

Q1. Billions of years ago, the Earth's early atmosphere was probably like the atmosphere of Venus today.

The table shows the temperature and the percentage composition of the atmospheres of the Earth and Venus today.

Name of gas	Percentage (%) composition of atmosphere	
	Earth today	Venus today
Nitrogen	78	3.5
Oxygen	20.6	a trace
Argon	0.97	a trace
Carbon dioxide	0.03	96.5
Water vapour	0.4	a trace
Average surface temperature	20 °C	460 °C

(a) Use information from the table to help you to answer each part.

(i) In the Earth's atmosphere today, the main gas is (1)

(ii) In the Earth's atmosphere billions of years ago
the main gas was (1)

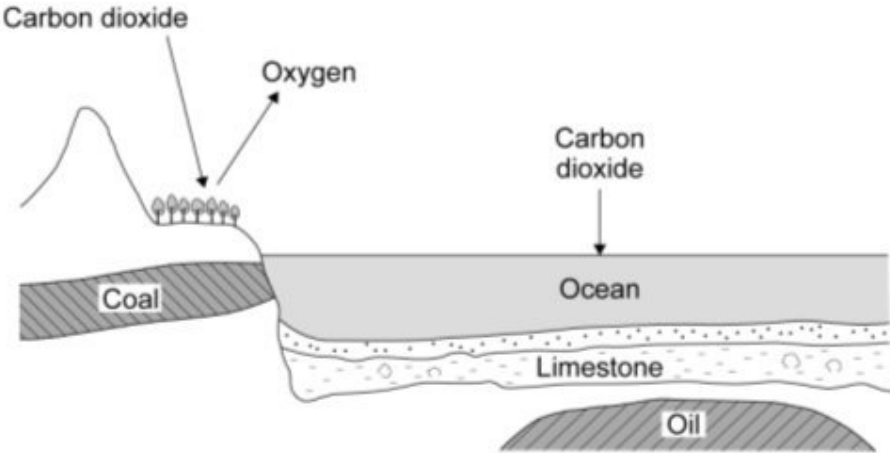
(iii) The Earth's surface is mainly covered with water.

There is no water on the surface of Venus.

Suggest why.

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(b) The diagram shows part of the Earth and ways that carbon dioxide can be removed from the Earth's atmosphere.



Give **three** ways that carbon dioxide can be removed from the Earth's atmosphere.

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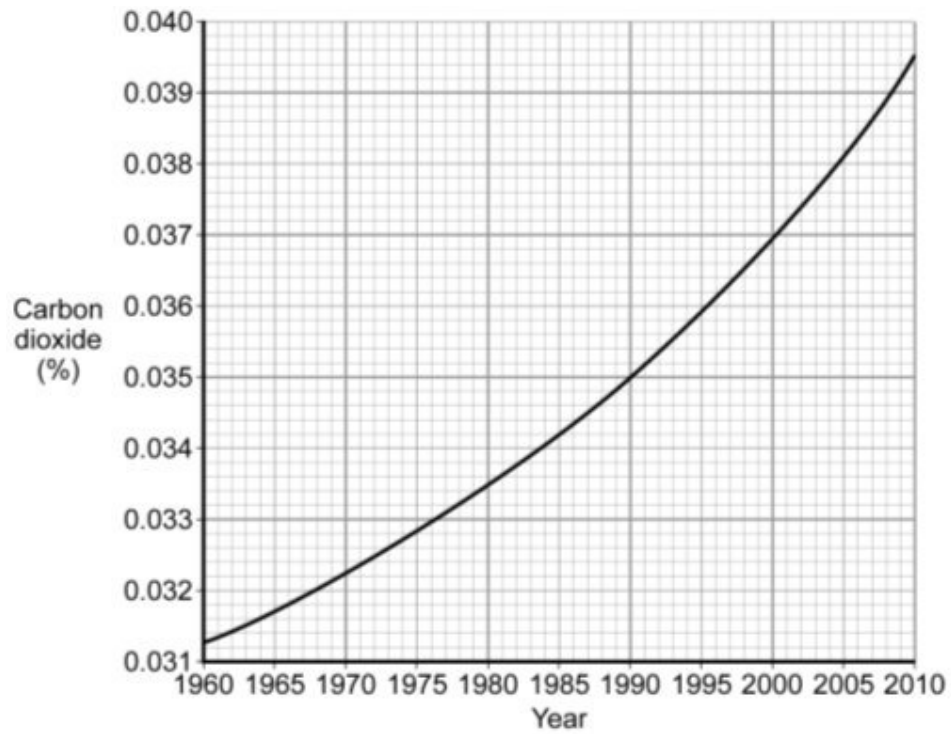
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(c) In the Earth's atmosphere the percentage of carbon dioxide has remained at about 0.03% for many thousands of years.

The graph shows the percentage of carbon dioxide in the Earth's atmosphere over the last 50 years.



(i) What was the percentage of carbon dioxide in the Earth's atmosphere in 1965?

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 %

(1)

(ii) What change has happened to the percentage of carbon dioxide in the Earth's atmosphere over the last 50 years?

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(1)

(iii) Suggest **one** reason for this change.

