AQA GCSE Chemistry

Chemistry of the atmosphere · Foundation tier

Questions only

The newest questions on the Foundation papers, about an hour. All 9 are in the exam generator.

Questions	Total marks	Time allowed
6	**57**	**1 h**

Name _____ Class or teacher _____ Date _____

Instructions

- Answer all questions in the spaces provided.
- Use black ink. Show your working for every calculation.
- You may use a scientific calculator and the periodic table insert.
- Print the separate mark scheme when you are ready to mark your answers.

For marking

Q	Source	Marks	Score
1	2023 P2F Q1	9	
2	2023 P2F Q5	9	
3	2024 P2F Q2	9	
4	2024 P2F Q4	13	
5	2025 P2F Q6	8	
6	2021 P2F Q1	9	

Total _____ / 57 **Percentage** _____ %

Questions from AQA GCSE past papers, 2021–2025, reproduced for revision. Practise these topics online, with instant marking: `whiteboardchemistry.com/revision/gcse-chemistry/exam-questions?topics=c9-chemistry-of-the-atmosphere&demand=low,standard&len=0`

Questions

Chemistry of the atmosphere · Foundation tier · 6 questions · 57 marks · time allowed 1 h

Q1 · June 2023 · Paper 2 Foundation · Q1 · [9 marks]

This question also needs Chemical analysis and The rate and extent of chemical change.

This question is about oxygen.

Scientists think that there was little or no oxygen in the Earth's early atmosphere.

01.1 Which planet today has an atmosphere that is similar to the Earth's early atmosphere?

Tick (✓) **one** box.

Jupiter	☐
Mars	☐
Neptune	☐
Saturn	☐

[1 mark]

01.2 Which is the approximate percentage of oxygen in the Earth's atmosphere today?

Tick (✓) **one** box.

20%	☐
50%	☐
80%	☐
100%	☐

[1 mark]

01.3 Which **two** of the following increased the percentage of oxygen in the Earth's atmosphere?

Tick (✓) **two** boxes.

Active volcanoes emitted gases	☐
Algae and plants evolved	☐
Animals evolved	☐
Carbonate sediments formed in oceans	☐
Photosynthesis took place	☐

[2 marks]

