

Mark Scheme - 1.4 The Ever-Changing Earth

1.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
(a)		1	oxygen	O ₂	air O	
(b)		2	sulfur dioxide (1) carbon (1)	SO ₂ C	SO	
(c)		3	(wood) burns forming carbon dioxide / combustion produces carbon dioxide (1) trees take in carbon dioxide/ photosynthesis uses carbon dioxide (1) 3 rd marking point can only be awarded when first two are given carbon dioxide kept in balance (1)	 woods / forests / plants cancels out / remains equal	'the wood'	

2.

Mark	Answer
6	<p>Indicative content Many fossil fuels contain impurities including sulfur. The sulfur produces sulfur dioxide during combustion which can eventually produce sulfuric acid resulting in acid rain. Lakes can then become acidic damaging aquatic life. Forests and vegetation gets damaged. Limestone buildings are badly affected. Acid rain also attack metal structures such as bridges.</p> <p>5-6 marks: 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>3-4 marks: 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>1-2 marks: 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>0 marks: The candidate does not make any attempt or give a relevant answer worthy of credit.</p>

3.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(a)	2	<p>increased (fossil) fuel consumption / burning more (fossil) fuels causes (1)</p> <p>increased carbon dioxide emissions / more carbon dioxide formed (1)</p> <p>[Credit (1) for 'burning (fossil) fuels forms carbon dioxide' when no reference made to increase]</p>	accept named fossil fuel	deforestation	reference to 'ozone layer' or 'acid rain'
(b)	1	<p>Any one from:</p> <p>sea level rises / flooding</p> <p>destruction of habitats / kills wildlife</p>	accept named animal e.g. polar bears decrease in number / nowhere for polar bears to live		
(c)	2	<p>Any two sensible disadvantages, e.g.</p> <p>separation issues: cost (of separation)</p> <p>transport issues: road – burns fuels pipeline – cost, hazards</p> <p>storage issues: leakage back into the atmosphere / dissolves into the sea / increases acidity</p> <p>unproven</p> <p>only power stations – other sources not addressed</p> <p>other options available</p>			

4.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)	1	2×10^8	2000000 2 million		2
	(ii)	2	(1) for a reason and (1) for linked explanation sulfur scrubbing / react with lime / with sea waterremoves sulfur dioxide / neutralises sulfur dioxide use cleaner fuelsremove sulfur from oil / gas / fuel use coal / fuel containing less sulfur use less coalgreater use of alternative energy sources which do not produce sulfur dioxide			
	(iii)	1	$2\text{SO}_2 + 2\text{H}_2\text{O} + \text{O}_2 \longrightarrow 2\text{H}_2\text{SO}_4$			
(b)	(i)	1	neutralisation		exothermic	
	(ii)	2	(adding limestone) increases the pH (1) (higher the pH the) lower the acidity (1) <i>i.e. relationship between pH and acidity</i>	goes from 3.4 → 4.3 'weaker' the acidity		
	(iii)	1	increased lake acidity / decreased pH of lakes increased soil acidity / decreased pH of soil destruction of trees / fish killed / destruction of food chains / destruction of food webs increased metal corrosion (e.g. bridges)	lakes = reservoirs / ponds / rivers	'harmful to nature' 'marine life'	drinking water

5.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
(a)		2	$7 + 27 + 20 + 11$ (1) $100 - 65 = 35\%$ (1) correct answer only (cao) (2)			
(b)		2	increased temperature of Earth's atmosphere / global warming (1) ice caps melting faster / climate change / more flooding / more extreme weather / changing weather patterns (1)			
(c)		1	any one from: use renewable energy sources e.g. solar panels / wind turbines / hydroelectric / tidal / biomass nuclear power carbon capture and storage	use less electricity e.g. by using power saving light bulbs – must give example		

6.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
(a)		3	<p>coal contains sulfur impurities (1)</p> <p>(impurities burn to produce sulfur dioxide) which dissolves in rainwater to produce acid rain (1)</p> <p>acid rain kills fish / trees / erodes limestone statues or buildings / causes metals to rust quicker (1)</p>		kills marine life	ozone layer global warming
(b)	(i)	2	<p>as the amount of coal burnt increases the emission of sulfur dioxide decreases / more coal used as time goes on but less sulfur dioxide released (1)</p> <p>would expect more sulfur dioxide to be released as more coal is burnt (1)</p>			
	(ii)	1	(introduction of techniques to remove sulfur dioxide from smoke) e.g. sulfur scrubbing coal burnt has lower sulfur content	sulfur dioxide neutralised / reacted with limestone	new technology	carbon capture and storage

7.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
(a)		2	increase (1) carbon dioxide given out during breathing / respiration (1)		breathing	
(b)		2	decrease (1) carbon dioxide removed during photosynthesis / plants take in carbon dioxide (1)			
(c)		2	increase (1) carbon dioxide given out during combustion / burning (of fuels) (1)			

8.

(a) Only the more able candidates gained both marks for this question. Once again poor writing skills prevented many candidates being able to gain credit. Many candidates were unable to identify general trends and instead described in detail year on year changes between the graphs.

(b) (i) Most candidates made reference to 'burning fossil fuels' but far fewer talked about an 'increase' in the amount of fossil fuels burned, which was required to gain the mark. This comment has been included in many previous examiners reports.

(ii) Well answered. 'Carbon capture' was the most common correct answer.

9.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
(a)		3	today's atmosphere has <ul style="list-style-type: none"> • less water vapour lower • less carbon dioxide lower • no / less sulfur dioxide • more nitrogen • contains oxygen / more oxygen any three for (1) each – comparison required if no credit gained, award (1) for quoting amounts of carbon dioxide and nitrogen in volcano and atmosphere	converse	water disappeared amounts quoted	
(b)		2	photosynthesis (1) respiration (1)	combustion	breathing burning	
(c)		2	carbon dioxide (1) sulfur dioxide / oxides of nitrogen (1)	formulae	methane	

10.

Mark	
6	<p>Indicative content: a description of photosynthesis and respiration producing and removing oxygen and removing and producing carbon dioxide respectively. Discussing combustion and how oxygen is reduced to produce carbon dioxide during this process. Discussing deforestation reduces the number of plants available to produce oxygen and to reduce the amount of carbon dioxide in the atmosphere which therefore increases the percentage of carbon dioxide in the air leading to global warming.</p> <p>5 – 6 marks: 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>3 – 4 marks: 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>1 – 2 marks: 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>0 marks: The candidate does not make any attempt or give a relevant answer worthy of credit.</p>