



## New Document 1

Name: \_\_\_\_\_

Class: \_\_\_\_\_

Date: \_\_\_\_\_

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Time: **32 minutes**

Marks: **31 marks**

Comments:

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**Q1.**

There is less carbon dioxide in the Earth's atmosphere now than there was in the Earth's early atmosphere.

- (a) The amount of carbon dioxide in the Earth's early atmosphere decreased because it was used by plants and algae for photosynthesis, dissolved in the oceans and formed fossil fuels.

Give **one** other way that the amount of carbon dioxide in the Earth's early atmosphere decreased.

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(1)

- (b) Carbon dioxide is a greenhouse gas.

Describe the greenhouse effect.

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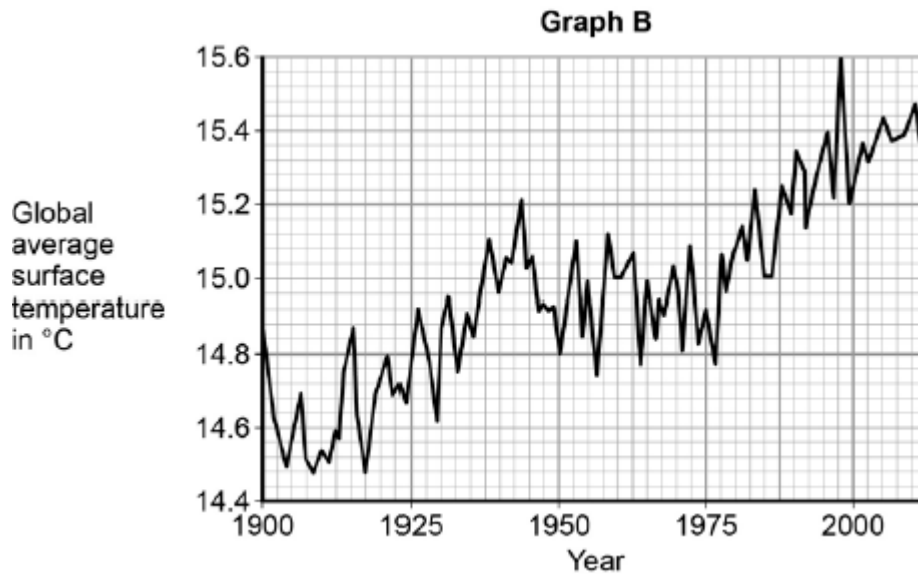
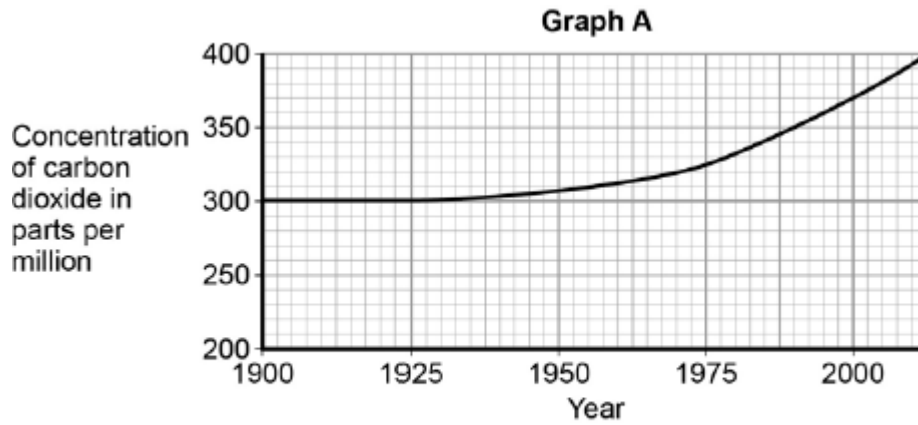
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(4)

- (c) The graphs in **Figure 1** show the concentration of carbon dioxide in the atmosphere and global average surface temperature since 1900.

**Figure 1**



Calculate the percentage increase in the concentration of carbon dioxide from 1975 to 2000.

\_\_\_\_\_ %

(1)

(d) What was the global average surface temperature in 1980?

Global average surface temperature = \_\_\_\_\_ °C

(1)

(e) A student stated: 'The graphs show that increasing the concentration of carbon dioxide in the atmosphere causes global temperature increases.'

Discuss why this statement is only partially true.