01.4 Some scientists think that 1100 million years ago the Earth's atmosphere contained:

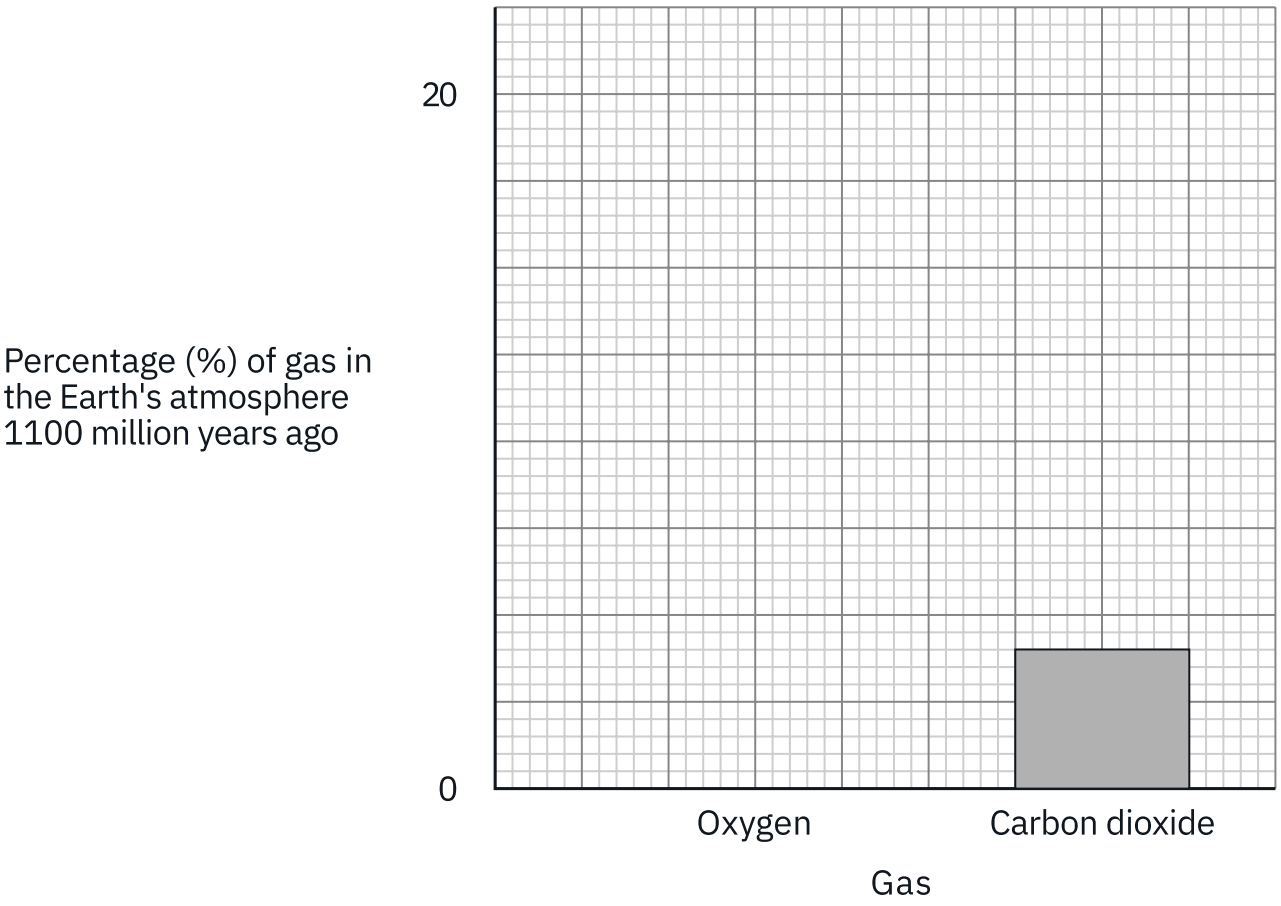
- 16% oxygen
- 4% carbon dioxide.

Complete Figure 1.

You should:

- complete the y-axis scale
- plot the percentage of oxygen in the Earth's atmosphere 1100 million years ago.

Figure 1



[2 marks]

Draw your answer on the figure above.

01.5 Oxygen is produced when manganese dioxide is added to hydrogen peroxide solution.

The equation for the reaction is:

hydrogen peroxide → water + oxygen

A student investigated the effect of changing the temperature on the decomposition of hydrogen peroxide.

This is the method used.

