Q1. Greenhouse gases affect the temperature of the Earth.

(a) Which gas is a greenhouse gas?

Tick **one** box.

Argon ☐

Methane ☐

Nitrogen ☐

Oxygen ☐

(1)

(b) An increase in global temperature will cause climate change.

What is **one** possible effect of climate change?

Tick **one** box.

Deforestation ☐

Global dimming ☐

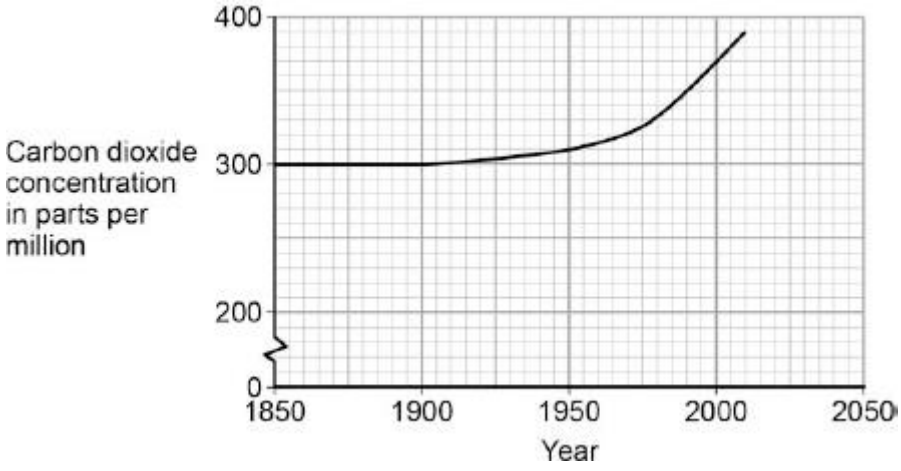
Sea levels rising ☐

Volcanic activity ☐

(1)

(c) Carbon dioxide is also a greenhouse gas.

The figure below shows how the concentration of carbon dioxide in the atmosphere has changed since 1850.



Which process is the reason for the change in carbon dioxide concentration shown on the figure above?

Tick **one** box.

Burning of fossil fuels ☐

Carbon capture ☐

Formation of sedimentary rocks ☐

Photosynthesis ☐

(1)

(d) Give **three** conclusions that can be made from the figure above.

1 .....

.....

2 .....

.....

3 .....

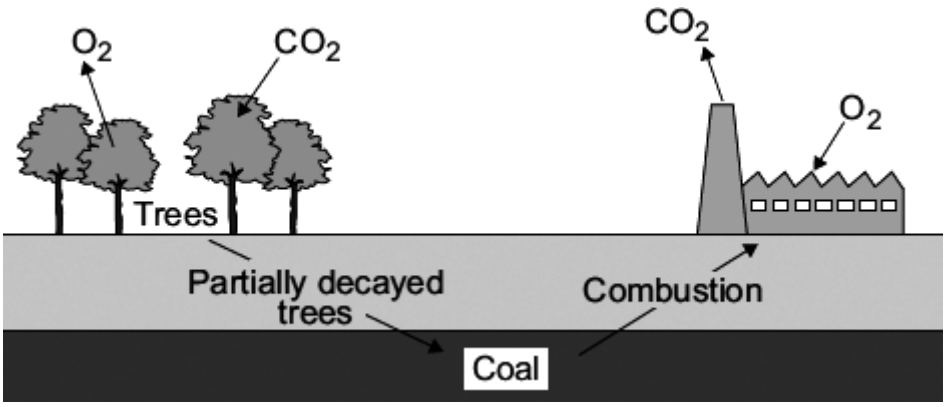
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(3)
(Total 6 marks)

