

Answer ALL questions. Write your answers in the spaces provided.

**Some questions must be answered with a cross in a box ☒.
If you change your mind about an answer, put a line through the box ☒ and then
mark your new answer with a cross ☒.**

1 This question is about changes to the Earth's atmosphere.

(a) Which of the following is a correct statement about the relative amounts of carbon dioxide and oxygen in the Earth's early atmosphere?

(1)

- A** large amount of carbon dioxide and large amount of oxygen
- B** large amount of carbon dioxide and small amount of oxygen
- C** small amount of carbon dioxide and large amount of oxygen
- D** small amount of carbon dioxide and small amount of oxygen

(b) Several processes change the composition of the Earth's atmosphere.

Describe how the composition of the atmosphere is affected by burning fossil fuels.

(2)

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(c) The graphs in Figure 1 and Figure 2 show the concentration of carbon dioxide in the atmosphere and the mean global temperature between 1960 and 2000.

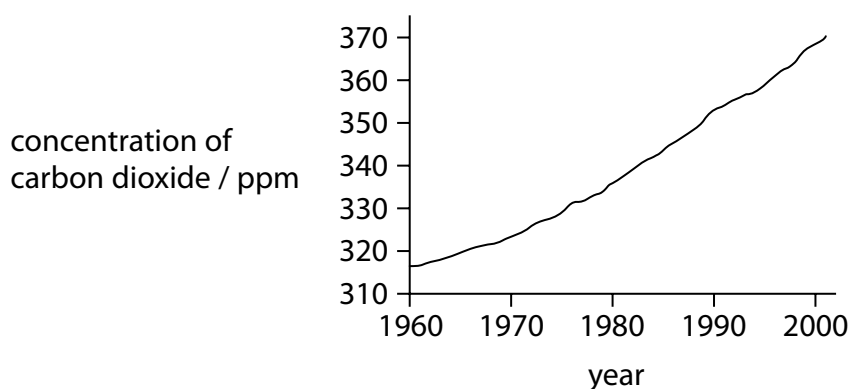


Figure 1

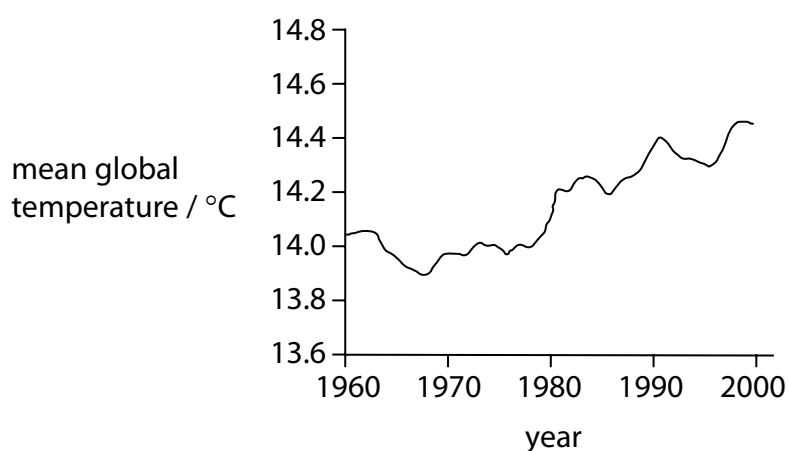


Figure 2

Explain whether these graphs provide evidence that an increase in carbon dioxide is causing the Earth's temperature to rise.

(2)

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(d) Which of these pairs of gases are both greenhouse gases?

(1)

- A nitrogen and methane
- B nitrogen and oxygen
- C oxygen and water vapour
- D water vapour and methane

(Total for Question 1 = 6 marks)

The atmosphere

3 The Earth's atmosphere today has changed, when compared with the Earth's earliest atmosphere.

(a) Two processes that caused changes were the cooling of the atmosphere and photosynthesis.

(i) State how cooling changed the composition of the Earth's atmosphere.

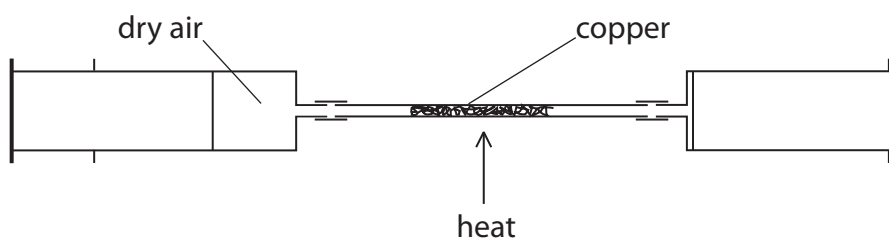
(1)

(ii) Explain how photosynthesis changed the composition of the Earth's atmosphere.

(2)

(b) In an experiment, dry air is passed backwards and forwards over hot, excess copper in the apparatus shown.

The oxygen in the air reacts with the hot copper to form copper oxide, CuO.



(i) Write the balanced equation for the reaction of copper with oxygen.

(3)



(ii) When the copper has reacted with all the oxygen, the apparatus is allowed to cool.

The initial volume of dry air in the apparatus was 50 cm^3 , measured at room temperature and pressure.

During the experiment the volume of gas in the apparatus decreased.

Calculate the final volume of gas remaining in the apparatus after allowing it to cool to room temperature.

(percentage of oxygen in dry air is 21%)

(2)

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final volume of gas remaining in apparatus = cm^3

(iii) Complete the sentence by putting a cross (☒) in the box next to your answer.