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(1)

(Total 10 marks)

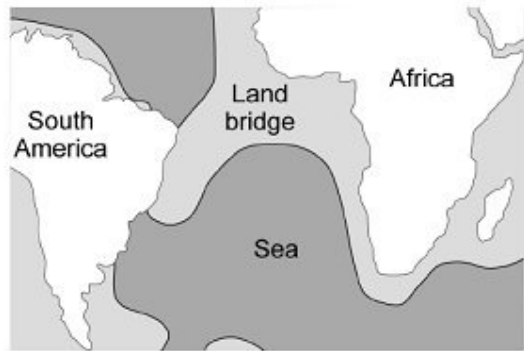
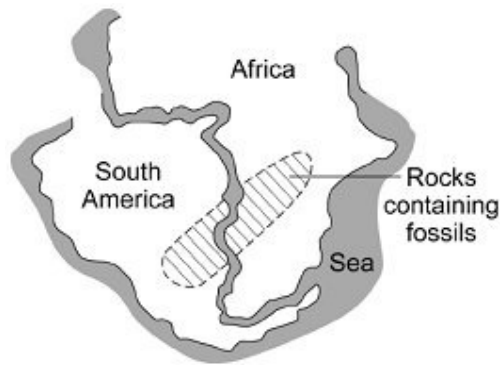
Q2. Evidence shows that the Earth formed from a molten ball of rocks and minerals.

Before 1900 many scientists thought that the Earth's mountains and continents formed in fixed positions when the molten ball of rocks and minerals cooled and wrinkled.

(a) In 1912 Alfred Wegener suggested his hypothesis of continental drift.

The areas of rocks shown on **Map 1** contain fossils of the same type of animals.

Today animals in Africa are different from animals in South America.



Map 1
Wegener suggested his hypothesis that all of the continents, including Africa and South America, had been joined together but then drifted slowly apart.

Map 2
In 1920 other scientists stated that all of the continents were in fixed positions, including Africa and South America, and that they had once been joined together by a land bridge.

(i) Use the information to suggest **two** pieces of evidence that may have led Wegener to propose his hypothesis that continents move.

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(2)

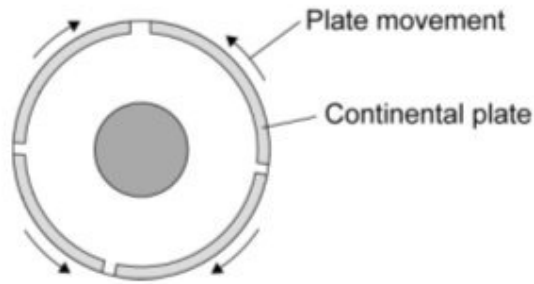
(ii) Suggest why, in 1920, other scientists thought that Wegener's hypothesis was wrong.

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(2)

(b) In 1962 scientists produced the theory of plate tectonics.

The theory of plate tectonics supported Wegener's hypothesis that continents move.



Tectonic plates move a few centimetres a year.

Complete the sentences about what causes the movement of the Earth's tectonic plates.

Deep inside the Earth processes release large amounts of energy. These processes heat up the substances in the Earth's producing convection currents.

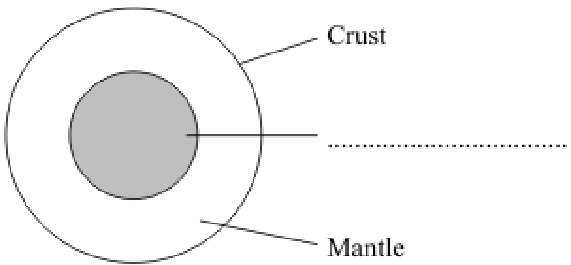
(2)
(Total 6 marks)

Q3. Earthquakes are common in certain places on Earth.

(a) The diagram shows the layered structure of the Earth.

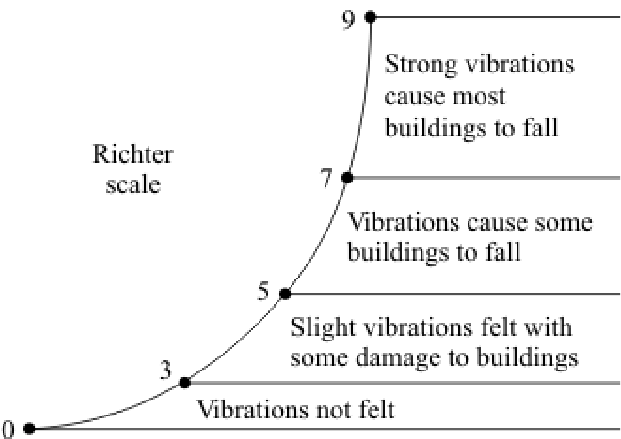
Choose one word from the box to complete the label on the diagram.

atmosphere	core	plate
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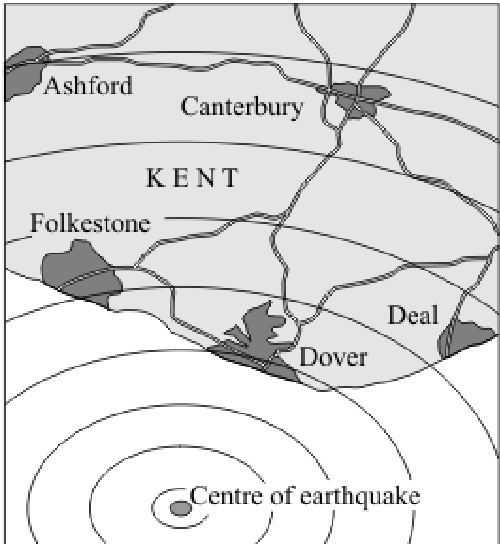


(1)

(b) In 1935 C.F. Richter designed a scale for comparing the size of earthquakes.



A newspaper reported that an earthquake off the coast of Kent had caused plaster to come down from ceilings, house tiles to loosen and church bells to ring.



(i) Earthquakes happen often in the UK.

Suggest why most of these earthquakes are **not** reported in the newspapers.

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(1)

(ii) Draw a ring around the number which best shows the size of the earthquake in Kent.

1 4 6 8

(1)

(iii) State what causes earthquakes.

