

4.2 Carbon Cycling & Climate Change

Question Paper

Course	DP IB Biology
Section	4. Ecology
Topic	4.2 Carbon Cycling & Climate Change
Difficulty	Medium

Time allowed: 20
Score: /10
Percentage: /100

Question 1

Which of the following statements about the removal of carbon from the atmosphere are correct?

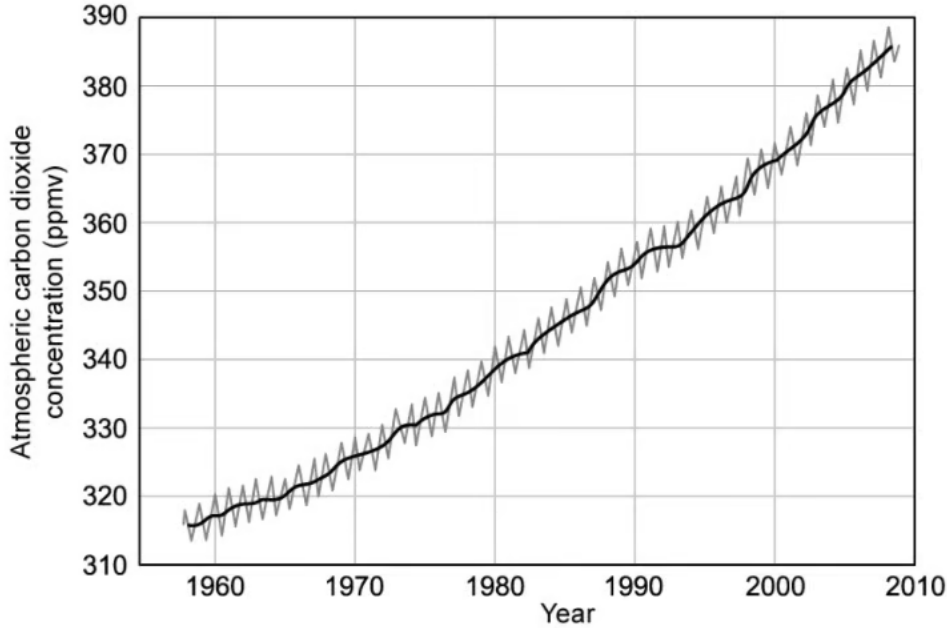
- I. Atmospheric carbon is converted into carbohydrates during photosynthesis.
- II. Carbon enters the cells of aquatic plants by diffusing directly from the surrounding water.
- III. Carbon combines with water to form carbonic acid, which dissociates to form hydrogen carbonate ions, raising the pH of water.

- A** I only
- B** I and II only
- C** I and III only
- D** I, II, and III

[1 mark]

Question 2

What can be concluded about levels of atmospheric carbon dioxide from the graph shown?



Key: — = Average carbon dioxide concentration per year
 — = Actual carbon dioxide concentration

A	Carbon dioxide levels fluctuate yearly due to seasonal changes in photosynthesis	Average carbon dioxide levels are increasing	Average yearly carbon dioxide level increases vary from year to year
B	Carbon dioxide levels fluctuate yearly	Average carbon dioxide levels increased between 1960-2010	Average yearly carbon dioxide level increases vary from year to year
C	Carbon dioxide levels fluctuate yearly	Average carbon dioxide levels are increasing	Average yearly carbon dioxide level increases vary from year to year
D	Carbon dioxide levels fluctuate yearly due to seasonal changes in photosynthesis	Average carbon dioxide levels increased between 1960-2010	Average yearly carbon dioxide level increases are linear

[1 mark]

