

Interpreting and Interacting with Earth Systems (H)

1. Which statement about the greenhouse effect and greenhouse gases is correct?

- A Greenhouse gases absorb all the infrared radiation that is emitted by the Earth's surface.
- B The greenhouse effect is caused by the infrared radiation being absorbed and re-emitted by greenhouse gases.
- C The lower the concentration of greenhouse gases in the Earth's atmosphere, the warmer the Earth becomes.
- D Greenhouse gases are a large percentage of the Earth's current atmosphere.

Your answer

[1]

2. The table shows the composition of the Earth's early atmosphere compared with the atmosphere today.

	Nitrogen	Oxygen	Argon	Carbon dioxide
Percentage of gas in the early atmosphere	4	0.5	0.5	95
Percentage of gas in the atmosphere today	78	21	0.9	0.04

Which gas has **changed by the largest percentage** from the early atmosphere to the atmosphere today?

- A Nitrogen
- B Oxygen
- C Argon
- D Carbon dioxide

Your answer

[1]

3. Which of these pairs of gases are **both** greenhouse gases?

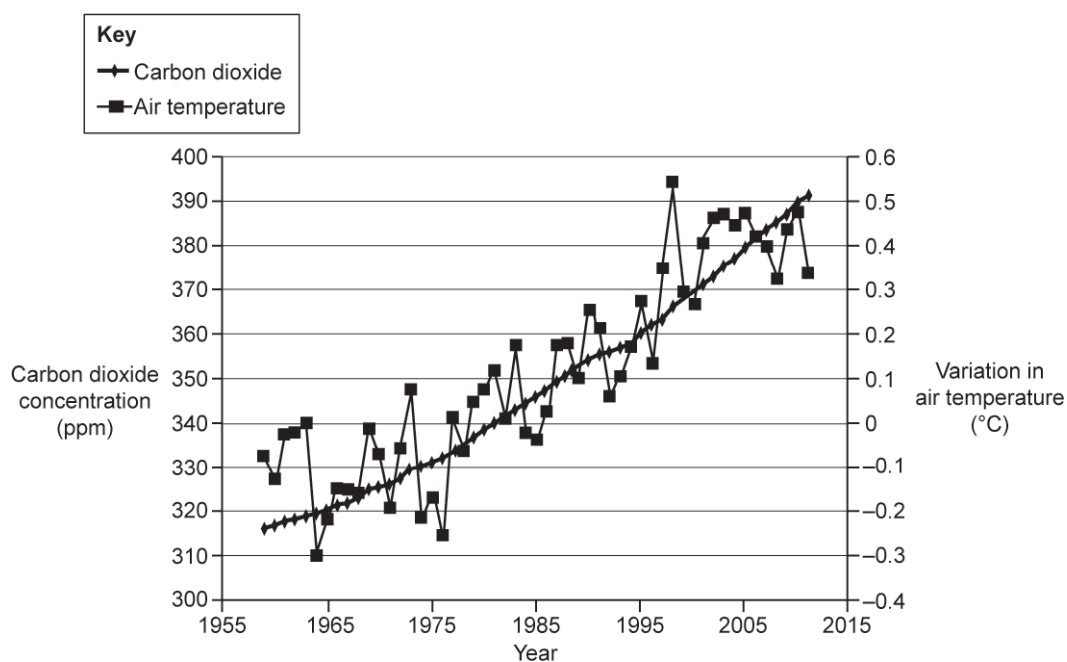
- A Nitrogen and methane
- B Nitrogen and oxygen
- C Water vapour and methane
- D Water vapour and oxygen

Your answer

[1]

4 (a). This question is about the Earth's atmosphere.

The graph shows how carbon dioxide concentration and air temperature have changed between 1955 and 2015.



Evaluate the information shown in the graph.

To what extent does the graph support a link between carbon dioxide levels and global warming?

[2]

(b). Describe and explain what is meant by the **greenhouse effect**.

[3]

(c). Many scientists believe an **enhanced greenhouse effect** is caused by human activities.

i. State a **human activity** that can cause an enhanced greenhouse effect.

[1]

ii. State **two** environmental effects of an enhanced greenhouse effect.

1

2

[2]

5 (a). There are problems with using information about **CO₂ emissions by fossil fuels** to draw conclusions about the effect of carbon dioxide emissions on **global** sea levels.

Suggest what these problems are.

[2]

(b).