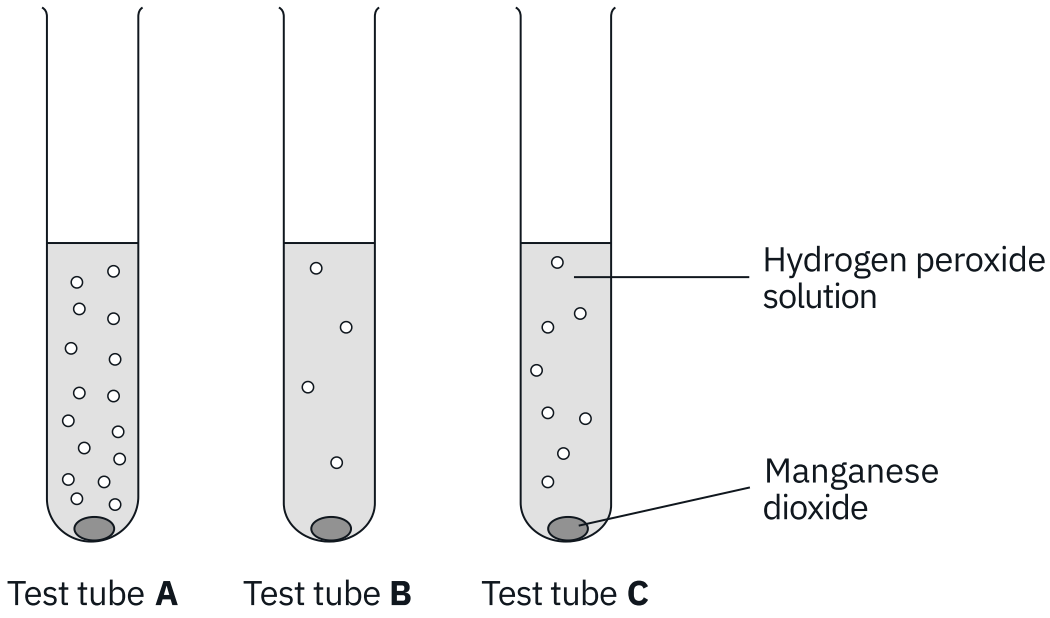
1. Add 5 cm^3 of hydrogen peroxide solution to three test tubes labelled A, B and C.

2. Place each test tube in a water bath at a different temperature.

3. Add 0.2 g of manganese dioxide to each test tube.

Figure 2 shows the results.

Figure 2



Which test tube contained hydrogen peroxide solution at the highest temperature?

Tick (✓) **one** box.

Test tube A	☐
Test tube B	☐
Test tube C	☐

[1 mark]

01.6 The student tested the gas produced.

What is used to prove that the gas is oxygen?

Tick (✓) **one** box.

A glowing splint	☐
Bromine water	☐
Damp litmus paper	☐

[1 mark]

01.7 Manganese dioxide does not appear in the chemical equation for this reaction.

Which is a correct statement about manganese dioxide in this reaction?

Tick (✓) **one** box.

Manganese dioxide increases the activation energy in this reaction.	☐
Manganese dioxide is a catalyst in this reaction.	☐
Manganese dioxide is used up during this reaction.	☐
Manganese dioxide reduces the rate of this reaction.	☐

[1 mark]

Q2 · June 2023 · Paper 2 Foundation · Q5 · [9 marks]

This question is about greenhouse gases and climate change.

05.1 Which **two** gases are greenhouse gases?

Tick (✓) **two** boxes.

Argon	☐
Carbon dioxide	☐
Nitrogen	☐
Methane	☐
Oxygen	☐

[2 marks]

05.2 Why are greenhouse gases essential for supporting life on Earth?

[1 mark]

05.3 The percentage of greenhouse gases in the Earth's atmosphere today is increasing.

Many scientists think that this increase is causing global climate change.

What is a cause of the greenhouse effect?

Complete the sentence.

Greenhouse gases absorb long wavelength _____ .

[1 mark]

05.4 Which **two** are potential effects of global climate change?

Tick (✓) **two** boxes.

Fewer droughts	☐
Fewer storms	☐
Higher sea levels	☐
Less coastal flooding	☐
Melting polar ice	☐

[2 marks]

05.5 Water vapour is a greenhouse gas.

The percentage by mass of water vapour in the Earth's atmosphere is 0.25%.

Calculate the mass of water vapour in 350 kg of the Earth's atmosphere.

Give your answer in grams.

Mass = _____ g

[3 marks]

Q3 · June 2024 · Paper 2 Foundation · Q2 · [9 marks]

This question is about burning coal.

A power station has four coal-burning furnaces.

Each furnace burns 3000 kg of coal per minute.

Table 1 shows some information about this coal burning power station

Table 1

Number of furnaces in use	Mass of coal burned per minute in kilograms	Mass of sulfur dioxide produced per minute in kilograms	Mass of carbon dioxide produced per minute in kilograms
0	0	0	0
1	3000	100	7000
2	6000	200	14 000
3	9000	300	21 000
4	12 000	400	28 000

02.1 Carbon dioxide is a greenhouse gas.

What is the effect on the rate of global climate change of using more furnaces in this power station?