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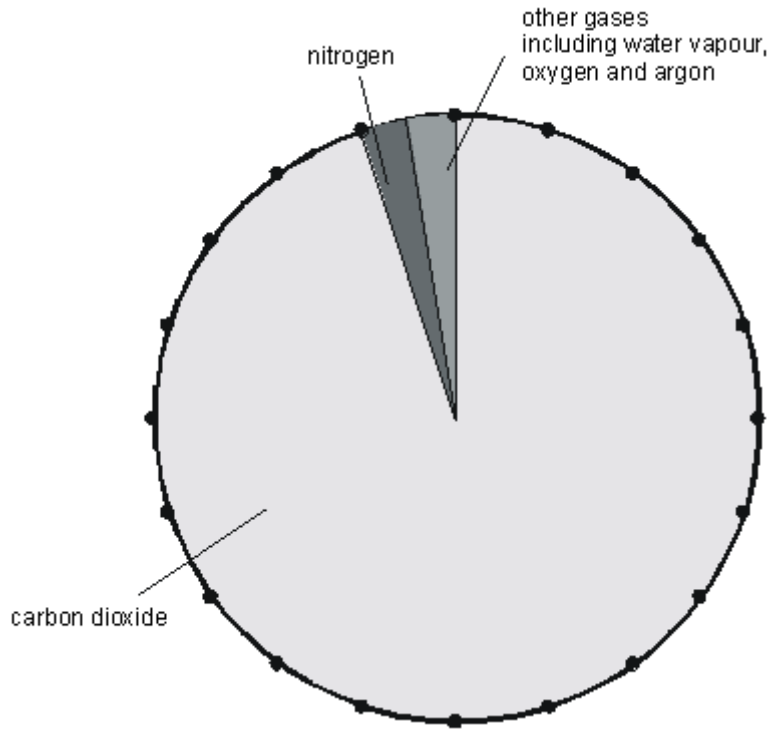


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- (a) Use the pie chart above to calculate the percentage of carbon dioxide in the atmosphere on Mars.

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%

(2)

- (b) The atmosphere on Earth is very different from that on Mars. One important difference is that the Earth's atmosphere contains a large amount of oxygen.

Give **two** other ways in which the Earth's atmosphere is different from the atmosphere on Mars.

1. \_\_\_\_\_

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2. \_\_\_\_\_

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(2)

- (c) When the Earth was formed its atmosphere is thought to have been similar to the atmosphere on Mars. Explain how green plants and other organisms have changed the composition of the Earth's atmosphere.

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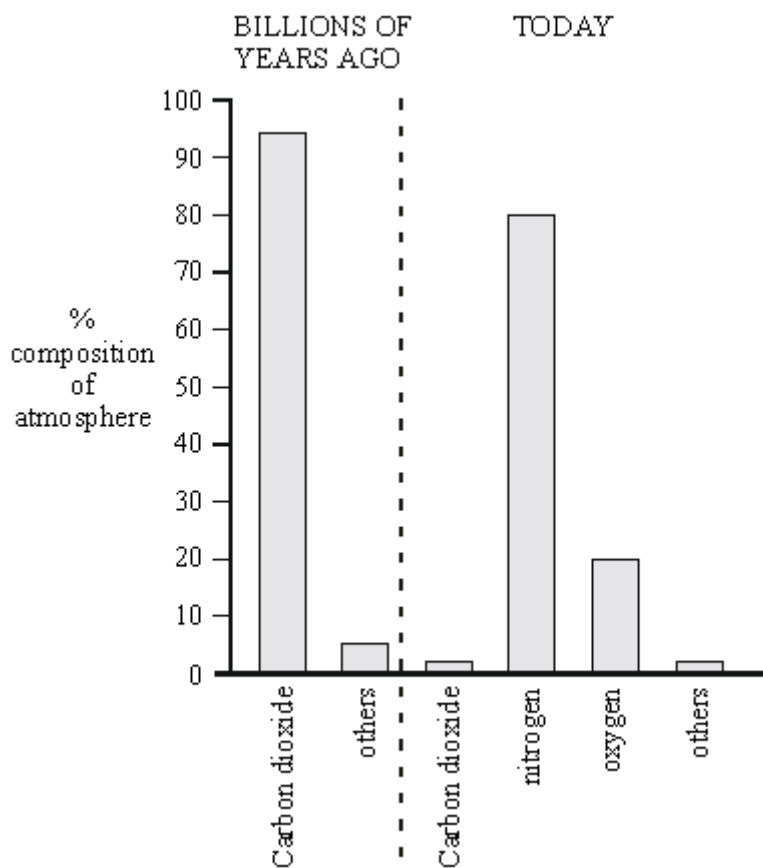
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(4)  
(Total 8 marks)

**Q4.**

The bar chart shows the composition of the Earth's atmosphere today, and as it was billions of years ago.