Question 3

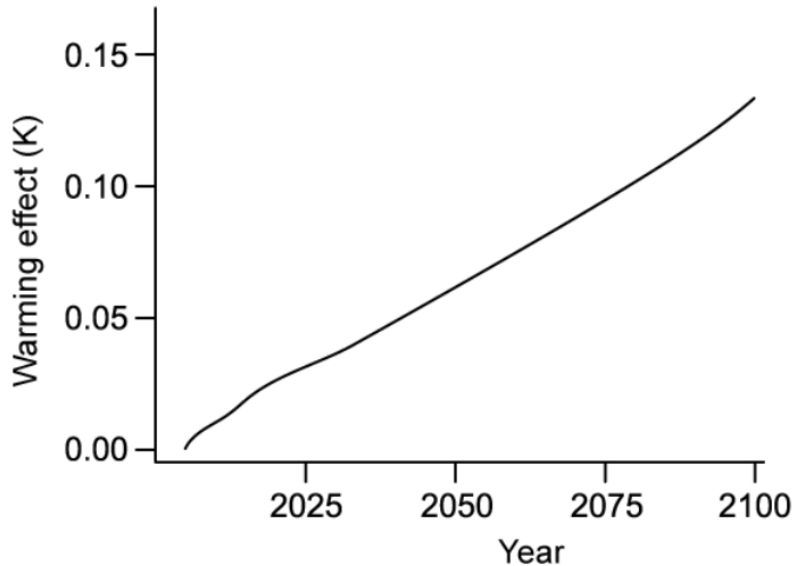
What is the benefit of collecting accurate, quantitative data on atmospheric carbon dioxide levels?

- A** Scientists can identify the sources of greenhouse gases such as methane.
- B** Scientists can directly assess the impact of deforestation.
- C** Scientists can prove that climate change is caused by human activities.
- D** Scientists can identify trends in atmospheric carbon dioxide levels.

[1 mark]

Question 4

The graph below shows the predicted effect on global warming of the continued draining of peat bogs. Warming effect is measured on the kelvin (K) scale.



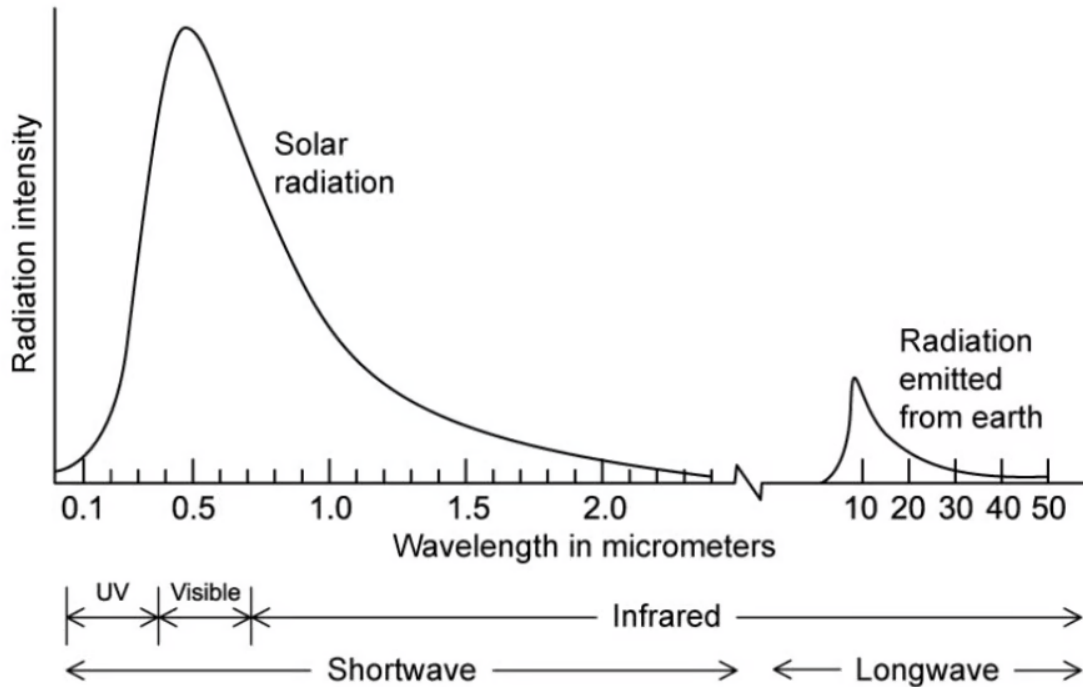
How does peat drainage lead to the effect on warming seen in the graph?