Complete the sentence.

Choose the answer from the box.

decreases stays the same increases

Use Table 1.

The rate of global climate change _____ .

[1 mark]

02.2 7000 kg of carbon dioxide are produced when 3000 kg of coal are burned.

Calculate the mass of carbon dioxide produced when 1 kilogram of coal is burned.

Mass of carbon dioxide = _____ kg

[2 marks]

02.3 Complete the sentence.

Sulfur dioxide causes an environmental effect called acid _____ .

[1 mark]

02.4 Table 1 is repeated below.

Table 1

Number of furnaces in use	Mass of coal burned per minute in kilograms	Mass of sulfur dioxide produced per minute in kilograms	Mass of carbon dioxide produced per minute in kilograms
0	0	0	0
1	3000	100	7000
2	6000	200	14 000
3	9000	300	21 000
4	12 000	400	28 000

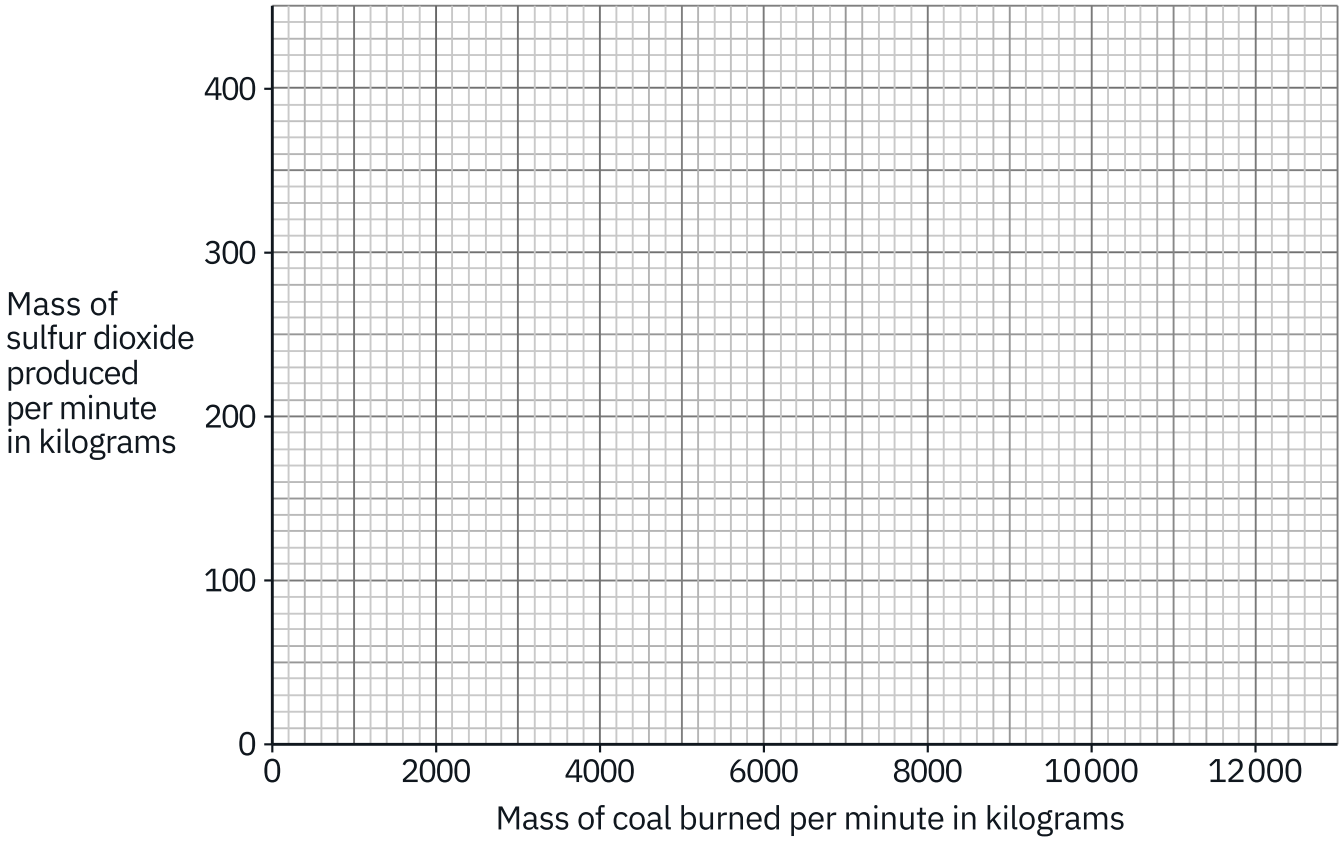
Figure 3 shows how the mass of sulfur dioxide produced per minute varies with the mass of coal burned per minute.