- i. Describe **one** effect on the Earth's climate of increased carbon dioxide levels, other than rising sea levels.

[1]

- ii. Suggest how we can lower carbon dioxide levels.

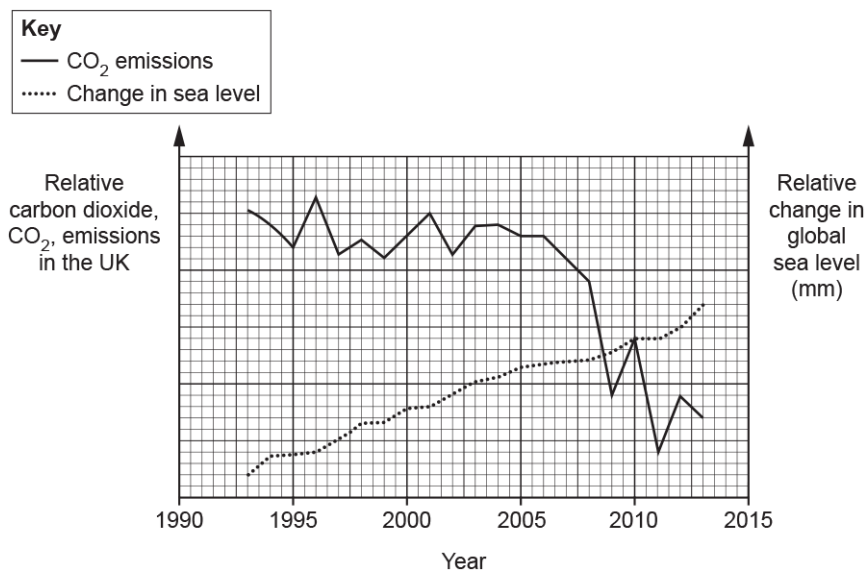
[1]

(c). Some scientists believe that the increased burning of fossil fuels has contributed to global warming.

The scientists say that global warming is causing ice to melt, which results in sea levels rising.

Other scientists believe that rises in global temperatures are just natural variations.

The graph shows the carbon dioxide, CO₂, emissions by fossil fuels in the UK and the changes in global sea levels between 1993 and 2013.



Evaluate the information shown in the graph.

To what extent does the graph support a link between human activity and global warming?

[3]

6 (a). Carbon dioxide is one of several greenhouse gases.

It is made by the combustion of fossil fuels such as coal, gas and oil.

Look at the table. It shows the amount of carbon dioxide produced in a large city in the years 2010 and 2016.

Between the years 2010 and 2016 the percentage increase of atmospheric carbon dioxide has been about 2.5%. During the same time, the increase in mean global temperature has been only 0.05°C.

Source of carbon dioxide	Carbon dioxide produced (tonnes)		Percentage increase (%)
	in 2010	in 2016	
Homes	500 000	600 000	20
Factories and industry	500 000	750 000	50
Transport	1 000 000	1 000 000	0
Electricity generation	750 000	900 000

Look at the row for electricity generation.

Calculate the percentage increase of carbon dioxide produced.

Percentage increase = %

[2]

(b). Some scientists think there is a link between the amount of fossil fuels burnt and climate change.

The data in the table does **not** support this view.

Suggest reasons why.

[2]

7. These statements explain how scientists think our modern-day atmosphere was formed.

1. Plants evolved and used carbon dioxide during photosynthesis to make oxygen.
2. As the Earth cooled down water fell as rain resulting in the formation of the oceans.
3. The atmosphere today consists of nitrogen, oxygen and a small amount of carbon dioxide.
4. Volcanoes gave out ammonia and carbon dioxide as well as methane and water vapour.
5. Ammonia was changed by bacteria in the soil into nitrogen gas.

What is the correct order that these events happened?

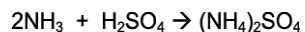
- A. 4, 2, 5, 1, 3
- B. 2, 4, 5, 3, 1
- C. 4, 1, 5, 2, 3
- D. 1, 4, 2, 5, 3

Your answer

[1]

8. Ammonium sulfate is a salt.

It is made using the reaction between the alkali ammonia and sulfuric acid.



- i. Describe how a sample of solid ammonium sulfate is prepared in a laboratory.

Explain why this method is not suitable to be used industrially.

[4]

- ii. Predict the maximum mass of ammonium sulfate that can be made from 51 tonnes of ammonia.

Maximum mass = tonnes [2]

END OF QUESTION PAPER