

## **A. The proportions of different gases in the atmosphere**

1. The majority of the Earth's atmosphere consist of two gases. Name these two gases and state the proportion of the atmosphere they inhabit. (4)

*Nitrogen [1] 80% [1]*

*Oxygen [1] 20% [1]*

2. Name two other gases in the Earth's atmosphere. (2)

*Any two from Carbon dioxide/water vapour/any named noble gas [2]*

## **B. The Earth's early atmosphere**

1. Why is it difficult to predict the gases in the Earth's early atmosphere? (2)

*4.6 billion years ago [1] limited evidence [1]*

2. **Extended response question:**

In the first billion years of the Earth's atmosphere the main gases were carbon dioxide and water vapour.

Explain how these gases were released into the atmosphere and how they were removed from the Earth's early atmosphere. (6)

*Volcanoes produced these gases [1]*

*Water vapour condensed [1] to form the oceans [1]*

*Carbon dioxide dissolved in the oceans [1] carbonates were precipitated [1] producing sediments [1]*

*Do not allow photosynthesis here.*

## **C. How oxygen increased**

1. Which organisms produced oxygen in the early atmosphere? (2)

*Algae [1] plants [1]*

2. Write the balanced symbol equation for photosynthesis. (3)



*reactants [1] products [1] balancing [1]*

## D. How Carbon Dioxide Decreased

### 1. Extended response question:

Describe and explain how the amount of carbon dioxide in the atmosphere has decreased over the last 2.7 billion years. (6)

*Algae and plants [1] removed carbon dioxide by photosynthesis [1]*

*Formation of fossil fuels [1] trapped carbon [1]*

*Formation of sedimentary rock [1] trapped carbon in calcium carbonate [1]*

## E. Greenhouse Gases

### 1. Name two greenhouse gases. (2)

*Any two carbon dioxide/methane/water vapour*

### 2. Describe the greenhouse effect in terms of the wavelength of radiation and its interaction with matter. (4)

*Shorter wavelength visible light [1] is absorbed by the Earth [1] emitted as longer wavelength [1] absorbed by greenhouse gases [1]*

## F. Human Activities Which Contribute To An Increase In Greenhouse Gases In The Atmosphere And Global Climate Change

### 1. For each gas, name one way in which human activities increase the amount of carbon dioxide and methane in the atmosphere. (2)

*Carbon dioxide – burning fossil fuels/deforestation [1]*

*Methane – farming of livestock/landfills [1]*

### 2. Describe two potential effects of global climate change. (2)

*Any two from flooding/rising sea level/droughts/ice caps melting/desertification [2]*

## G. The Carbon Footprint And Its Reduction

### 1. What is meant by the term Carbon Footprint? (3)

*The total amount of carbon dioxide [1] and other greenhouse gases [1] given off by a product/service/event [1]*

### 2. The use of electric cars may result in the reduction of carbon dioxide pollution. Explain how the use of electric cars may reduce the amount of carbon dioxide released and explain why, overall, their use may not lead to a reduction in the amount of carbon dioxide released. (3)

*Electric cars do not release carbon dioxide as petrol/fossil fuels are not burnt/combusted [1] the electricity used is produced in power stations [1] that may burn fossil fuels [1]*

## H. Atmospheric Pollutants From Fuels And The Properties And Effects of Atmospheric Pollutants

### 1. Extended response question:

Carbon monoxide, sulfur dioxide and particulates may be produced from the combustion of fossil fuels. Describe and explain how each of these pollutants are produced. (6)

*Carbon reacts with oxygen to make carbon monoxide [1] there is a lack of oxygen [1]  
Sulfur is present in small amounts in fossil fuels [1] it reacts with oxygen to make sulfur dioxide [1]  
Particulates are solid particles [1] and unburnt hydrocarbons [1]*

### 2. Describe the problems caused by carbon monoxide, sulfur dioxide and particulates in the atmosphere (3)

*Carbon monoxide is toxic/poisonous [1]  
Sulfur dioxide cause respiratory problems/acid rain [1]  
Particulates cause global dimming/health problems in humans [1]*