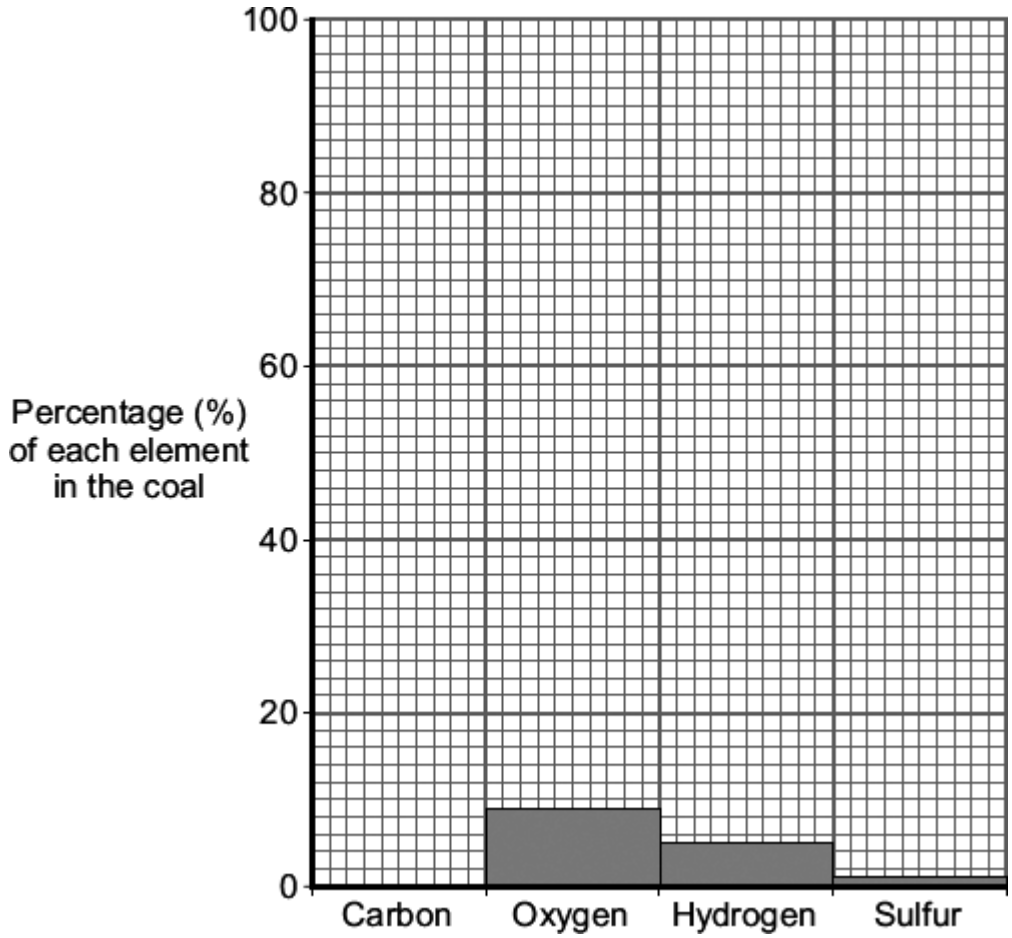
Q2. About 3000 million years ago carbon dioxide was one of the main gases in the Earth's early atmosphere.

About 400 million years ago plants and trees grew on most of the land. When the plants and trees died they were covered by sand and slowly decayed to form coal.

Today coal is burned in power stations to release the energy needed by industry.



(a) The bar chart shows the percentage of some of the elements in this coal.



(i) This coal contains 85 % carbon. Draw the bar for carbon on the chart.

(1)

(ii) Coal is burned in the atmosphere to release energy.
Two of the products of burning coal are shown.

Draw **one** line from each product to its environmental impact.

Product	**Environmental impact**
Sulfur dioxide	Acid rain
Carbon particles	Global dimming
	Global warming

(2)

(b) Use the information above and your knowledge and understanding to answer these questions.

(i) How did the formation of coal decrease the amount of carbon dioxide in the Earth's early atmosphere?

.....

.....

(1)

(ii) How does burning coal affect the amount of carbon dioxide in the Earth's atmosphere?
Explain your answer.

.....

.....

.....

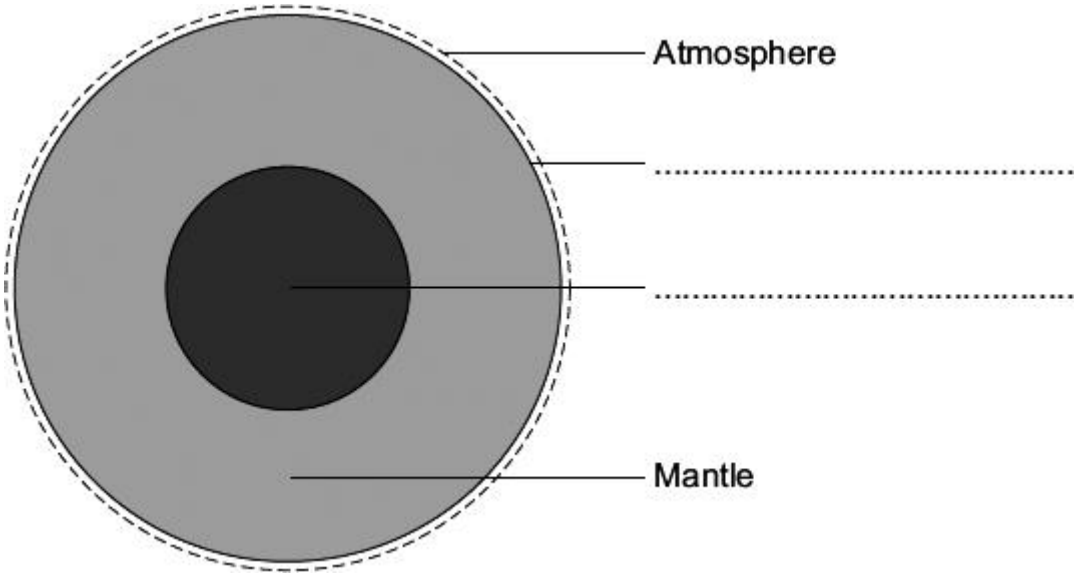
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(2)
(Total 6 marks)

Q3. The Earth has a layered structure and is surrounded by an atmosphere.

