

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
7	1	(a)		2	melting point decreases (1)  density increases (1)			
		(b)		1	potassium	K		sodium
		(c)		2	values from 669–650°C (1)  (francium boiling point) below that of caesium /boiling points decrease down the group below 670°C <b>and</b> above 650°C / no greater than 20°C below caesium's boiling point (1)			

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FT	HT								
8	2	(a)			2	Iceland (1)  positioned on the mid-Atlantic ridge / mid-Atlantic ridge passes through Iceland / positioned at a boundary where plates are moving apart / on constructive plate boundary			
		(b)	(i)		1	rocks furthest away (from the plate boundary) are the oldest			
			(ii)		2	new (igneous) rock formed (1)  ocean floor moving / ocean floor spreading / rocks moving away from boundary / plates moving apart (1)  constructive plate boundary (1)  any 2 for (1) each	ocean floor = sea floor floor = rocks	new 'land' formed	plates move towards/past each other

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9	3	(a)	(i)	1	circle around <b>3.0</b>			
			(ii)	1	incorrect <i>mass of magnesium</i> used / incorrect <i>volume of copper(II) sulfate solution</i> used / thermometer <i>out of the reaction</i> mixture when read any one		too much magnesium added	incorrect thermometer reading
		(b)		3	all points plotted correctly (2) one plotting error only (1)  smooth curve of best fit (by eye) (1) <i>(line must be a single line and line must go to origin)</i>			points joined by straight lines
		(c)		1	no magnesium added = no temperature rise/ no magnesium added = no reaction			
		(d)		2	0.8(g) (1) consequential from graph  temperature stops rising /graph stops rising (1)			

Question Number		Mark	Answer
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<b>10</b>	<b>4</b>	6	<p><b>Indicative content:</b> Reference to the <i>causes, consequences</i> and <i>solutions</i> of global warming e.g.</p> <p>QWC Causes: burning fossil fuels / named fuels deforestation CO<sub>2</sub> in atmosphere increases CO<sub>2</sub> prevents heat escaping from atmosphere/ CO<sub>2</sub> is a greenhouse gas increased greenhouse effect = global warming/increase in atmospheric temperature</p> <p>Consequences: sea level increasing/ climate change/ extreme weather event/ increase in melting glaciers, sea ice &amp; permafrost</p> <p>Ways of reducing impact: burn less fossil fuel/ reduce deforestation / alternative energy / reduce use of electricity (personal level) carbon capture and storage</p> <p><b>5-6 marks</b> The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</p> <p><b>3-4 marks</b> The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</p> <p><b>1-2 marks</b> The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</p> <p><b>0 marks</b> The candidate does not make any attempt or give a relevant answer worthy of credit.</p>

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FT	HT	(a)	(i)					
	<b>5</b>			1	<b>C</b>	Mg		
			(ii)	2	(good) electrical conductor (good) thermal conductor malleable / bends ductile / can be stretched into wire high mp / high bp high density hard shiny sonorous  any two for 1 mark each	good conductor (1)  thermal = heat dense	strong/durable	
			(iii)	I	<b>D</b>			
				II	1 brittle and yet has a high mp brittle and yet has a high bp brittle and yet is shiny has both metallic and non-metallic properties found on the boundary between metals and non-metals has intermediate properties any one	metalloid	reference to Group 4	
		(b)		1	(left) gaps			

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FT	HT	(a)	(i)					
	<b>6</b>		(i)	1	decreases			
			(ii)	3	$2.5$ (accept range 2.4-2.6) – 2.2 = <b>0.3</b> (1) <b>0.3/2.5</b> (1) <i>consequential marking</i> $0.3/2.5 \times 100 = \mathbf{12\%}$ (1) <i>consequential marking</i>			
		(b)	(i)	3	coal contains <b>sulfur</b> (1) sulfur burns forming <b>sulfur dioxide</b> (1)  <b>SO<sub>2</sub> reacts with rain</b> (water) forming (acid rain) (1)		reference to CO <sub>2</sub> and/or oxides of nitrogen	
			(ii)	1	use coal containing less sulfur / use sulfur scrubbers/neutralise the SO <sub>2</sub> before it leaves the power station		Use less coal/ power coal/ trap SO <sub>2</sub>	use alternative energy resources