- A** Drainage allows saprotroph activity to increase, releasing carbon dioxide when the organic matter stored in the peat is broken down.
- B** Water seals the stored carbon dioxide underground, so the loss of water allows the gas to escape.
- C** The removal of water from the peatland allows herbivores to move in and consume the vegetation growing on the peat bog, eventually leading to the release of carbon stored in the vegetation into the atmosphere
- D** Drained land can be used for crop growth, removing carbon from the soil.

[1 mark]

Question 5

The graph below shows the differences between the radiation reaching the earth from the sun and the radiation re-emitted by the earth.



How does this radiation cause the greenhouse effect?

- A** Greenhouse gases absorb mainly low intensity radiation.
- B** Greenhouse gases absorb mainly shortwave radiation.
- C** Greenhouse gases absorb mainly UV radiation.
- D** Greenhouse gases absorb mainly longwave radiation.

[1 mark]

Question 6

Different greenhouse gases have different global warming potential, or GWP.

Gas	GWP over 100 years
Carbon dioxide	1
Methane	21
Nitrous oxide	310
Sulfur hexafluoride	23,900

Which factors contribute to the global warming potential of greenhouse gases?

- A** Atmospheric concentration only.
- B** Atmospheric concentration and ability to absorb radiation.
- C** Atmospheric concentration, ability to absorb radiation, and atmospheric lifetime.
- D** Ability to absorb radiation only.

[1 mark]

Question 7

Which of the following are impacts of global warming?

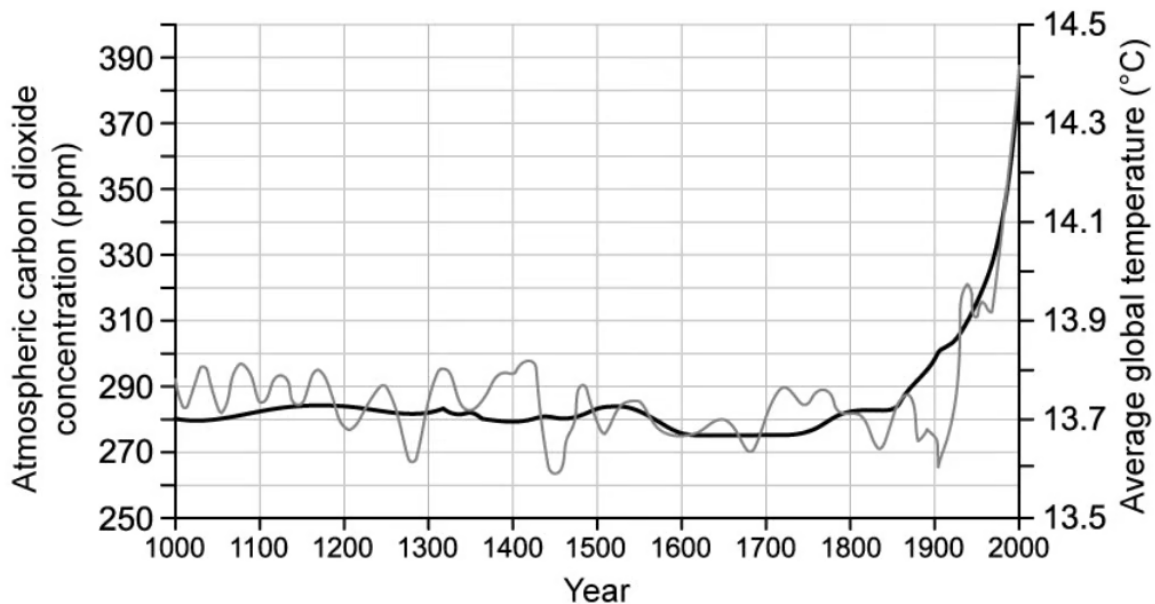
- I. Increased UV radiation reaching earth due to depletion of ozone gas in the atmosphere
- II. Ocean acidification
- III. An increase in the number of extreme weather events

- A** I and II only
- B** II and III only
- C** III only
- D** I, II, and III

[1 mark]

Question 8

What can be concluded from the graph shown?