After the reaction between dry air and copper is complete, most of the gas remaining in the apparatus is

(1)

- A argon
- B carbon dioxide
- C nitrogen
- D oxygen

(Total for Question 3 = 9 marks)



Carbon dioxide

- 3 (a) Which of these shows the relative amounts of carbon dioxide and oxygen in the Earth's early atmosphere?

(1)

Put a cross (☒) in the box next to your answer.

- A large amount of carbon dioxide and large amount of oxygen
- B large amount of carbon dioxide and small amount of oxygen
- C small amount of carbon dioxide and large amount of oxygen
- D small amount of carbon dioxide and small amount of oxygen

- (b) The concentration of carbon dioxide in the Earth's atmosphere depends on the balance between the processes that remove carbon dioxide from the atmosphere and those that release carbon dioxide into the atmosphere.

- (i) Explain how carbon dioxide is removed from the atmosphere.

(2)

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- (ii) Explain how carbon dioxide is released into the atmosphere.

(2)

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(c) Describe the test to show that a gas is carbon dioxide.

(2)

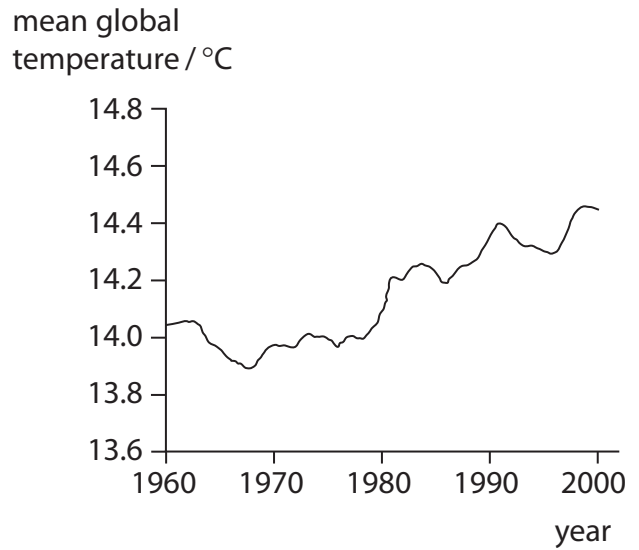
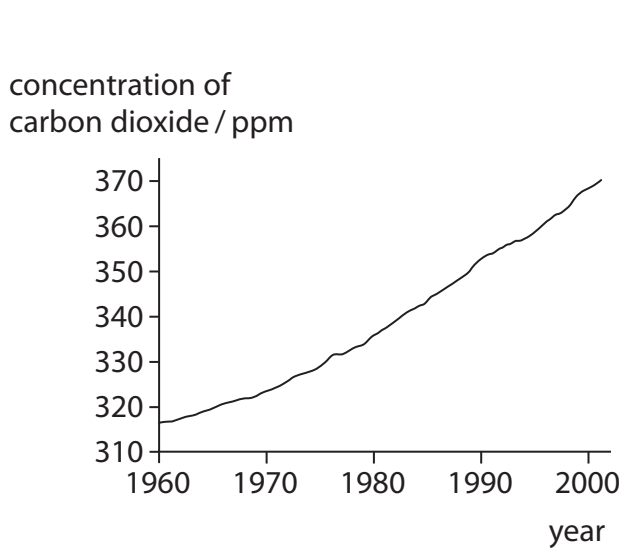
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(d) The graphs show the concentration of carbon dioxide in the atmosphere and the mean global temperature between 1960 and 2000.



Explain whether or not these graphs provide evidence that human activity is causing the Earth's temperature to rise.

(3)

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(Total for Question 3 = 10 marks)



Answer ALL questions

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Carbon dioxide

1 Carbon dioxide dissolves in the water in the Earth's oceans.

(a) Describe how these oceans were originally formed.

(2)

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(b) Some rocks are formed from dissolved carbon dioxide.

(i) Describe how this happens.

(2)

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(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

(1)

The substance formed in these rocks is

- A calcium carbonate
- B sodium chloride
- C calcium hydroxide
- D iron oxide

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- (c) Iron seeding is the introduction of iron into the ocean.
This stimulates the growth of small plants.

Explain how the growth of these plants affects the amount of carbon dioxide in the atmosphere.

(2)

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- (d) Carbon dioxide is one of the products of the complete combustion of methane in air.

Write the word equation for this reaction.

(2)

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(Total for Question 1 = 9 marks)



Answer ALL questions

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Carbon dioxide

- 1** (a) The Earth's early atmosphere contained larger amounts of water vapour and carbon dioxide than it does today.

Explain how the amounts of water vapour and carbon dioxide in the Earth's atmosphere decreased.

(2)

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- (b) Describe how the presence of carbon dioxide in the atmosphere helps to keep the Earth warm.

(1)

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- (c) State a human activity, apart from burning fuels, that has increased the percentage of carbon dioxide in the atmosphere.

(1)

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(d) This table shows a set of data for the percentage of carbon dioxide in the atmosphere and the mean surface temperature of the Earth in the years 1960 and 2014.

year	percentage of carbon dioxide	mean surface temperature / °C
1960	0.0318	14.0
2014	0.0401	14.4

Suggest why this information does not prove that the increase in percentage of carbon dioxide alone has caused the increase in the mean surface temperature of the Earth.

(1)

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(e) Hydrogen can be used as a fuel for cars.

(i) State one advantage and one disadvantage of using a car which uses hydrogen as the fuel rather than a car which uses petrol as the fuel.

(2)

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(ii) Write the word equation for the reaction between hydrogen and oxygen.

(1)

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(Total for Question 1 = 8 marks)

