| Question | Answer | Extra information | Marks | AO / Spec ref. |
| --- | --- | --- | --- | --- |
| **01.1** | methane and carbon dioxide | No mark if more than one box ticked. | 1 | AO1C9.2.2 |
| **01.2** | peer-reviewed evidence | No mark if more than one box ticked.  | 1 | AO1C9.2.2 |
| **01.3** | the global climate system is very complex | No mark if more than one box ticked.  | 1 | AO1C9.2.2 |
| **02.1** | **Level 3 (5–6 marks):** Reasonably detailed description of at least **two** changes. | 6 | AO1×2AO2×2AO3×2C9.1.2C9.1.3C9.1.4 |
| **Level 2 (3–4 marks):** Reasonably detailed description of **one** change. |
| **Level 1 (1–2 marks):** Basic description of **one** change. |
| **Level 0 (0 marks):** No relevant content. |
| **Indicative content:*** oxygen increased because plants/algae developed and used carbon dioxide for photosynthesis/growth producing oxygen
* carbon dioxide decreased because plants/algae developed and used carbon dioxide for photosynthesis/growth producing oxygen
* carbon dioxide decreased because oceans formed and dissolved/absorbed carbon dioxide
* carbon dioxide became locked up in sedimentary/carbonate rocks and/or fossil fuels
* volcanoes also produced nitrogen which gradually built up in the atmosphere
* ammonia reacted with oxygen to form nitrogen.

This indicative content is not exhaustive, other creditworthy responses should be awarded marks as appropriate. |
| **02.2** | methanecarbon dioxide |  | 11 | AO1C9.2.1 |
| **03.1** | Any **two** from :* carbon (particles) ─ any adverse health effect, e.g. breathing/heart problems
* global dimming ─ effects, e.g., climate change, photosynthesis
* carbon monoxide ─ effects of CO poisoning, e.g., dizziness, lack of oxygen in blood.
 | Allow C/soot. Do **not** accept smoke;must be linked to carbon;allow CO, do **not** allow carbon oxide. | 1111 | AO1C9.3.1C9.3.2 |
| **03.2** | nitrogen oxide(s)/nitrogen monoxide/nitrogen dioxideacid rain **or** respiratory/breathing problems | Allow NO*x*. or NO or NO2;allow asthma. | 11 | AO2×1AO1×1C9.3.1C9.3.2 |
| **04.1** | Any **two** from:* more extreme weather/storms
* change in (local) rainfall patterns
* change in (local) temperatures.
 | Allow hurricanes/tornados etc.;allow flooding/drought. | 2 | AO2C9.2.3 |
| **04.2** | Any **two** from:Cattle: * fewer cows producing methane
* less deforestation.

Taxes: * less fossil fuel burnt
* so less CO2 released.

Biofuel: * carbon neutral
* so does not add to CO2.

Grants: * less energy used/less fossil fuel burned in power stations/in homes
* so less CO2 released.

Any valid economic or social impact comparison of the chosen method, for example, impact on jobs/food production/poverty/land use. |  | 21 | AO3C9.2.2C9.2.4 |
| **05.1** | sulfur dioxide | Accept sulfur oxides. | 1 | AO2C9.3.2 |
| **05.2** | Idea of the removal of sulfur dioxide gas;idea of removing sulfur from fuels/ using fuels with no sulfur content. |  | 11 | AO2C9.3.2 |
| **05.3** | Idea of reduced photosynthesis of plants;less carbon dioxide removed from the atmosphere. |  | 11 | AO2C9.1.4C9.2.2 |
| **06.1** | methane + oxygen → carbon dioxide + water | **1** mark for reactants;**1** mark for products. | 2 | AO2C9.3.1 |
| **06.2** | Total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product, service, or event. |  | 1 | AO1C9.2.4 |