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FT	HT	(a)		3	<p>O<sub>2</sub> appears/increases <b>and</b> CO<sub>2</sub> decreases <b>both</b> needed (1)</p> <p>plants give out O<sub>2</sub> <b>and</b> plants take in CO<sub>2</sub> <b>both</b> needed (1)</p> <p>photosynthesis / evolution of green plants (1)</p> <p>CO<sub>2</sub> dissolved in oceans (1)</p> <p>any 3 for (1) each</p>			
		(b)		2	<p>nitrogen: 78-80 oxygen: 20-21 carbon dioxide: 0.03-0.04</p> <p>all three correct (2) any two correct (1)</p>			

Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT	(a)	(i)		2	<b>A</b> = sodium carbonate / carbonate <b>B</b> = sodium hydroxide / hydroxide <b>C</b> = sodium chloride / chloride  all correct (2) any one (1)	$\text{Na}_2\text{CO}_3$ / $\text{CO}_3^{2-}$  $\text{NaOH}$ / $\text{OH}^-$  $\text{NaCl}$ / $\text{Cl}^-$		
			(ii)		1	correct balancing <b>2</b> HCl and <b>2</b> NaCl			
		(b)			1	$\text{Cu}(\text{NO}_3)_2$	$\text{Cu}^{2+}(\text{NO}_3)_2$		



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	<b>9</b>	(a)		2	<p>for shorter chains ( <math>C_1</math>- <math>C_{16}</math> ) demand &gt; supply (1)</p> <p>for longer chains ( <math>C_{17}</math> – <math>C_{28}</math> ) demand &lt; supply (1)</p>			
		(b)		2	<p>(cracking) is the breaking down of large chains/molecules/hydrocarbons into smaller ones (1)</p> <p>reduce unwanted fractions / use up less useful fractions/use up large chains</p> <p>make more useful fractions/ make more smaller chains / make more petrol / make more diesel / makes monomers (for polymerisation)</p> <p>more demand for smaller chains</p> <p style="text-align: right;">any one for 1 mark</p>	example such as decane broken down to octane and ethene		

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT	(a)		1	saves energy / reduces amount of electricity consumption (for <b>melting</b> aluminium oxide)		reference to electrolysis e.g. reduces amount of electricity for <b>electrolysis</b>  reference to power/heat	
	<b>10</b>	(b)		1	(ions) <i>attracted</i> to <i>oppositely</i> charged electrodes	opposite charges attract		
		(c)		1	correct balancing <b>2</b> O <sup>2-</sup> and <b>4</b> e <sup>-</sup>			

Question Number		Mark	Answer
FT	HT		
	<b>11</b>	6 QWC	<p><b>Indicative content:</b> Reference to <i>raw materials, reactions</i> and <i>products</i> e.g.</p> <p><b>Raw materials:</b></p> <ul style="list-style-type: none"> <li>• <b>Iron ore:</b> source of iron</li> <li>• <b>Coke:</b> acts as a fuel/ burns/ forms carbon monoxide/ forms carbon dioxide</li> <li>• <b>Limestone:</b> removes impurities / forms slag</li> <li>• <b>Air:</b> source of oxygen</li> </ul> <p><b>Reactions:</b></p> <ul style="list-style-type: none"> <li>• coke/C burns forming CO/CO<sub>2</sub></li> <li>• C/CO reacts with iron oxide forming iron / iron oxide reduced by C/CO</li> <li>• limestone decomposes forming lime / lime reacts with impurities</li> </ul> <p><b>Products :</b> molten iron and slag</p> <p style="text-align: right;"><i>Correct word and symbol equations will satisfy indicative content. Labelled diagram can be used to supplement written answer.</i></p> <p><b>5-6 marks</b> The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</p> <p><b>3-4 marks</b> The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</p> <p><b>1-2 marks</b> The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</p> <p><b>0 marks</b> The candidate does not make any attempt or give a relevant answer worthy of credit.</p>