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(1)

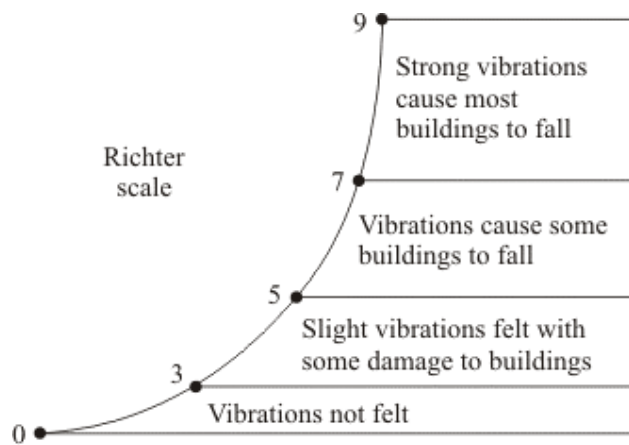
(iv) Why were people living in Kent **not** warned about this earthquake?

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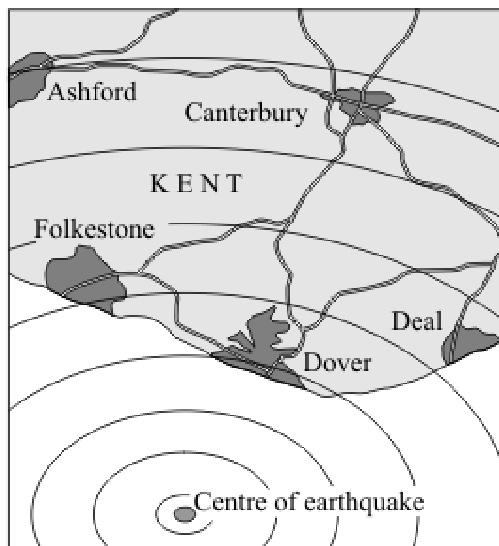
(1)

(Total 5 marks)

Q4. In 1935 C.F. Richter designed a scale for comparing the size of earthquakes.



A newspaper reported that an earthquake off the coast of Kent had caused plaster to come down from ceilings, house tiles to loosen and church bells to ring.



The epicentre is the place on the surface of the Earth directly above where the earthquake occurs.

- (a) Suggest why the earthquake in Kent was reported and why most earthquakes in the UK are **not** reported.

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(2)

(b) Explain how earthquakes are caused.

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(3)

(c) People living in Kent were not warned about this earthquake.

In terms of what is happening within the Earth, explain the problems of trying to predict earthquakes.

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(2)

(Total 7 marks)

Q5. Billions of years ago, the Earth's early atmosphere was probably like the atmosphere of Venus today.

The table shows a comparison of the atmospheres of the Earth and Venus today.

Name of gas	Percentage composition of atmosphere	
	Earth today	Venus today
Nitrogen	78	3.5
Oxygen	21	a trace

Argon	0.97	a trace
Carbon dioxide	0.03	96.5
Average surface temperature	20 °C	460 °C

(a) Use the names of gases from the table to complete the sentences.

(i) In the Earth's atmosphere today, the main gas is
..... (1)

(ii) In the Earth's atmosphere billions of years ago, the main gas was
..... (1)

(b) (i) Scientists do **not** know the accurate composition of the Earth's early atmosphere.
Suggest why.

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..... (1)

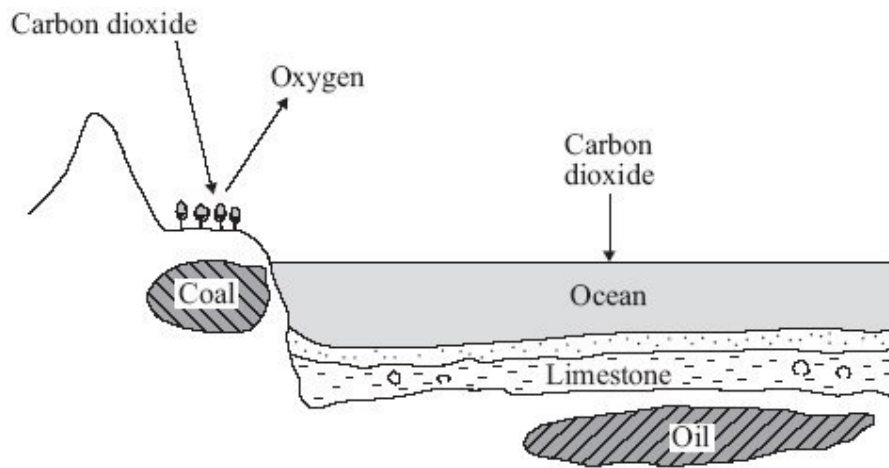
(ii) Use information from the table to answer this question.

Water vapour is present in the atmospheres of the Earth and Venus today.
The Earth's surface is mainly covered by water.

Suggest why there is no water on the surface of Venus.

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..... (1)

(c) The diagram shows how carbon dioxide is removed from the Earth's atmosphere.



Describe what happened to the carbon dioxide in the Earth's early atmosphere. Use the diagram to help you.

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(3)
(Total 7 marks)

Q6. There are many ideas about the formation of the Earth and its atmosphere from a molten ball of rock and minerals.

- (a) One idea is that the Earth's early atmosphere and average surface temperature were probably like that of Venus today.

The table shows information about the Earth and Venus today.

Name of gas	Percentage composition of atmosphere	
	Earth today	Venus today
Nitrogen	78	3.5
Oxygen	21	a trace

Argon	0.97	a trace
Carbon dioxide	0.03	96.5
Average surface temperature	20 °C	460 °C

There is a variable amount of water vapour in both atmospheres.

- (i) How was the Earth's early atmosphere formed?

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(1)

- (ii) The Earth's average surface temperature decreased over time. At what temperature would oceans have started to form?