(a) The diagram shows the layers of the Earth.

Complete the labels on the diagram.

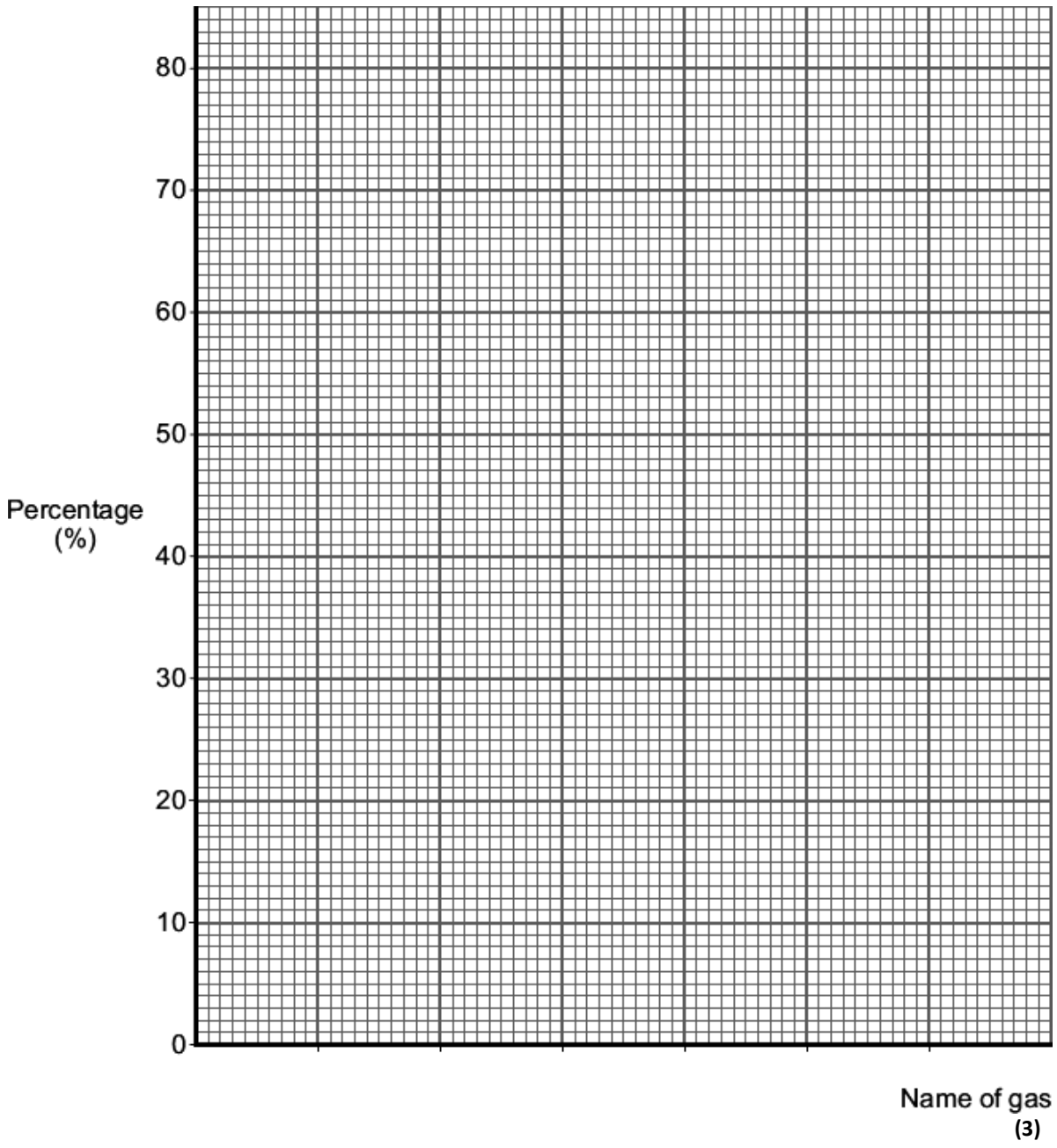


(2)

(b) The data in the table shows the percentages of the gases in the Earth's atmosphere.

