1.8 Climate Change: 30-minute Pack

AQA 8035 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 'Adaptation strategies are more effective than mitigation strategies in responding to climate change.' Assess the extent to which you agree with this statement.

(Total for Question 1 is 9 marks)

2 Explain the difference between the natural greenhouse effect and the enhanced greenhouse effect.

(Total for Question 2 is 3 marks)

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3 This question is about the evidence for climate change.

(a) Describe how ice cores provide evidence of past climate change. **(2)**

(b) State TWO other sources of evidence for climate change. **(2)**

(Total for Question 3 is 4 marks)

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4 This question is about the causes of climate change.

(a) Give TWO natural causes of climate change. **(2)**

(b) Give TWO human causes of climate change. **(2)**

(Total for Question 4 is 4 marks)

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5 Table 1 shows illustrative, hypothetical ice-core data for a research site, showing the estimated atmospheric carbon dioxide concentration at different points in the past. These figures are for practice only and are not real measured values.

Years before present	Estimated CO2 concentration (parts per million)
800,000	180
400,000	230
100,000	200
0 (present day, illustrative)	420

(a) Using Table 1, calculate the increase in estimated CO2 concentration between 100,000 years before present and the present day. **(2)**

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(b) Using Table 1, state which of the four time points shown had the lowest estimated CO2 concentration. **(1)**

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(c) Suggest why the present-day value in Table 1 stands out from the pattern of the other three, much older values. **(2)**

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(Total for Question 5 is 5 marks)

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6 Suggest why international agreement on climate change, such as the Paris Agreement, can be difficult to achieve and enforce.

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(Total for Question 6 is 3 marks)

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Mark scheme · 1.8 Climate Change: 30-minute Pack

Question 1

Level 4 A detailed, well-balanced assessment that uses accurate reference to named mitigation and adaptation strategies (and, ideally, international agreements such as the Paris Agreement); weighs the strengths and limitations of each approach and reaches a clear, justified conclusion about the extent of agreement.	**7-9**
Level 3 A clear assessment that considers both mitigation and adaptation strategies with some accurate detail; a conclusion is reached, though the balance of the argument may be less developed.	**5-6**
Level 2 Some relevant points about mitigation and/or adaptation are made, with limited or generalised detail; a simple conclusion is given with little justification.	**3-4**
Level 1 One or two isolated relevant points about climate change management are made, with little or no comparison of strategies.	**1-2**
Level 0 No relevant content.	**0**

Indicative content:

- Mitigation strategies (e.g. renewable energy, afforestation, international agreements like the Paris Agreement) aim to reduce the CAUSE of climate change and can benefit the whole world over the long term, but require widespread, coordinated action and can be slow to show results.
- Adaptation strategies (e.g. drought-resistant crops, improved coastal defences, water management) can protect specific people and places relatively quickly, and can be acted on by a single country or community without needing global cooperation.
- Supports adaptation as more effective: since some warming is already locked in from past emissions, adaptation provides more immediate, guaranteed protection, whereas mitigation depends on the cooperation of many countries and its full benefits may take decades to appear.
- Challenges adaptation as more effective (favours mitigation, or a combined view): adaptation alone does not address the underlying cause, so without mitigation the scale of future change (and the cost of adapting to it) would keep growing; many geographers argue mitigation and adaptation are complementary rather than alternatives.
- This is a genuinely debated policy question, unlike the physical science of the greenhouse effect and human-caused warming, which is well established; a strong answer should make clear it is evaluating a policy judgement, not disputing the underlying science.
- A well-supported conclusion should weigh the relative speed, certainty, cost and scale of impact of each approach, and may reasonably argue that the two are most effective when used together rather than picking one as simply 'better'.

Question 2

the natural greenhouse effect is a normal process that has kept the Earth's climate broadly stable and warm enough for life for a very long time, oe	**B1**
the enhanced greenhouse effect occurs when human activity releases extra greenhouse gases (mainly from burning fossil fuels), oe	**B1**
these extra gases trap additional heat, on top of the natural effect, causing average global temperatures to rise, oe	**B1**

Answer: The natural greenhouse effect is a normal, longstanding process that keeps the Earth warm enough for life. The enhanced greenhouse effect occurs when human activity, mainly burning fossil fuels, releases extra greenhouse gases, which trap additional heat on top of the natural effect, causing average global temperatures to rise.