Temperature = °C

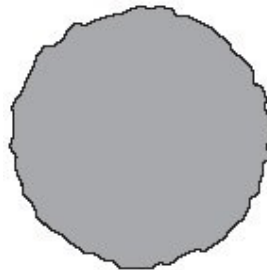
(1)

- (iii) Describe how the evolution of plants changed the Earth's atmosphere.

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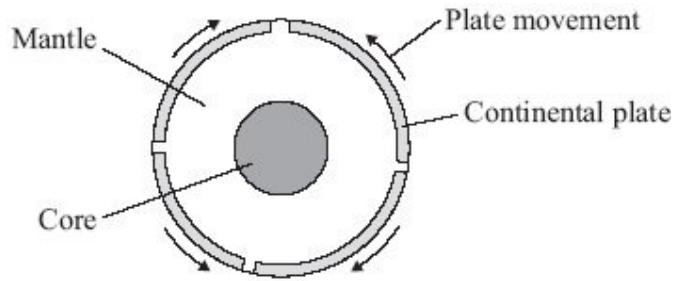
(2)

- (b) Another idea was that the Earth's mountains and continents formed in fixed positions as the molten ball of rock and minerals cooled and wrinkled.



Wegener, in 1915, had the idea that the Earth's crust and the upper part of the mantle

had cracked into plates that were able to move. His idea meant that the mountains and continents were not in fixed positions.



(i) Give **one** piece of evidence that led to Wegener's idea being accepted.

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(1)

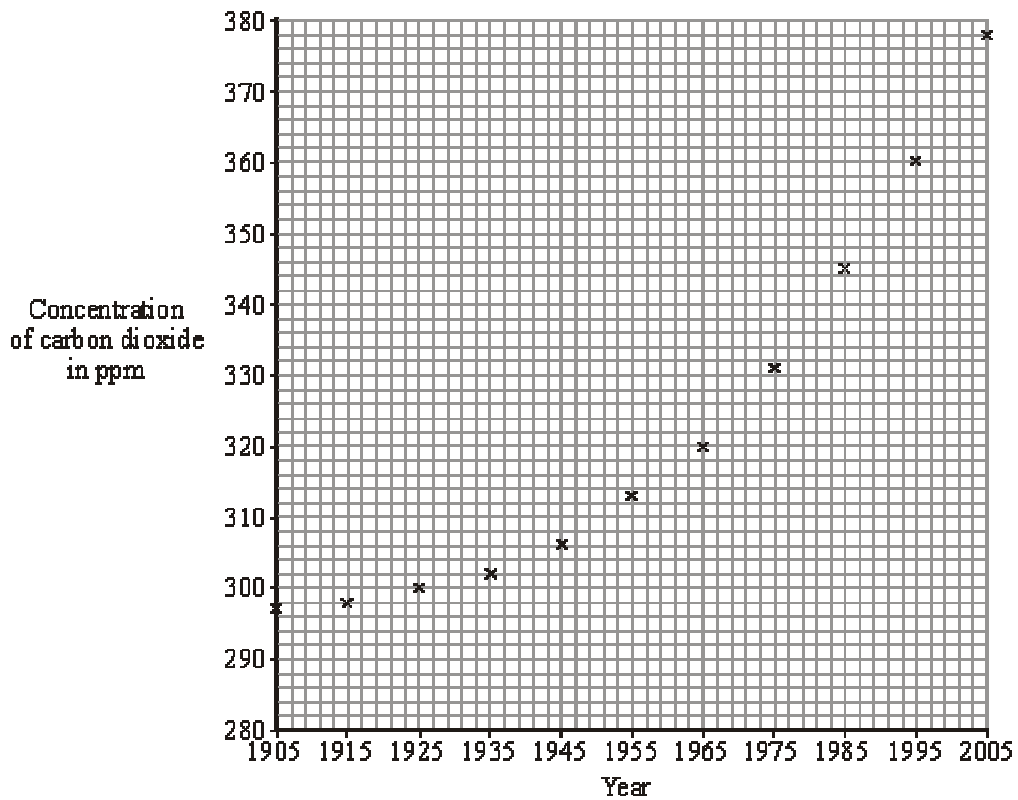
(ii) Describe what causes the Earth's tectonic plates to move.

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(3)

(Total 8 marks)

Q7. 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)

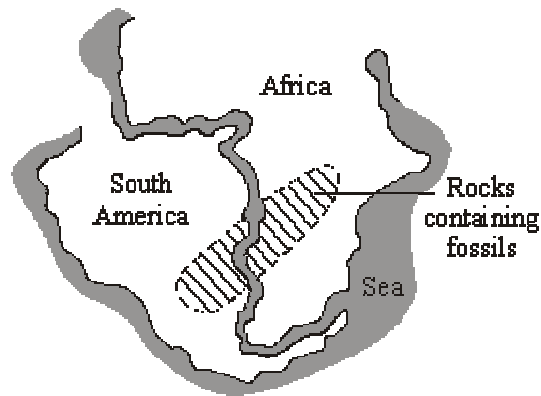
(ii) In what year did the concentration of carbon dioxide reach 350 ppm?
 (1)

(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.

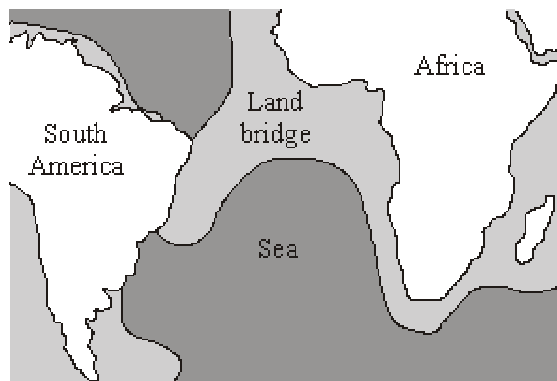
(2)
(Total 5 marks)

Q8. A map of the world shows that the outline of South America looks as if it would fit into the west coast of Africa.