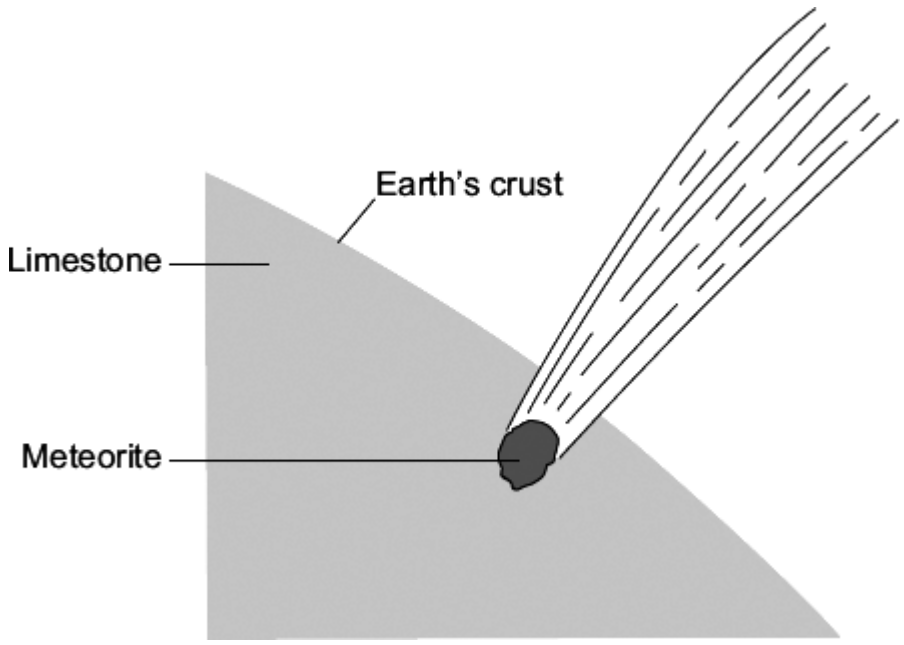
Name of gas	**Percentage (%) of gas**
Nitrogen	78
Oxygen	21
Other gases	1

Present the data in the table on the grid below.



(3)

(c) Millions of years ago a large meteorite hit the Earth.
The meteorite heated limestone in the Earth's crust to a very high temperature.
The heat caused calcium carbonate in the limestone to release large amounts of carbon dioxide.



Draw a ring round the correct answer to complete each sentence.

(i) Carbon dioxide was released because the calcium carbonate was

decomposed.
evaporated.
reduced.

(1)

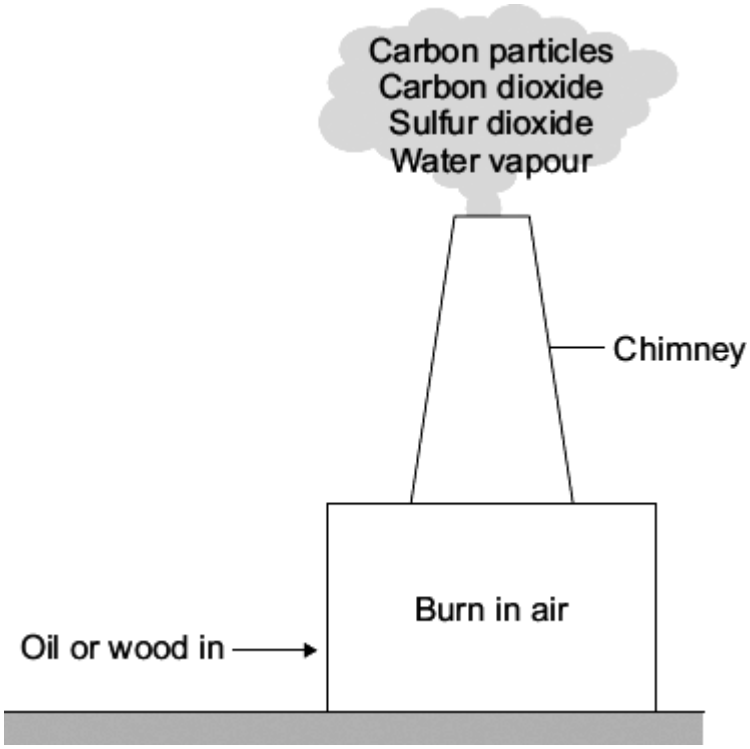
(ii) More carbon dioxide in the Earth's atmosphere causes

acid rain.
global dimming.
global warming.

(1)
(Total 7 marks)

Q4. In the future:

- there will be fewer oil burning power stations
- there may be more wood burning power stations.



