

# Climate change: practice questions

9 questions · 32 marks · mark scheme at the back

For Pearson Edexcel International AS Biology XBI11 and International A Level Biology YBI11. **A Level only** is IA2 content (Units 4 to 6), not needed for the International AS.

Name .....

Total ..... / 32

**1** UNIT 4 STYLE [1 mark]

Which of the following is a limitation of using tree rings (dendrochronology) as evidence of past climate?

- A. ☐ Tree rings cannot be dated accurately.
- B. ☐ Tree growth is also affected by factors other than climate, such as disease and competition.
- C. ☐ Tree rings are formed only in the tropics.
- D. ☐ Tree rings show only changes in carbon dioxide concentration.

**2** UNIT 4 STYLE [4 marks]

Describe how pollen in peat bogs can be used to provide evidence of past climate change.

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**3** UNIT 4 STYLE

[3 marks]

The table shows a positive correlation between mean atmospheric carbon dioxide concentration and mean global temperature from 1900 to 2000. A student concluded that increased carbon dioxide has caused the temperature rise. Evaluate this conclusion.

| Atmospheric CO <sub>2</sub> and mean global temperature change (selected years) |                       |                                   |
|---------------------------------------------------------------------------------|-----------------------|-----------------------------------|
| Year                                                                            | CO <sub>2</sub> / ppm | Temperature change from 1900 / °C |
| 1900                                                                            | 296                   | 0.0                               |
| 1950                                                                            | 311                   | 0.2                               |
| 2000                                                                            | 369                   | 0.9                               |

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**4** UNIT 4 STYLE

[4 marks]

Explain how the greenhouse effect keeps the surface of Earth warm, and how human activities have enhanced it.

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**5** UNIT 4 STYLE

[4 marks]

Using your knowledge of the carbon cycle, explain how two different methods could reduce the concentration of carbon dioxide in the atmosphere.

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**6** UNIT 4 STYLE **[3 marks]**

Scientists use models to predict future changes in mean global temperature. Explain two limitations of these models.

[illegible]

## 7 UNIT 4 STYLE [4 marks]

A species of butterfly has been found at increasingly northerly latitudes in Europe over the last 50 years and now emerges from pupae earlier in spring. Explain how climate change could have caused these two changes.

[illegible]

## 8 UNIT 4 STYLE [4 marks]

A report published by an oil company claims that human activity is not the main cause of recent climate change. Suggest why scientists might treat this report with caution, and how they could decide whether the conclusion is valid.

[illegible]

A country plans to grow sugar cane to produce ethanol as a biofuel on land that is currently tropical forest. Evaluate this plan in terms of reducing atmospheric carbon dioxide and conserving biodiversity.

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# Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

## 1. [1]

**B** B: ring width depends on other factors as well as temperature and rainfall.

## 2. [4]

- peat is acidic / anaerobic / waterlogged so pollen is preserved (and does not decay) (1)
- cores are taken and layers (of different depths) are dated, for example by radiocarbon dating (1)
- pollen grains are identified and counted in each layer (1)
- different plant species need different conditions, so the species present show the climate at that time (accept cold-adapted vs warm-adapted species) (1)
- change in the pollen types with depth shows change in climate over time (1)
- Max 4

## 3. [3]

- both rise together / positive correlation (1)
- a correlation does not prove cause; another factor could affect both (1)
- the greenhouse effect gives a mechanism (CO<sub>2</sub> absorbs infra-red radiation) so a causal link is plausible (accept data from several independent sources / ice cores) (1)
- only three data points / limited data / temperature rose by more between 1950 and 2000 than before (1)
- Max 3

## 4. [4]

- short-wavelength radiation from the Sun passes through the atmosphere and warms Earth's surface (1)
- Earth emits longer-wavelength infra-red radiation (1)
- greenhouse gases absorb the infra-red radiation and re-radiate it back to Earth's surface (1)
- burning fossil fuels / deforestation increases carbon dioxide (accept methane from cattle / rice paddies) (1)
- so more infra-red is trapped (enhanced greenhouse effect) (1)
- Max 4

## 5. [4]

- planting trees / afforestation increases photosynthesis (1)
- so more carbon dioxide is removed from the atmosphere and carbon is stored in wood (1)
- burning fewer fossil fuels / using renewable energy reduces combustion (1)
- so less carbon is released from the fossil fuel store (1)
- other valid methods, for example protecting peat bogs / forests, using biofuels with explanation (up to 2)
- Max 4

**6. [3]**

- climate is a complex system with many variables / interacting factors (1)
- so not all can be included accurately / small errors in data are amplified (1)
- feedback loops are difficult to predict, for example melting ice reduces reflection of heat (1)
- predictions depend on assumptions about future emissions / extrapolation assumes the trend continues (1)
- data are incomplete / not available for all areas (1)
- Max 3

**7. [4]**

- mean temperatures have increased, so the area with suitable abiotic conditions has moved north (1)
- the butterfly (and its food plants) can now survive / reproduce further north (1)
- higher temperatures speed up enzyme-controlled reactions in development (1)
- so pupae develop faster and adults emerge earlier (accept earlier spring) (1)
- if food plants do not respond in the same way, there may be a mismatch in timing (1)
- Max 4

**8. [4]**

- the company may have a vested interest / financial interest in fossil fuels (1)
- the report may use selected data / not include all the evidence (1)
- check whether it has been peer reviewed / published in a scientific journal (1)
- compare with data from independent sources / other scientists' research (1)
- check the authors' expertise / who funded the research (1)
- Max 4

**9. [5]**

- biofuels may be close to carbon neutral, because the CO<sub>2</sub> released was absorbed by the crop in photosynthesis (1)
- they replace fossil fuels, so less carbon is released from the fossil store (1)
- clearing forest releases stored carbon as CO<sub>2</sub> (by burning and decay) (1)
- forests are removed so fewer trees to remove CO<sub>2</sub> / loss of carbon sink (1)
- loss of habitats and biodiversity / monoculture supports fewer species (1)
- fertiliser, machinery and processing use energy / release greenhouse gases (1)
- valid judgement, for example better to use waste material or poor land / reforestation (1)
- Max 5