- Alfred Wegener in 1920 suggested his idea that the continents had been joined together but then slowly drifted apart.



- Other scientists in 1920 said that the continents were fixed on solid Earth and had been joined by a land bridge.



Modern South American animals are different from modern African animals.

Most fossils of animals found in South America and Africa are exactly the same.

(a) Consider the information above.

- (i) What evidence gave Wegener the idea that the continents of South America and Africa had been joined?

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(1)

(ii) Suggest **two** reasons why the other scientists in 1920 thought that Wegener was wrong.

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(2)

(b) Complete the sentences by writing in the correct words.

Recent evidence has supported Wegener's idea.

The Earth's and the upper part of the mantle are now thought to be composed of tectonic plates.

Heat released by radioactive processes causes convection currents within the Earth's These convection currents cause the plates to move a few centimetres per

(3)

(Total 6 marks)

Q9. A headline from 27 December 2004 read:

'MASSIVE EARTHQUAKE CAUSES TSUNAMI'

The earthquake happened at a plate boundary under the sea. This produced a huge wave called a tsunami. The wave travelled quickly across the Indian Ocean. The tsunami destroyed homes on many islands and on the east coast of India.

- (a) Use words from the box to complete the sentences about earthquakes.

convection	radioactive	tectonic	volcanic
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The earthquake was caused by the movement of two of the Earth's
..... plates.

The energy for this movement comes from the heat released by natural
..... processes.

(2)

- (b) It was estimated that 300 000 people died as a result of the tsunami in 2004.

Some newspapers criticised scientists for not predicting the tsunami, because if people had been warned they could have moved to safety.

- (i) Suggest why we can only estimate that 300 000 people died as a result of the tsunami.

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(2)

(ii) Explain why scientists could not have predicted the tsunami.

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(2)

(Total 6 marks)

Q10. Scientists study the atmosphere on planets and moons in the Solar System to understand how the Earth's atmosphere has changed.

(a) Millions of years ago the Earth's atmosphere was probably just like that of Mars today.

The table shows data about the atmospheres of Mars and Earth as they are now.

Mars		Earth	
nitrogen	3%	nitrogen	78%
oxygen	trace	oxygen	21%
water	trace	water	trace
carbon dioxide	95%	carbon dioxide	trace
Average surface temperature $-23\text{ }^{\circ}\text{C}$		Average surface temperature $15\text{ }^{\circ}\text{C}$	

Suggest what has caused the main gases in the Earth's atmosphere of millions of years ago to change to the present-day atmosphere.

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(2)

- (b) Titan is the largest moon of the planet Saturn. It has an atmosphere that, like the Earth's, contains mainly nitrogen. Methane is the other main gas.

Main gases in Titan's atmosphere	Percentage (%)	Boiling point in °C
Nitrogen	95	-196
Methane	5	-164
Average surface temperature -178 °C		

When it rains on Titan, it rains methane! Explain why.

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(2)

- (c) Ultraviolet radiation from the Sun produces simple alkenes, such as ethene and propene, from methane in Titan's atmosphere.

(i) Draw the structure of propene, C_3H_6 , to show the covalent bonds.

(1)

(ii) Explain how propene molecules form a polymer. You should name the polymer formed.

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(3)
(Total 8 marks)

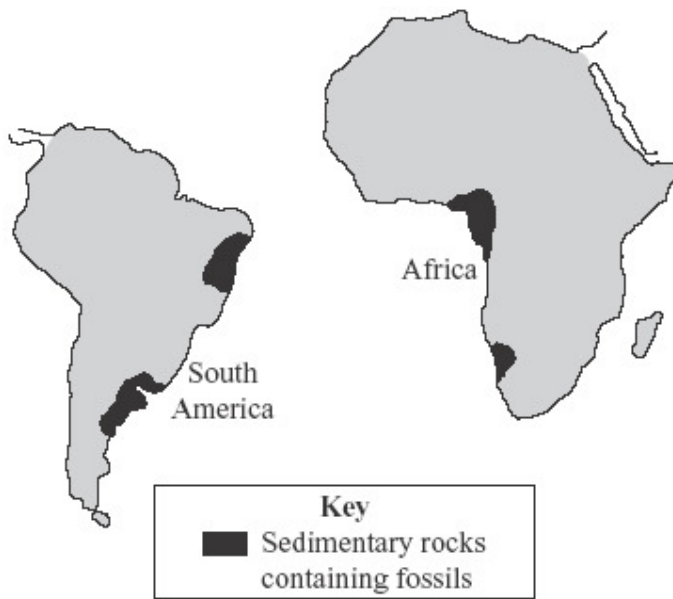
Q11. (a) Two hundred years ago, scientists thought that the Earth was about 400 million years old. This estimate came from the idea that the centre of the Earth was still molten. More recently, measurement of radioactivity in rocks has shown that the Earth is much older than 400 million years.

Suggest **one** reason why scientists now know that the Earth is much older than 400 million years.

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(1)

(b) About one hundred years ago there was a scientist called Alfred Wegener. He found evidence that the continents, such as South America and Africa, had once been joined and then drifted apart.



Use the diagram to suggest **two** pieces of evidence that could be used to show that the continents had once been joined.

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- 2
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(2)

(c) About fifty years ago, new evidence convinced scientists that the Earth's crust is made up of tectonic plates that are moving very slowly.