(a) Which **one** of the emissions from the chimney can cause acid rain?

.....

(1)

(b) Draw a ring around the correct answer to complete the sentence.

Carbon particles in the Earth's atmosphere cause

acid rain.
global dimming.
global warming.

(1)

(c) Which gas in the air is needed for oil or wood to burn?

.....

(1)

(d) Suggest why there will be **fewer** power stations burning oil in the future.

.....

.....

(1)

(e) Some power stations burn wood.
The wood comes from trees grown in forests.

Suggest why burning wood in power stations is said to be 'carbon-neutral'.

.....

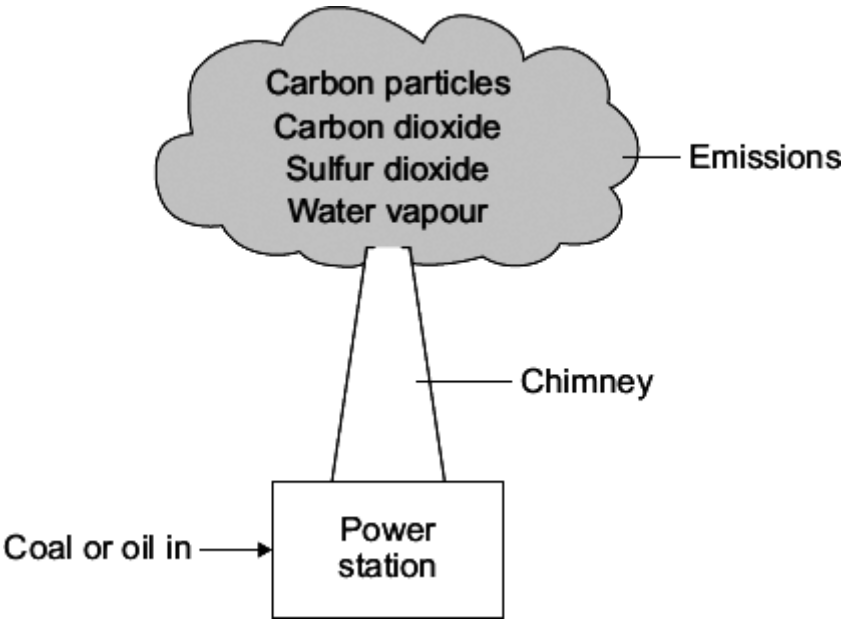
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(2)
(Total 6 marks)

Q5. In the future more coal-fired and fewer oil-fired power stations will be used to generate electricity.
When coal and oil are burned they produce the same types of emissions which can cause environmental problems.



(a) Emissions from the chimney can cause acid rain, global dimming and global warming. Draw **one** straight line from each possible environmental problem to the emission that causes it.

Possible environmental problem	**Emission that causes it**
acid rain	carbon particles
global warming	carbon dioxide
global dimming	sulfur dioxide
	water vapour

.....

(3)

(b) Draw a ring around the correct word in the box to complete each sentence.

(i) Incomplete combustion of coal or oil is caused by too little

carbon dioxide.
nitrogen.
oxygen.

(1)

(ii) A gas formed by the incomplete combustion of coal or oil is

carbon monoxide.
hydrogen.
oxygen.

(1)

(c) The table shows the world production for both coal and oil in 2000.

The world production figures after 2000 are predicted.

Year	**World production of coal (billions of tonnes per year)**	**World production of oil (billions of barrels per year)**
2000	3.5	12.5
2050	4.5	5.6
2100	5.0	1.7
2150	5.5	0.5
2200	6.0	0.0

(i) How is the world production of oil predicted to change from 2000 to 2200?

.....

.....

(1)

(ii) Suggest **two** reasons why the world production of coal is predicted to increase.

1 .....