Key: — = Carbon dioxide — = Temperature

- A Increasing atmospheric carbon dioxide concentration causes an increase in average global temperatures
- B Increasing average global temperatures cause an increase in atmospheric carbon dioxide
- C There is a correlation between atmospheric carbon dioxide concentration and average global temperature
- D The industrial revolution that began in the mid 1700s has caused an increase in average global temperatures

[1 mark]

Question 9

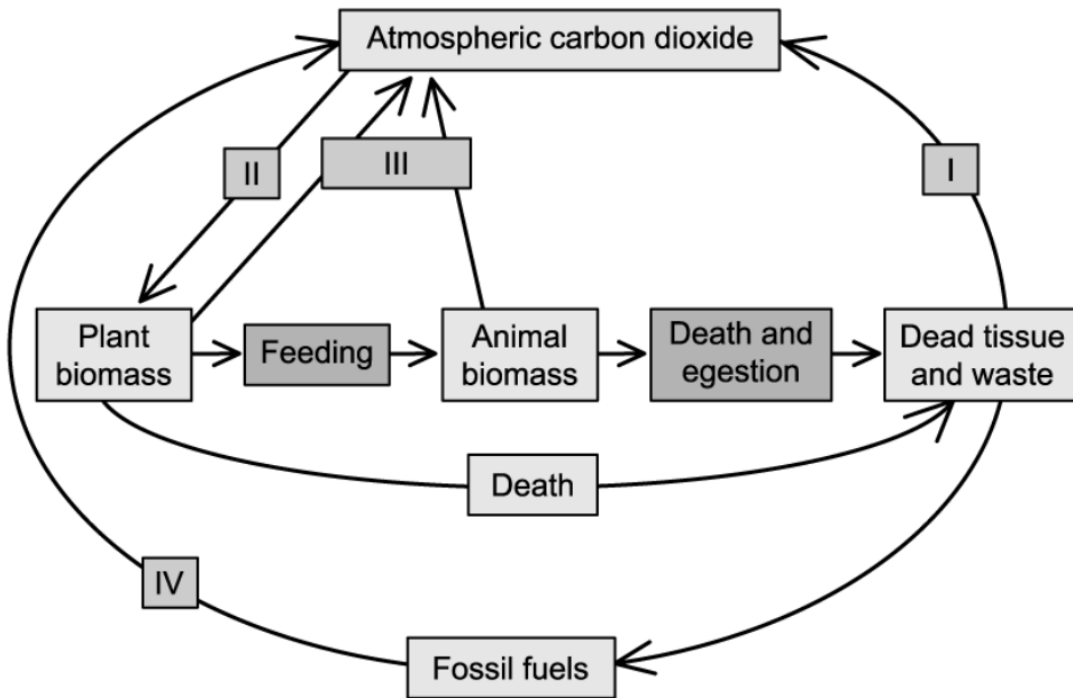
Which factors should be considered when assessing scientific claims about climate change?

A	Whether those making the claim have a financial interest	Whether or not a particular extreme weather event supports the claim	Whether or not journalists have read the research and believe it to be of high quality
B	Whether those making the claim have a financial interest	Whether or not a particular extreme weather event supports the claim	Whether or not other scientists have reviewed the research and believe it to be high quality
C	Whether those making the claim have a financial interest	Whether those making the claim have taken all the evidence into account	Whether or not other scientists have reviewed the research and believe it to be high quality
D	The wealth of those making the claim	Whether those making the claim have taken all the evidence into account	Whether or not journalists have read the research and believe it to be of high quality

[1 mark]

Question 10

The diagram below shows the stages of the carbon cycle.



Which processes are shown in the diagram?

	I	II	III	IV
A	Fossilisation	Photosynthesis	Respiration	Decomposition
B	Decomposition	Absorption	Photosynthesis	Combustion
C	Decomposition	Absorption	Photosynthesis	Decomposition
D	Decomposition	Photosynthesis	Respiration	Combustion

[1 mark]