Question 3

(a) ice cores are drilled from thick ice sheets (e.g. in Antarctica or Greenland), and contain tiny bubbles of ancient air trapped as snow compressed into ice over thousands of years, oe	**B1**
(a) scientists analyse the trapped air to measure past greenhouse gas concentrations (e.g. carbon dioxide), and the ice itself to estimate past temperatures, building a timeline of past climate, oe	**B1**

(a) Answer: Ice cores drilled from thick ice sheets contain tiny bubbles of ancient air trapped as snow compressed over thousands of years; scientists analyse this trapped air and the ice itself to measure past greenhouse gas concentrations and estimate past temperatures.

(b) one valid source of evidence for climate change other than ice cores, e.g. tree rings (wider rings usually indicate warmer/wetter growth years), historical/written temperature records, retreating glaciers and shrinking ice sheets, or rising sea levels, oe	**B1**
(b) a second, different valid source of evidence (not ice cores), oe	**B1**

(b) Answer: For example, tree rings (wider rings usually indicate warmer, wetter growth years), and retreating glaciers/shrinking ice sheets.

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Question 4

(a) one valid natural cause of climate change, e.g. orbital changes (changes in the Earth's orbit around the Sun and its tilt), which alter how much solar energy different parts of the Earth receive over long timescales, oe **B1**

(a) a second, different valid natural cause, e.g. volcanic activity, which can release ash and gases (aerosols) into the atmosphere that reflect sunlight and temporarily cool the climate; or changes in solar output (sunspot activity), oe **B1**

(a) Answer: For example: orbital changes (changes in the Earth's orbit and tilt, altering how much solar energy reaches different parts of the Earth), and volcanic activity, which can release ash and gases that reflect sunlight and temporarily cool the climate.

(b) one valid human cause of climate change, e.g. burning fossil fuels (coal, oil, gas), which releases carbon dioxide into the atmosphere, oe **B1**

(b) a second, different valid human cause, e.g. deforestation, which reduces the number of trees able to absorb carbon dioxide, and can also release stored carbon; or farming, such as livestock and rice paddies releasing methane, oe **B1**

(b) Answer: For example: burning fossil fuels, which releases carbon dioxide into the atmosphere, and deforestation, which reduces the number of trees able to absorb carbon dioxide and can release stored carbon.

Question 5

(a) 420 - 200 seen, oe **M1**

(a) 220 parts per million cao **A1**

(a) Answer: 220 parts per million.

(b) 800,000 years before present **B1**

(b) Answer: 800,000 years before present.

(c) the older values fluctuate within a relatively narrow range, consistent with natural cycles over long timescales, oe **B1**

(c) the present-day value is far higher and represents a rapid rise over a much shorter period, consistent with the effect of human fossil fuel use since industrialisation rather than a natural cycle, oe **B1**

(c) Answer: The older values fluctuate within a relatively narrow range, consistent with natural cycles over long timescales, whereas the present-day value is far higher and represents a rapid rise over a much shorter period, consistent with the effect of human fossil fuel use since industrialisation.

Question 6

countries have very different levels of development and different amounts of past and present emissions, so they disagree over who should cut emissions the most and who should pay for it, oe **B1**

cutting emissions can have short-term economic costs (e.g. for industries reliant on fossil fuels), which some governments are reluctant to accept, oe **B1**

international agreements often rely on countries setting and enforcing their own targets, with limited ability for other countries to force compliance if a country falls short, oe **B1**

Answer: Countries have very different levels of development and different amounts of past and present emissions, so they disagree over who should cut emissions most and who should pay; cutting emissions can have short-term economic costs that some governments are reluctant to accept; and agreements often rely on countries enforcing their own targets, with limited power for others to force compliance.

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