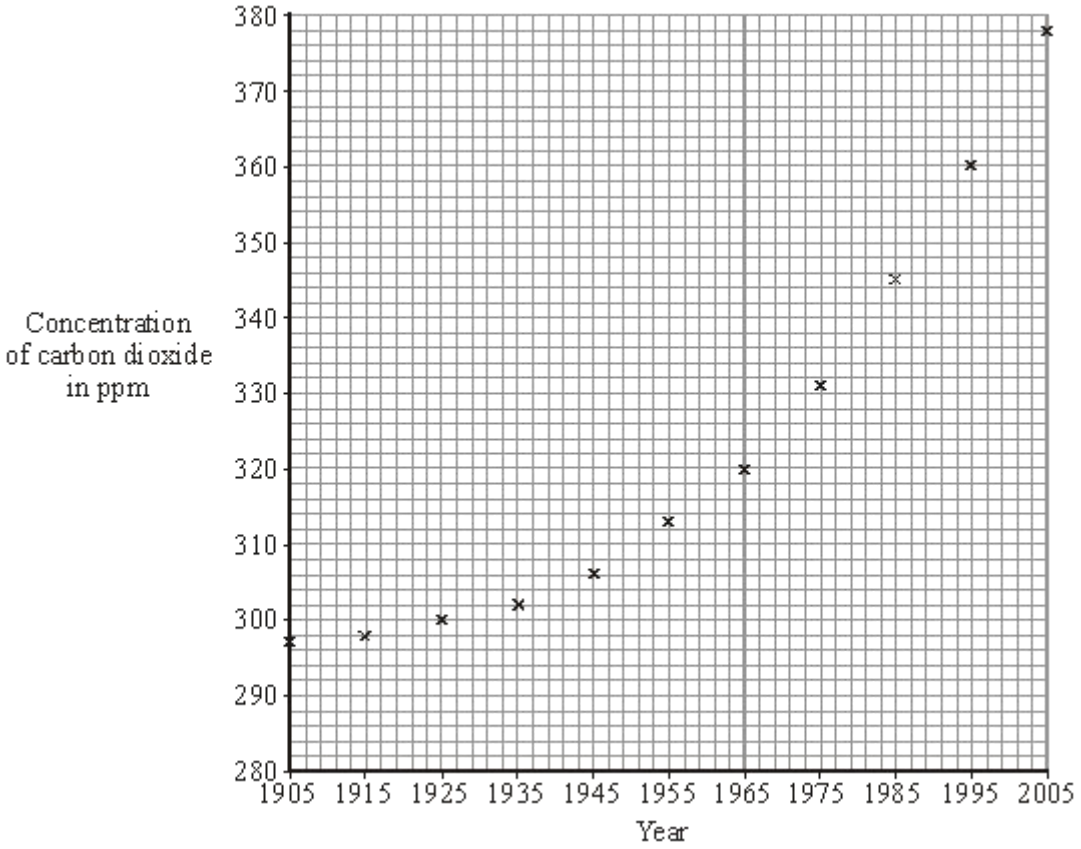
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2 .....

.....

(2)
(Total 8 marks)

Q6. Global warming is thought to be happening because of the increased burning of fossil fuels. The concentration of carbon dioxide in the air from 1905 to 2005 has been calculated.



(a) Draw a line of best fit for these points.

(1)

(b) (i) What was the concentration of carbon dioxide in 1955?

..... ppm

(1)

(ii) In what year did the concentration of carbon dioxide reach 350 ppm?

.....

(1)

(c) Use the graph to describe, in as much detail as you can, what happened to the concentration of carbon dioxide from 1905 to 2005.

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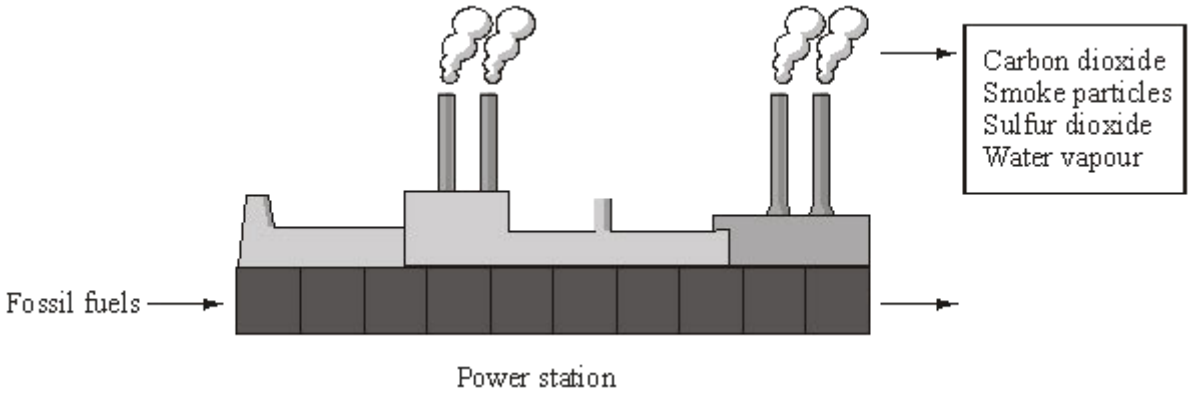
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(2)
(Total 5 marks)

Q7. Most electricity in the UK is generated in power stations that burn fossil fuels. The diagram lists some of the substances released into the air when fossil fuels are burned.



(a) (i) Which **one** of the substances released into the air causes acid rain?

.....

(1)

(ii) In the sentence below, draw a ring around the correct answer.