Complete Figure 3.

You should:

- plot data from Table 1 on Figure 3
- draw a line of best fit.

Figure 3



[3 marks]

Draw your answer on the figure above.

02.5 Complete the sentence.

Use Table 1 and Figure 3.

As the mass of coal burned per minute increases, the mass of sulfur dioxide produced per minute _____ .

[1 mark]

02.6 This power station also releases particulates into the air.

Complete the sentence.

The release of particulates into the air causes global _____ .

[1 mark]

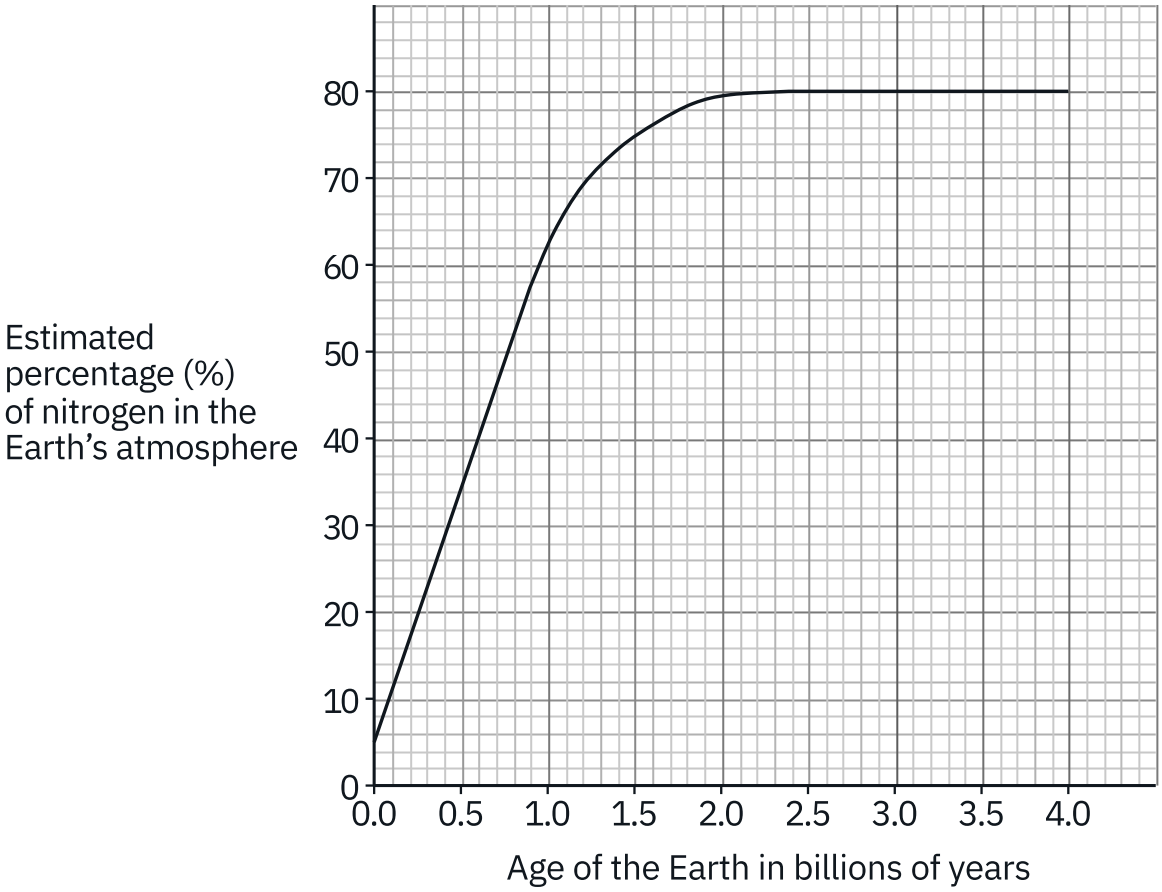
Q4 · June 2024 · Paper 2 Foundation · Q4 · [13 marks]

