| Question | Answer | Extra information | Marks | AO /  Spec ref. |
| --- | --- | --- | --- | --- |
| **01.1** | methane and carbon dioxide | No mark if more than one box ticked. | 1 | AO1  C9.2.2 |
| **01.2** | peer-reviewed evidence | No mark if more than one box ticked. | 1 | AO1  C9.2.2 |
| **01.3** | the global climate system is very complex | No mark if more than one box ticked. | 1 | AO1  C9.2.2 |
| **02.1** | **Level 3 (5–6 marks):** Reasonably detailed description of at least **two** changes. | | 6 | AO1×2  AO2×2  AO3×2  C9.1.2  C9.1.3  C9.1.4 |
| **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** | methane  carbon dioxide |  | 1  1 | AO1  C9.2.1 |
| **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. | 1  1  1  1 | AO1  C9.3.1  C9.3.2 |
| **03.2** | nitrogen oxide(s)/nitrogen monoxide/nitrogen dioxide  acid rain **or** respiratory/breathing problems | Allow NO*x*. or NO or NO2;  allow asthma. | 1  1 | AO2×1  AO1×1  C9.3.1  C9.3.2 |
| **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 | AO2  C9.2.3 |
| **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. |  | 2  1 | AO3  C9.2.2  C9.2.4 |
| **05.1** | sulfur dioxide | Accept sulfur oxides. | 1 | AO2  C9.3.2 |
| **05.2** | Idea of the removal of sulfur dioxide gas;  idea of removing sulfur from fuels/ using fuels with no sulfur content. |  | 1  1 | AO2  C9.3.2 |
| **05.3** | Idea of reduced photosynthesis of plants;  less carbon dioxide removed from the atmosphere. |  | 1  1 | AO2  C9.1.4  C9.2.2 |
| **06.1** | methane + oxygen → carbon dioxide + water | **1** mark for reactants;  **1** mark for products. | 2 | AO2  C9.3.1 |
| **06.2** | Total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product, service, or event. |  | 1 | AO1  C9.2.4 |