The type of environmental pollution caused by

smoke particle is	global dimming global warming rising sea levels

(1)

(iii) Suggest how the burning of fossil fuels may cause climate change.

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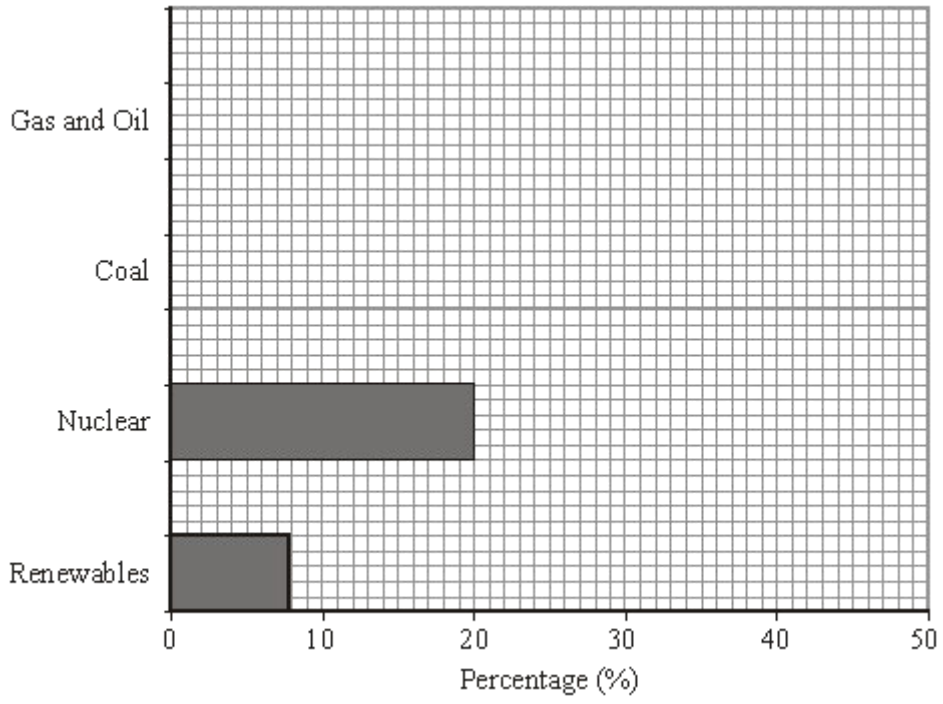
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(2)

(b) The table shows the percentage of electricity generated by different energy sources.

Energy sources	Renewables	Nuclear	Coal	Gas and Oil
Percentage (%)	8	20	32	40

Complete the bar chart to show the percentage of electricity generated by coal and by gas and oil.



(2)
(Total 6 marks)

Q8. Crude oil is a natural resource from which useful fuels can be separated.

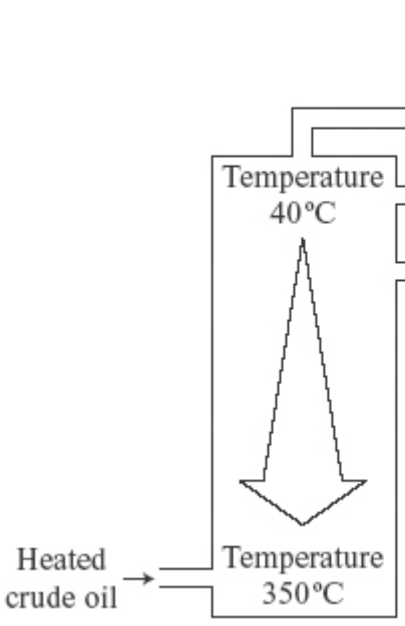
(a) Crude oil is a mixture of hydrocarbons.

Complete the sentence about a hydrocarbon molecule.

A hydrocarbon molecule is made up of ..... and carbon atoms only.

(1)

(b) Many fuels come from crude oil. Some of these fuels are shown in the diagram.



Fraction	Number of carbon atoms in each molecule
gases	1–4
petrol	5–12
diesel	15–25

Suggest **two** properties of these fuels that allow them to be separated from crude oil.