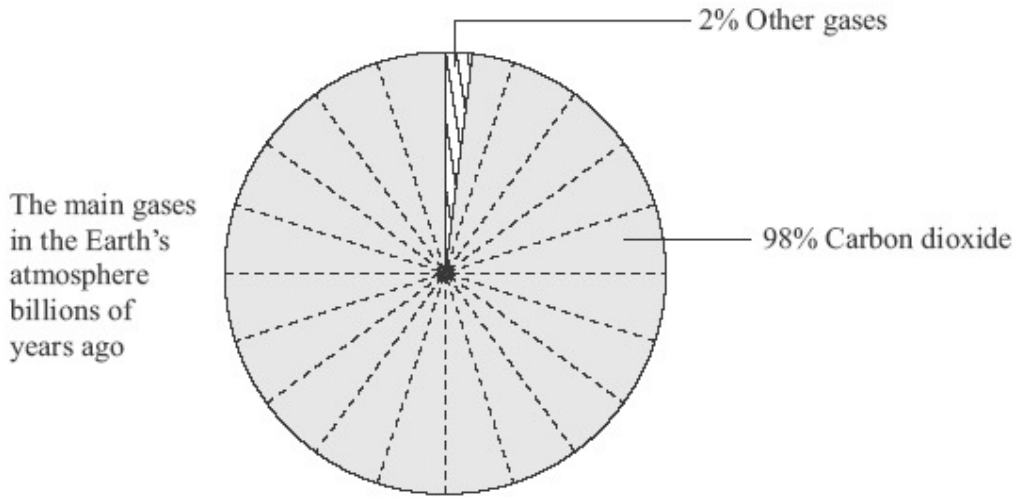
Give **two** pieces of evidence that have helped to convince these scientists that the tectonic plates are moving.

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-
- 2
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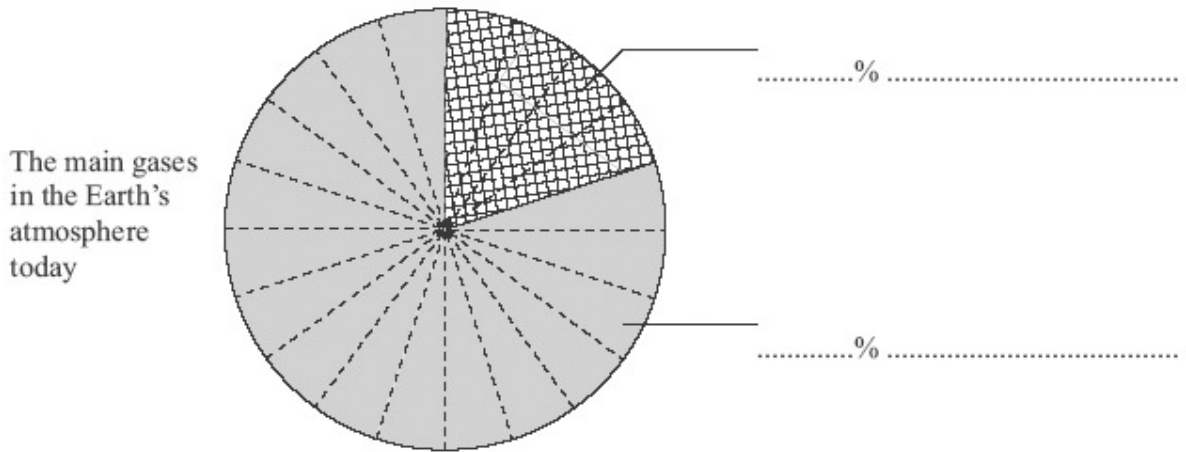
(2)

(Total 5 marks)

Q12. Life on Earth would not exist without the atmosphere. Billions of years ago the composition of the Earth's atmosphere was very different from the composition today.



(a) Label the pie chart below to show the percentages and names of the two main gases in the Earth's atmosphere today.



(2)

(b) There is evidence that the composition of the Earth's atmosphere is still changing. One possible reason is that many power stations generate electricity by burning fossil fuels such as coal, oil or natural gas. Sulfur dioxide, SO₂, is produced when coal burns in air.

(i) What environmental problem does sulfur dioxide cause?

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(1)

(ii) How could this environmental problem be reduced in coal-fired power stations?

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(1)

(iii) Gas-fired power stations burn methane, CH₄, in air.

Complete the word equation for this reaction.

methane + → carbon dioxide +

(2)

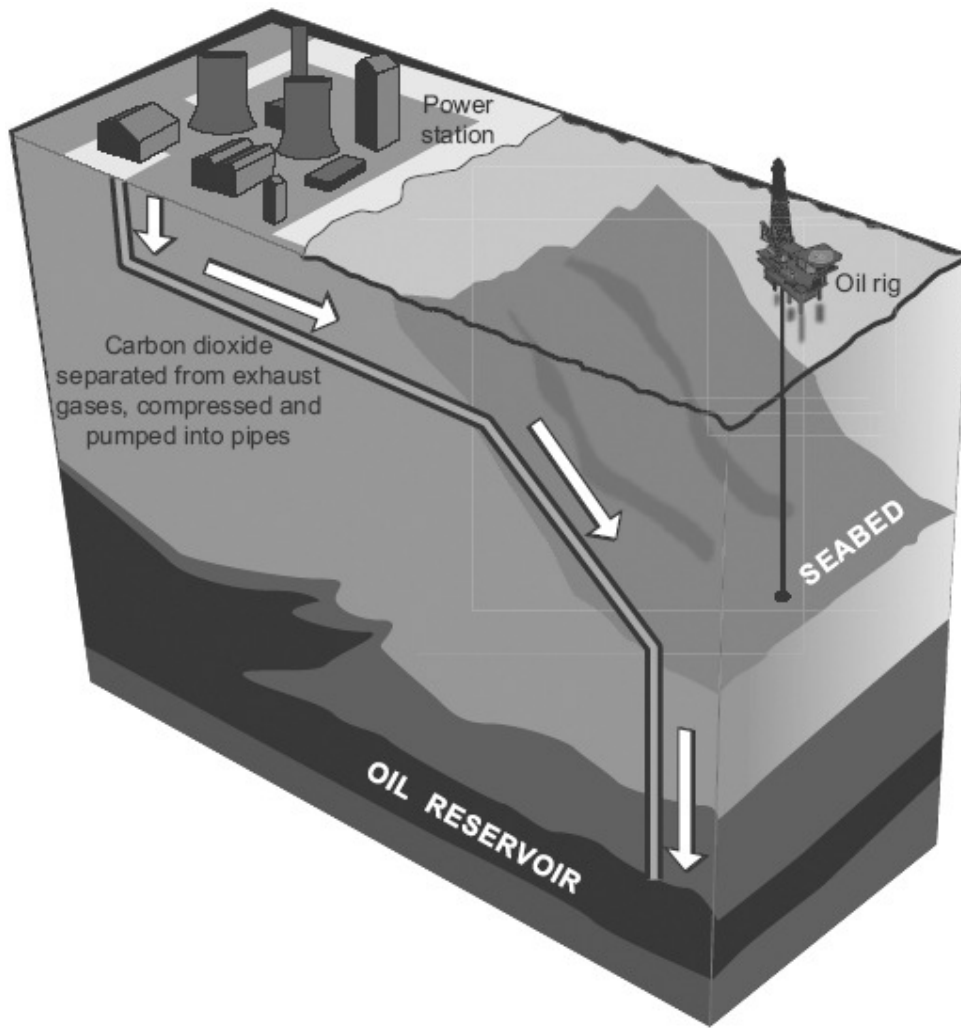
(c) Excess carbon dioxide should be prevented from entering the atmosphere.