- (a) Use information from the bar chart to describe how the atmosphere today is different from the atmosphere of billions of years ago.

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(2)

- (b) Describe the processes which have brought about the changes in the proportions of these gases in the air over billions of years.

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**(4)**  
**(Total 6 marks)**

## Mark schemes

### Q1.

- (a) sediment / limestone formation from carbonates 1
- (b) short wavelength radiation 1
- passes through atmosphere to Earth's surface 1
- Earth's surface radiates different wavelengths 1
- which are absorbed by greenhouse gases to produce temperature increase  
*allow CH<sub>4</sub> H<sub>2</sub>O or CO<sub>2</sub>* 1
- (c) 13.8 %  
*allow values in the range 13.0 to 15.0* 1
- (d) 15.08 (°C)  
*allow values in the range 15.05 – 15.10* 1
- (e) correlation between CO<sub>2</sub> levels and temperature 1
- despite short-term variations of temperature 1
- supported by values from graph which show correlation 1
- cannot determine causality from this data or possible causality as increasing use of fossil fuels since 1900 has caused accelerated temperature increase 1

[11]

### Q2.

#### **Level 3 (5–6 marks):**

A full explanation is given that is coherent and logically structured, linking effect of increase in carbon dioxide to climate change and effects on biodiversity.

#### **Level 2 (3–4 marks):**

An attempt is made to link the effects of rising carbon dioxide levels to climate change and biodiversity. The logic may be inconsistent at times but builds towards a coherent explanation.

#### **Level 1 (1–2 marks):**

Discrete relevant points made. The logic may be unclear and attempts at reasoning may not be consistent.

#### **0 marks:**

No relevant content.



**Indicative content**

- rise in carbon dioxide increases atmospheric temperature / causes global warming
- global warming causes extreme weather patterns
- such as rise in sea levels
- increased or decreased rainfall
- frequency of storms / droughts
- rise in sea levels means habitats will change due to flooding
- rise in sea levels could increase salt in soil
- increased rainfall will increase water levels
- severity of storms / droughts could affect photosynthesis
- consequences of changes are loss of or damage to habitats
- which will affect animal and plant distributions
- by increasing migration or species dying off
- which decreases biodiversity

[6]

**Q3.**

- (a) 95% (1 mark for working) 2
- (b) Much less carbon dioxide  
Much more nitrogen 2
- (c) Plants take up CO<sub>2</sub>  
plants give out oxygen  
when they die trap CO<sub>2</sub> in rocks and fossil fuels  
methane and ammonia reacted with oxygen  
nitrogen gas produced  
by reaction of oxygen and ammonia  
and by denitrifying bacteria  
formation of ozone layer  
*any 4 for 1 mark each* 4

[8]

**Q4.**

- (a) amount of CO<sub>2</sub> (much) lower  
amount of O<sub>2</sub> (much) higher  
amount of N<sub>2</sub> (much) higher (owtte.)  
less other gases/less NH<sub>3</sub>/less CH<sub>4</sub>  
*any 2 for 2 marks* 2
- (b) 4 points from:  
plants (evolved)/photosynthesis/algae  
take in CO<sub>2</sub>  
give out O<sub>2</sub>  
water vapour condensed  
ozone formed from oxygen  
less CO<sub>2</sub> is produced now from volcanic activity  
CO<sub>2</sub> from air trapped in sedimentary rocks or fossil fuels  
nitrogen produced by bacteria/living organisms/microbes/decay of dead organisms (**not** nitrifying bacteria, nitrogen fixing 4 bacteria)  
nitrogen produced by reaction of NH<sub>3</sub> with O<sub>2</sub>/decomposition of NH<sub>3</sub>  
nitrogen builds up because it is unreactive

**(Assume answer refers to today's atmosphere)**

*any 4 for 1 mark each*

4

[6]