This question also needs Organic chemistry and Quantitative chemistry.

This question is about the Earth's atmosphere and naturally occurring polymers.

04.1 Figure 5 shows how the estimated percentage of nitrogen in the Earth's atmosphere has changed since the Earth was formed.

Figure 5



Describe the trends shown by the graph.

Use data from Figure 5.

[3 marks]

04.2 The percentage of oxygen in the Earth's atmosphere has increased since the Earth was formed.

This is because of photosynthesis.

The word equation for the photosynthesis reaction is:

carbon dioxide + water → glucose + oxygen

What happened to the percentage of carbon dioxide in the atmosphere when photosynthesis began?

Tick (✓) **one** box.

The percentage of carbon dioxide decreased.	☐
The percentage of carbon dioxide stayed the same.	☐
The percentage of carbon dioxide increased.	☐

[1 mark]

04.3 The photosynthesis reaction takes in energy from the surroundings.

Complete the sentence.

Choose the answer from the box.

carbon dioxide light water

The source of the energy used in photosynthesis is _____ .

[1 mark]

04.4 Which **two** produce oxygen by photosynthesis?

Tick (✓) **two** boxes.

Algae	☐
Animals	☐
Plants	☐
Viruses	☐
Yeast	☐

[2 marks]

04.5 The glucose produced during photosynthesis can form naturally occurring polymers.

Which **two** are naturally occurring polymers that can be produced from glucose?

Tick (✓) **two** boxes.

Cellulose	☐
DNA	☐
Poly(propene)	☐
Protein	☐
Starch	☐

[2 marks]

04.6 DNA molecules contain two polymer chains.

A DNA molecule has a relative formula mass (M_r) of approximately 140 000 000 000

What is the approximate relative formula mass (M_r) of the DNA molecule in standard form?

Tick (✓) **one** box.

1.4×10^9	☐
1.4×10^{10}	☐
1.4×10^{11}	☐
1.4×10^{12}	☐

[1 mark]

04.7 What is the approximate relative formula mass (M_r) of each polymer chain in the DNA molecule?

Tick (✓) **one** box.

70 000 000 000	☐
140 000 000 000	☐
280 000 000 000	☐
560 000 000 000	☐

[1 mark]

04.8 Complete the sentence.

The shape of a DNA molecule is a double _____ .

[1 mark]

04.9 How many different nucleotides are present in a molecule of DNA?

Tick (✓) **one** box.

