

**a** Billions of years ago, what was the surface of the Earth covered in?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

What gas made up most of the Earth's early atmosphere?  
 Circle one of the following.

oxygen    carbon dioxide    nitrogen    helium  
 ammonia    methane    water vapour

**b** How was carbon dioxide removed from the atmosphere?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

What evolved to carry out photosynthesis?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**c** Match up the proportions of gases with the percentage for today's atmosphere.

nitrogen	less than 1%
oxygen	80%
other gases	20%

**d** Why is it difficult to be sure about the evolution of the atmosphere?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**e** Name two other gases that are produced from burning fossil fuels.

- \_\_\_\_\_
- \_\_\_\_\_

What problems can they cause?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**f** How many billions of years ago did algae evolve? Choose the correct answer.

- 1.0
- 2.7
- 5.6
- 6.4

**g** Complete the equation for photosynthesis.  
 carbon dioxide + water →  
 $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow$

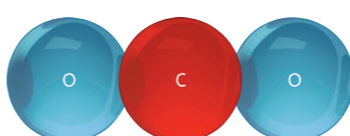
Why is this equation so important for the evolution of the atmosphere?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

What could then evolve?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**h** What is a greenhouse gas?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

How do greenhouse gases work?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**i** Why is carbon dioxide linked to climate change?



\_\_\_\_\_

**j** Why is climate change such a problem? What are the consequences of it?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**k** Why is releasing particulates a problem?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

What can carbon monoxide do to the body?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**l** Scientists use the term carbon footprint. Define what this term means.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**m** List three ways of reducing the carbon footprint.

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

**n** What is the biggest reason for governments not lowering their carbon footprint?  
 \_\_\_\_\_  
 \_\_\_\_\_

**o** Complete combustion is...  
 \_\_\_\_\_  
 \_\_\_\_\_

Incomplete combustion is...  
 \_\_\_\_\_  
 \_\_\_\_\_

During incomplete combustion, what other things are released into the atmosphere?

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

a Billions of years ago, what was the surface of the Earth covered in?  
**volcanoes**

What gas made up most of the Earth's early atmosphere?  
 Circle one of the following.

oxygen **carbon dioxide** nitrogen helium  
 ammonia methane water vapour

e Name two other gases that are produced from burning fossil fuels.

1. **sulphur dioxide**
2. **nitrogen oxides**

What problems can they cause?  
**Acid rain, damage to buildings, kills animals and plants and causes respiratory problems.**

h What is a greenhouse gas?  
**They keep the Earth warm enough to support life, e.g. carbon dioxide. Too many of these gases in the atmosphere may lead to climate change.**

How do greenhouse gases work?  
**They stop heat escaping from Earth into space (they absorb it), warming the Earth's atmosphere up.**

l Scientists use the term carbon footprint. Define what this term means.  
**The amount of greenhouse gases released over the full life cycle of something.**

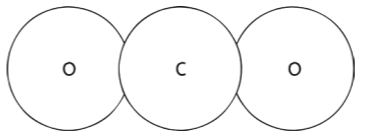
b How was carbon dioxide removed from the atmosphere?  
**Dissolved into the oceans.**

What evolved to carry out photosynthesis?  
**Green plants and algae.**

f How many billions of years ago did algae evolve? Choose the correct answer.

- 1.0
- 2.7**
- 5.6
- 6.4

i Why is carbon dioxide linked to climate change?



The Earth's surface temperature has been increasing. Scientists believe this is due to the extra carbon dioxide being produced by human activity. This may lead to climate change.

m List three ways of reducing the carbon footprint.

Answers could include:

- **renewable energy resources;**
- **governments could tax companies on the amount of gases they give out;**
- **limits on greenhouse gases;**
- **carbon capture to store CO<sub>2</sub> underground.**

c Match up the proportions of gases with the percentage for today's atmosphere.

nitrogen	less than 1%
oxygen	80%
other gases	20%

g Complete the equation for photosynthesis.  
 carbon dioxide + water → **glucose + oxygen**

$$6\text{CO}_2 + 6\text{H}_2\text{O} \longrightarrow \text{O}_2 + \text{C}_6\text{H}_{12}\text{O}_6$$

Why is this equation so important for the evolution of the atmosphere?  
**This built up the amount of oxygen in the atmosphere, and it also removes carbon dioxide.**

What could then evolve?  
**This meant that oxygen dependant lifeforms could then evolve.**

j Why is climate change such a problem? What are the consequences of it?  
**Answers can refer to: melting of the polar ice caps; sea levels may rise; more flooding; changes in rainfall; more severe/frequent storms; may affect food production.**

n What is the biggest reason for governments not lowering their carbon footprint?  
**economic reasons**

d Why is it difficult to be sure about the evolution of the atmosphere?  
**The atmosphere started to evolve around 4.6 billion years ago, so there is a lack of evidence.**

k Why is releasing particulates a problem?  
**If breathed in they can cause lung damage and breathing problems. Also, they can contribute to global dimming.**

What can carbon monoxide do to the body?  
**Stops the blood carrying oxygen around the body, a lack of oxygen could kill.**

o Complete combustion is...  
**plenty of oxygen available and all the fuel burns.**

Incomplete combustion is...  
**not enough oxygen available and some of the fuel does not burn.**

During incomplete combustion, what other things are released into the atmosphere?

1. **soot**
2. **carbon monoxide**
3. **unburnt fuel**