Explain why.

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(2)

(d) Carbon dioxide is produced when fossil fuels burn in power stations. The diagram represents one idea to prevent excess carbon dioxide from entering the atmosphere.



Use the diagram to explain how carbon dioxide can be prevented from entering the atmosphere.

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(2)
(Total 10 marks)

Q13. The Earth is shaped like a ball and is surrounded by an atmosphere.

(a) The diagram shows the layered structure of the Earth.

(ii) Use the bar charts to complete the sentence by writing in the correct number.

These theories suggest that there was about % nitrogen in the Earth's early atmosphere.

(1)

(iii) The atmosphere of the Earth today has much more nitrogen than in the early atmosphere. Denitrifying bacteria released most of this nitrogen into the atmosphere.

There are other differences between the Earth's early atmosphere and the atmosphere of the Earth today.

Use the bar charts to describe and explain **two** of these other differences.

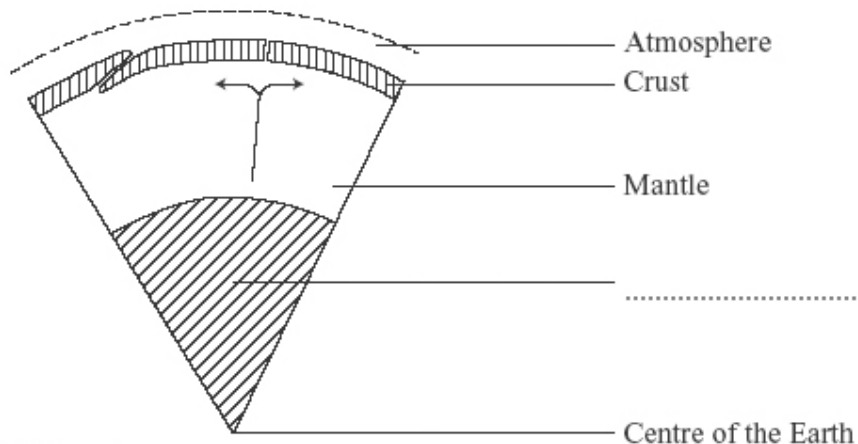
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(3)

(Total 8 marks)

Q14. The Earth is shaped like a sphere and is surrounded by an atmosphere.

(a) The diagram shows a section of the layered structure of the Earth.



Not to scale

(i) Complete the diagram by writing in the missing label. (1)

(ii) Earthquakes within the Earth's crust can be sudden and disastrous. Scientists cannot accurately predict when earthquakes will occur.

Explain why.

To obtain full marks you must support your answer with a description of what causes earthquakes.

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(4)

(b) Some theories suggest that the Earth's early atmosphere was like the atmosphere of Mars today.

Gases	The atmosphere of Mars today	The atmosphere of Earth today
Carbon dioxide %	95	0.03
Nitrogen %	3	
Argon %	1.5	0.97
Oxygen %	0.5	21

(i) Complete the table by writing in the percentage of nitrogen in the atmosphere of Earth today.

- (ii) Use the information in the table to describe the changes that have happened to **two** of the gases in the Earth's atmosphere.

Explain what has caused these changes.

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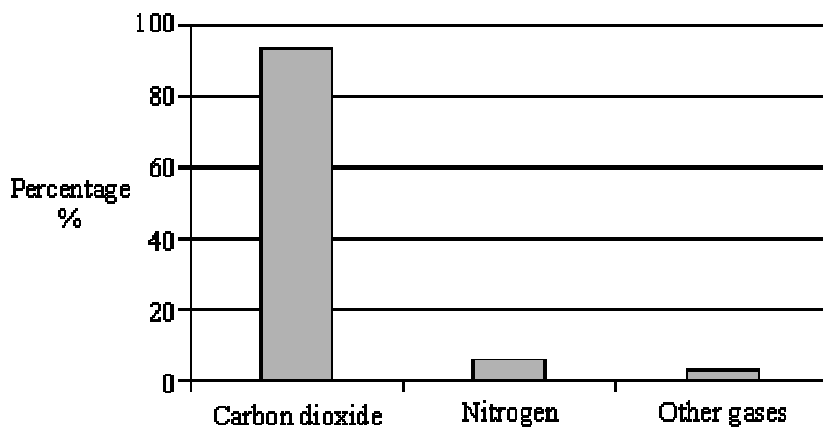
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(4)
(Total 10 marks)

Q15. The bar chart shows the percentage composition of the atmosphere on Mars.



