AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.9.2.3

Global climate change

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**2**
Available paper years	**2018–2023**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

5.9.2.3 Global climate change

Answer 01 · Mark scheme June 2018 | 8464/C/2H | Original Q2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	methane		1	AO1 5.9.2.2
02.2	any **two** examples from: • rising sea levels • melting ice • agricultural problems • extremes of weather • loss of habitats	allow effects from the same bullet point ignore global warming ignore acid rain ignore global dimming do **not** accept reference to ozone	2	AO1 5.9.2.3
02.3	$\frac{6.0}{4.1} \times 0.0235$ = 0.0344(kg)	an answer of 0.0344(kg) scores **2** marks allow correct rounding allow calculator reading if no mark awarded: allow **1** mark for 34.4 or 0.344 allow **2** marks for 34.4 g	1 1	AO2 5.9.2.4
02.4	use less plastic **or** use recycled plastic	allow carbon capture ignore any reference to energy / fuels	1	AO1 5.9.2.4 5.10.2.2

5.9.2.3 Global climate change

Answer 01 · Mark scheme

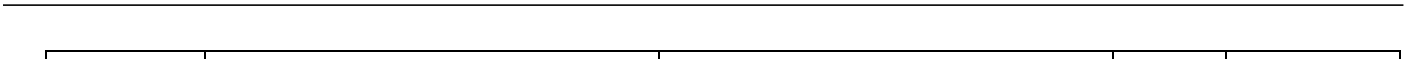
June 2018 | 8464/C/2H | Original Q2

Question	Answers	Mark	AO / Spec. Ref.
02.5	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to give a clear account.	5–6	AO1 5.9.1.2 5.9.1.3 5.9.1.4
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logically linking. The resulting account is not fully clear.	3–4	
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	
	No relevant content	0	
	Indicative content nitrogen increased • because volcanoes produced nitrogen • because (denitrifying) bacteria produced nitrogen • because ammonia was converted to nitrogen oxygen increased • because algae and plants produced oxygen • by photosynthesis carbon dioxide decreased • because algae and plants used carbon dioxide • by photosynthesis • because oceans formed and carbon dioxide dissolved in the water • because carbon dioxide formed carbonates, which precipitate as sediments or formed sedimentary limestone rocks • because algae / plants and animals formed fossil fuels / coal / crude oil / natural gas		
Total			**12**

5.9.2.3 Global climate change

Answer 01 · Mark scheme

June 2018 | 8464/C/2H | Original Q2



5.9.2.3 Global climate change

Answer 02 · Mark scheme

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	any **one** from: • melting ice • rising sea levels • flooding • extremes of weather • loss of habitats	ignore global warming do **not** accept acid rain do **not** accept global dimming do **not** accept references to ozone	1	AO1 5.9.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2		allow uv / ultra-violet for short wavelength radiation allow ir / infra-red for long wavelength radiation ignore references to the ozone layer		AO1 5.9.2.1 5.9.2.3
	(greenhouse gases) allow short wavelength radiation to enter the atmosphere		1	
	(which are) absorbed by the earth **and** re-emitted as longer wavelength radiation		1	
	(which is) absorbed by (greenhouse gases in) the atmosphere		1	
	(this) increases the temperature leading to global warming		1	

5.9.2.3 Global climate change

Answer 02 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	trees use carbon dioxide (for) photosynthesis (and) carbon dioxide causes global warming	 allow (and) carbon dioxide is a greenhouse gas	1 1 1	AO2 5.9.1.3 5.9.1.4

Total Question 5	8

5.9.2.3 Global climate change

Answer 01 · Examiner comments

June 2018 | 8464/C/2H | Original Q2

Question 2 (standard demand)

02.1 Methane was recognised by 85% of students as a greenhouse gas. Nitrogen was the most commonly seen incorrect response.

02.2 60% of students were able to name two effects of climate change, with a further 29% of students able to name one effect. Students give a wide range of creditworthy responses; melting polar ice caps, named extremes of weather and / or desertification.

Students who did not gain credit were sometimes too vague, for example giving responses such as unspecified changes in the weather, or unspecified effects on people. Others gave causes rather than effects of climate change or referred to acid rain.

02.3 51% of students achieved some credit on this question. Many of those who knew the correct method failed to convert from grams to kilograms and consequently achieved only one mark for the calculation. The remainder of students attempted a single division or multiplication with two of the numbers given but were unable to continue to complete the calculation required.

Some students were able to apply the correct method, but did the calculation in two parts, and their rounding after the initial calculation gave rise to an incorrect final answer. Students should be aware that they should not undertake any rounding until they reach their final answer.

5.9.2.3 Global climate change

Answer 01 · Examiner comments

02.4 27% of students suggested using less plastic or recycled plastic in the manufacture of plastic bottles or gave a reference to carbon capture. Some incorrect responses focussed on the disposal, including burning plastic, rather than the manufacture of plastic or transportation of the plastic bottles, releasing carbon dioxide in to the air. Planting trees to capture the carbon or using renewable energy sources to provide energy for manufacturing the bottles proved popular ideas.

02.5 This 'extended response' question discriminated well. It asked for an explanation of how the levels of three gases have changed since the Earth's early atmosphere. To achieve marks in level 1, statements of change for the three main gases in the Earth's atmosphere was required. When explanations were linked to the changes, marks in levels 2 or 3 were awarded. The clearer, more logical and more detailed accounts achieved level 3 marks.

19% of students achieved a level 3 mark on this standard demand question. Some accurate and well-expressed responses were seen, succinctly explaining the changes to all three gases. Many students gave detailed responses that showed a greater depth and understanding, giving numerous linked explanations for the changes in composition of the gases in the Earth's atmosphere. The most logically sequenced of these discussed each of the three gases in turn, resulting in very readable and accessible accounts. 33% of students achieved a level 2 mark, and a further 27% achieved a level 1 mark.

However, many of the lower-attaining students discussed post Industrial Revolution changes to the Earth's atmosphere, rather than addressing the changes since the formation of the Earth's early atmosphere. These students attempted to explain increases in carbon dioxide levels due to industrial manufacturing or other human activity; decreases in oxygen due to increasing population or deforestation. Some of these accounts were less logically sequenced and suggest that lower-attaining students are challenged by the concept of evolutionary timescales or are failing to read the question carefully.

As mentioned in the general comments for this paper, students should note the command word for an extended response question carefully. In this question students were asked to 'Explain'. Many students qualitatively described the changes in amounts of nitrogen, oxygen or carbon dioxide since the formation of the Earth's early atmosphere but were not successful at linking these changes to explanations. The most popular explanation was the effects of photosynthesis on changes in the percentages of both oxygen and carbon dioxide. The dissolving of carbon dioxide into the newly formed oceans was better known than those of the volcanic action on the change in percentage of nitrogen.

5.9.2.3 Global climate change

Answer 02 · Examiner comments June 2023 | 8464/C/2H | Original Q5

Question 5

05.1 Over four in five students could identify an effect of global climate change, with most giving melting ice or rising sea levels.

05.2 Two in five students were able to gain at least one mark, but few were able to continue with the explanation. Effective sequencing is required to gain full marks, and it is hoped that students will utilise mark schemes to identify expectations on questions like this in future examinations.

05.3 Over a third of students gained all three marks on this question. A further third missed the link of carbon dioxide being a greenhouse gas. Where students gained one mark, it was usually for the idea that trees absorb carbon dioxide.