1	☐
2	☐
3	☐
4	☐

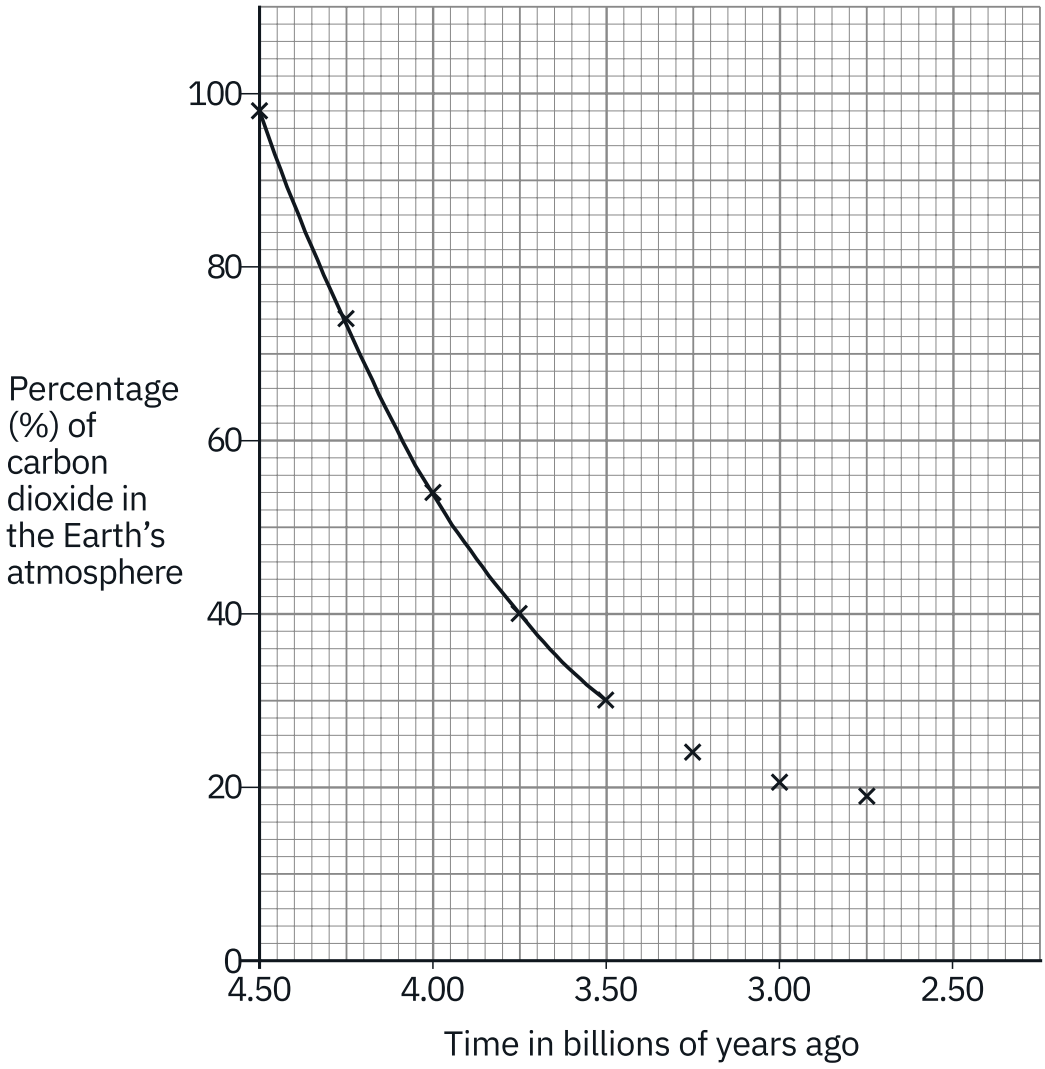
[1 mark]

Q5 · June 2025 · Paper 2 Foundation · Q6 · [8 marks]

The Earth's atmosphere has changed over time.

Figure 5 shows the percentage of carbon dioxide in the Earth's atmosphere between 4.5 billion and 2.75 billion years ago.

Figure 5



06.1 Complete Figure 5.

You should extend the line of best fit to the plotted point at 2.75 billions of years ago.

[1 mark]

Draw your answer on the figure above.

