $6/12=0.5$, $6/0.5=12$, $12 \times 0.5=6$ OR $3/6 = 0.5$, $3/0.5 = 6$, $6 \times 0.5 = 3$ No other calculations are acceptable</p> <p>Second marking point [mark independently] Any one of the following Correct equation written in symbol or word form $I=V/R$ $V=IR$ $R=V/I$</p> <p>[in series], current must be same through both resistors [components] / voltage split across the resistors</p> <p>indicates that “12” is a measure of [total] resistance or that the pd across one resistor is 3 [volts]</p>	[2]	<p>accept the calculation in words “6 is half of 12, so it’s 0.5”</p> <p>any statement about current being <u>split</u> or <u>shared between</u> resistors cannot get the second marking point.</p> <p>in series, so <u>charge</u> must be same through both resistors BOD</p> <p>accept any reference to “12Ω”, “resistors add up to 12”,</p>						
Total			[5]							
5	a	discusses magnetic field (1) which is changing (1) uses the term 'induces' or shows causal link between changing magnetic field and voltage (1)	[3]	accept any reference to magnetism e.g. 'electromagnet' ignore 'because transformers don't work on dc'						
	b	115 V (1)	[1]							
	c	16.8 kWh (1)	[1]							
Total			[5]							

Question		Expected Answers	Marks	Additional Guidance
6	a	<p>any three from the following:</p> <p><i>Clone</i> - the new plant/cutting/it is a clone</p> <p><i>Hormone</i> - Links hormone/auxin to growth or development [of any part of the plant]</p> <p><i>unspecialised cells</i> - infers that these are the cells which actually develop/ change/ specialise/ differentiate [into something else]</p> <p>xylem cells – infers that these develop from the unspecialised cells</p>	[3]	<p>IGNORE ANY INCORRECT STATEMENTS, unless they actually contradict a correct statement.</p> <p>Eg ignore ‘cutting is a clone of the DNA’ ignore “They clone cells that are needed”</p> <p>ignore ‘the hormones <u>in</u> the plant’, “the cutting gives off a hormone”, “hormone stimulates plant” ‘auxin is a hormone’ – not enough for a mark</p> <p>the hormone auxin helps the plant respond to light. BOD for growth</p> <p>accept ‘unspecialised cells grow <u>into any cell</u>’</p> <p>ignore ‘unspecialised cells grow’ ignore “all plant cells are unspecialised” ignore ‘the unspecialised cells in the cutting means <u>it</u> can grow into something else”</p> <p>ignore ‘meristem’</p> <p>“unspecialised cells develop into xylem cells” = 2 “[meristem cells] develop into xylem cells” = 1</p>
	b	mentions light/photosynthesis	[1]	<p>ignore any mention of ‘Sun’, but accept ‘sunlight’ reject incorrect statements, e.g.Plant gets its food from the sunlight</p>
Total			[4]	

Question		Expected Answers	Marks	Additional Guidance	
7	a	<p>cells divide <input checked="" type="checkbox"/> (1)</p> <p>chromosomes are copied <input type="checkbox"/></p> <p>number of organelles increases <input type="checkbox"/></p> <p>number of nuclei stays the same <input type="checkbox"/></p> <p>copies of chromosomes separate <input checked="" type="checkbox"/> (1)</p>	[2]	If more than two boxes ticked deduct a mark for each incorrect response. Candidates may not score less than zero.	
	b	i	gametes (1)	[1] accept sex cells, egg (cell), sperm (cell), haploid, reproductive cells reject zygote, embryo If more than one answer – mark the first one	
		ii	<p>The larger cell has more... <input type="checkbox"/></p> <p>The smaller cell has more... <input type="checkbox"/></p> <p>They have the same number... <input checked="" type="checkbox"/> (1)</p> <p>The first cell to form has more... <input type="checkbox"/></p>	[1]	
	c	i	<p>All genes are activated. <input type="checkbox"/></p> <p>All genes are inactivated. <input type="checkbox"/></p> <p>All active genes are inactivated. <input type="checkbox"/></p> <p>Some inactive genes are reactivated. <input checked="" type="checkbox"/> (1)</p>	[1]	

Question			Expected Answers	Marks	Additional Guidance
7	c	ii	Stem cells have twice... <input type="checkbox"/>	[1]	
			Stem cells are specialised. <input type="checkbox"/>		
			Stem cells are unspecialised. <input checked="" type="checkbox"/> (1)		
			Stem cells have half... <input type="checkbox"/>		
			Total	[6]	

Question		Expected Answers	Marks	Additional Guidance				
8	a	T G T C A	[1]					
	b	<p>to make...different <input type="checkbox"/></p> <p>to hold the strands...together <input checked="" type="checkbox"/></p> <p>to allow exact copies... <input checked="" type="checkbox"/></p> <p>to allow proteins to join... <input type="checkbox"/></p> <p>...code for a different amino acid <input type="checkbox"/></p>	[1]	beware – one mark for BOTH answers				
	c	<table border="1" style="margin-left: 20px;"> <tr> <td>D</td> <td>A</td> <td>E</td> <td>F</td> </tr> </table> <p>uses D, A, E in any order = 1 mark order correct = 1 mark</p>	D	A	E	F	[2]	
D	A	E	F					
Total			[4]					

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