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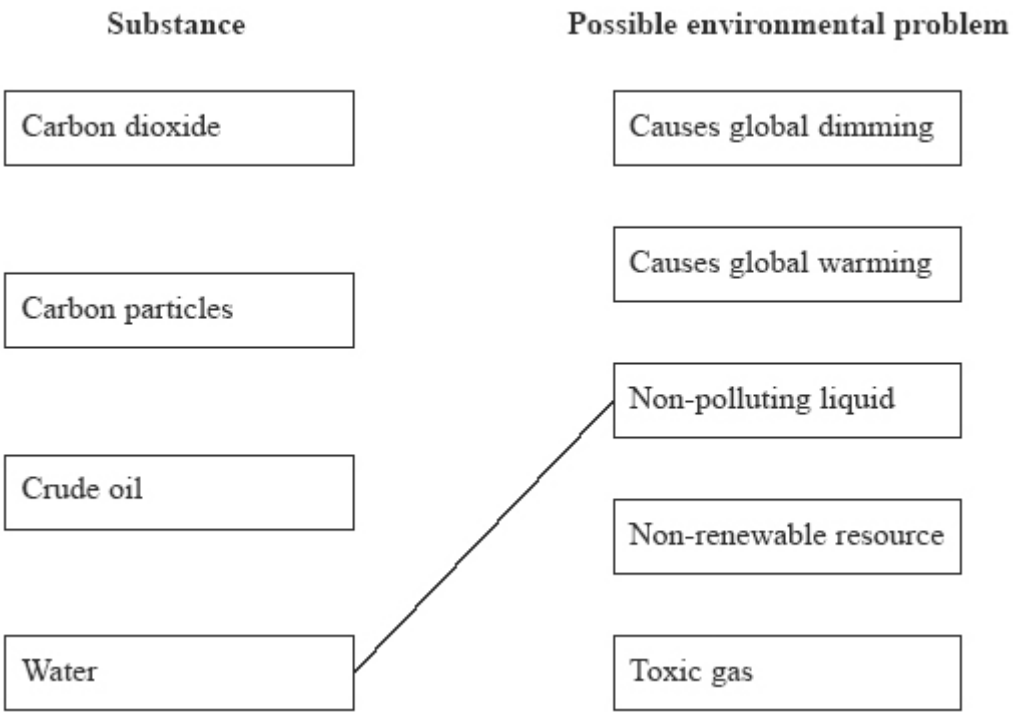
(2)

(c) Fuels from crude oil burn to provide heat energy.

When a fuel burns, it combines with oxygen in the air and produces carbon dioxide and water. When there is not enough oxygen, the fuel burns and also produces carbon monoxide and carbon particles.

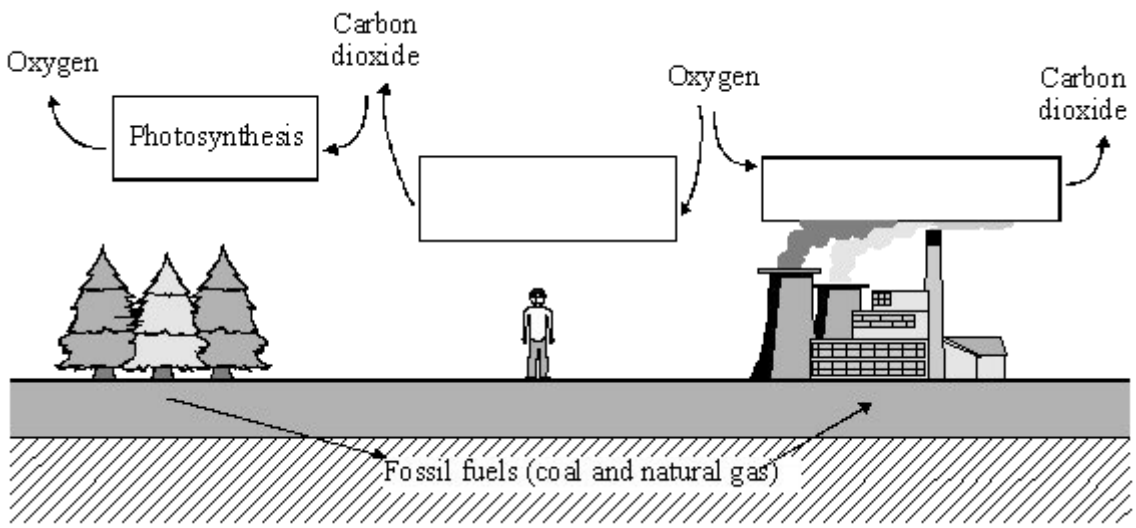
Draw a straight line from each substance that links it to a possible environmental problem.

One has been done for you.



(3)
(Total 6 marks)

Q9. In the carbon cycle the amounts of carbon dioxide and oxygen in the air are changed by several processes.



(a) The names of some processes are given in the box below.

combustion	decomposition	neutralisation
photosynthesis		respiration

Choose the correct process for each box in the diagram. The first one has been done for you.

(2)

(b) Fossil fuels, such as natural gas, react with oxygen.

$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

..... + oxygen → carbon dioxide + ...

Complete the word equation for this reaction

(2)

(c) What problem is caused by the formation of large amounts of carbon dioxide?

.....

.....

(1)

(Total 5 marks)