06.2 What was the percentage (%) of carbon dioxide in the Earth's atmosphere

3.75 billions of years ago?

Use Figure 5.

%

[1 mark]

06.3 The percentage of carbon dioxide changed between 4.5 and 3.0 billion years ago.

Which was a cause of this change?

Use Figure 5.

Tick (✓) **one** box.

Carbon dioxide was dissolved in oceans.	☐
Carbon dioxide was produced during combustion of fossil fuels.	☐
Carbon dioxide was released during volcanic activity.	☐

[1 mark]

06.4 Table 2 shows information about the percentage of nitrogen present in the Earth's atmosphere.

Table 2

Time in billions of years ago	Percentage (%) of nitrogen
4.5	4
4.0	34
3.5	62
3.0	75
2.5	78

The percentage of nitrogen changed between 4.5 and 2.5 billion years ago.

Which was a cause of this change?

Use Table 2.

Tick (✓) **one** box.

Nitrogen was dissolved in oceans.	☐
Nitrogen was produced during combustion of fossil fuels.	☐
Nitrogen was released during volcanic activity.	☐

[1 mark]

06.5 When did the percentage of nitrogen in the Earth's atmosphere become similar to the percentage of nitrogen in the Earth's atmosphere today?

Use Table 2.

Tick (✓) **one** box.

2.5 billion years ago	☐
3.0 billion years ago	☐
3.5 billion years ago	☐
4.0 billion years ago	☐
4.5 billion years ago	☐

[1 mark]

06.6 Which **two** gases may also have been present in the Earth's early atmosphere?

Tick (✓) **two** boxes.

Ammonia	☐
Chlorine	☐
Helium	☐
Hydrogen	☐
Methane	☐

[2 marks]

06.7 Name the process that started to produce oxygen in the Earth's atmosphere

2.7 billion years ago.

[1 mark]

Q6 · November 2021 · Paper 2 Foundation · Q1 · [9 marks]

This question is about the Earth's atmosphere.

01.1 How long ago was the Earth formed?

Tick (✓) **one** box.

4.6 billion years ago	☐
4.6 million years ago	☐
4.6 thousand years ago	☐

[1 mark]

01.2 Table 1 shows the percentages of gases in the atmospheres of Mars and Earth today.

Table 1

Gas	Percentage of gas in atmosphere (%)	
	Mars	**Earth**
Carbon dioxide	95.97	0.04
Nitrogen	1.89	78.09
Oxygen	0.15	20.95
Other gases	1.99	X

Calculate the percentage X of other gases in the Earth's atmosphere.

Use Table 1.

X = _____ %

[1 mark]

01.3 The atmosphere of the early Earth is thought to have been similar to the atmosphere of Mars today.

The percentages of nitrogen and of oxygen in the Earth's atmosphere today have changed from the percentages in the Earth's early atmosphere.

Draw **one** line from each gas to the change in the percentage of that gas.

Use Table 1.

Gas	Change in percentage of gas
Nitrogen	Increased by about 4 times
	Increased by about 21%
Oxygen	Increased by about 40 times
	Increased by about 96%

[2 marks]

Draw your answer on the figure above.

01.4 The percentage of carbon dioxide in the Earth's early atmosphere decreased.

Which **two** processes caused this decrease?

Tick (✓) **two** boxes.

Carbon dioxide dissolving in sea water	☐
Combustion of fossil fuels	☐
Farming of animals	☐
Formation of sedimentary rocks	☐
Volcanoes releasing carbon dioxide	☐

[2 marks]

01.5 Photosynthesis also decreased the percentage of carbon dioxide in the Earth's early atmosphere.

Photosynthesis increased the percentage of another gas.

Complete the word equation for photosynthesis.

_____ + water → glucose + _____

[2 marks]

01.6 Complete the sentence.

Scientists are not certain about the percentages of gases in the Earth's early atmosphere because there is a lack of _____ .

[1 mark]

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