- (a) State **three** ways in which the atmosphere on Earth today is different from that on Mars.

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(3)

- (b) The atmosphere on Earth may once have been like that on Mars. The evolution of green plants has changed the atmosphere on Earth.

Explain why.

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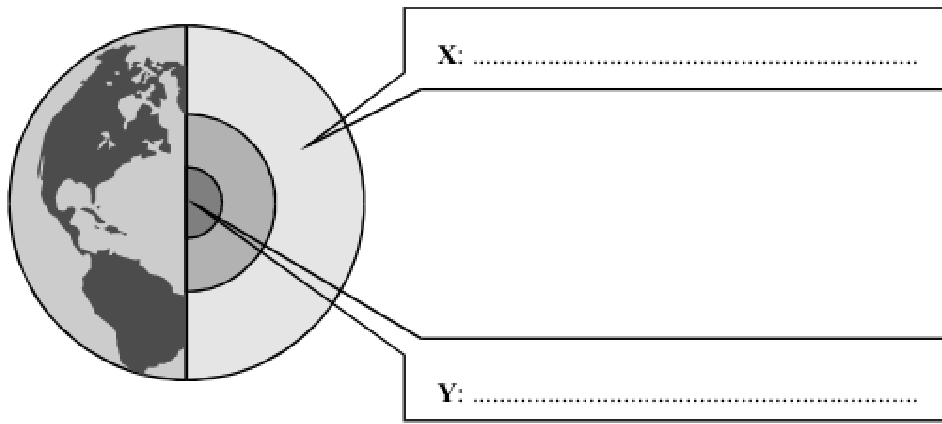
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(2)
(Total 5 marks)

- Q16.** (a) The diagram shows the layered structure of the Earth.



(i) Write in the boxes the name of layer **X** and the name of layer **Y**. (2)

(ii) The overall density of the Earth is about 5500 kg/m^3 . The average density of the rocks in the Earth's crust is about 2800 kg/m^3 . What does this suggest about the material that makes up the lower layers of the Earth?

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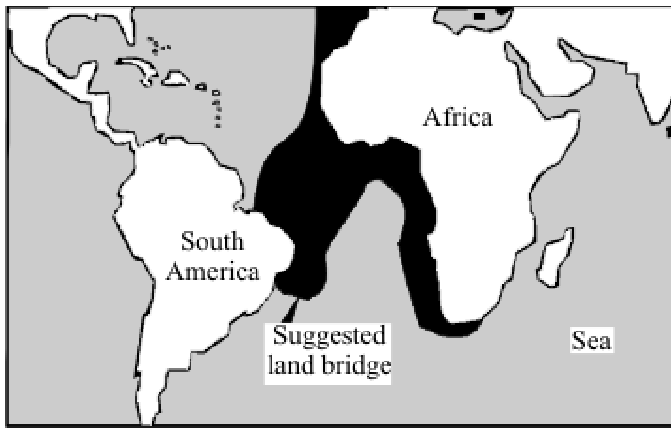
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(2)

(b) In 1915, the scientist Alfred Wegener suggested that Africa and South America had once been joined but had since drifted apart. Evidence for his theory came from the animal fossils found in the two continents. The fossils are almost the same, although animals now living in Africa and South America are different. Other scientists did not agree with Wegener and suggested that a land bridge had once joined the two continents.



How could scientists use the idea of a land bridge to explain the evidence put forward by Wegener?

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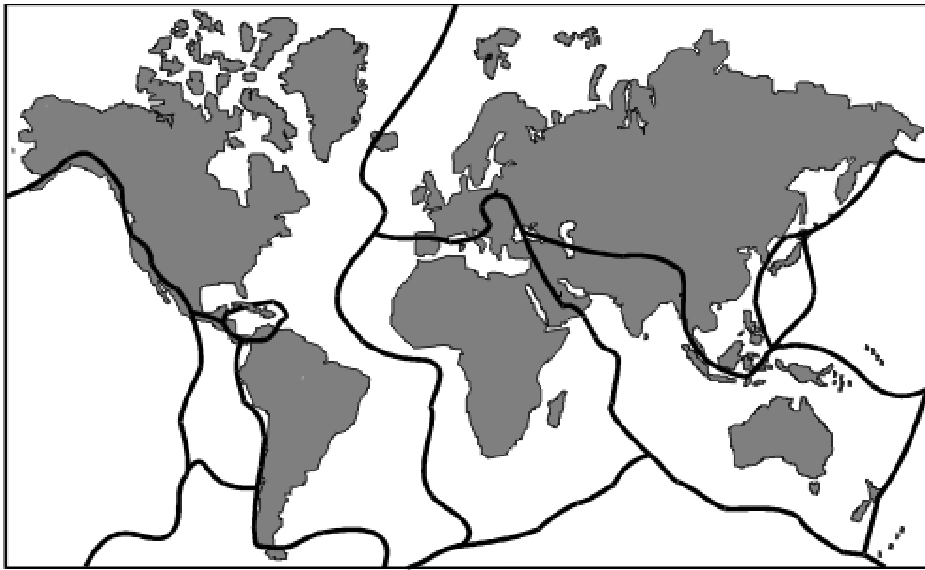
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(2)

- (c) Scientists now think that the outer layer of the Earth is cracked into a number of large pieces called tectonic plates. The tectonic plates are moving very slowly. The lines on the diagram show the boundaries between the major tectonic plates.



(i) Explain why there are no major earthquakes in Britain.

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(2)

(ii) What is causing the tectonic plates to move?

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(1)

(Total 9 marks)

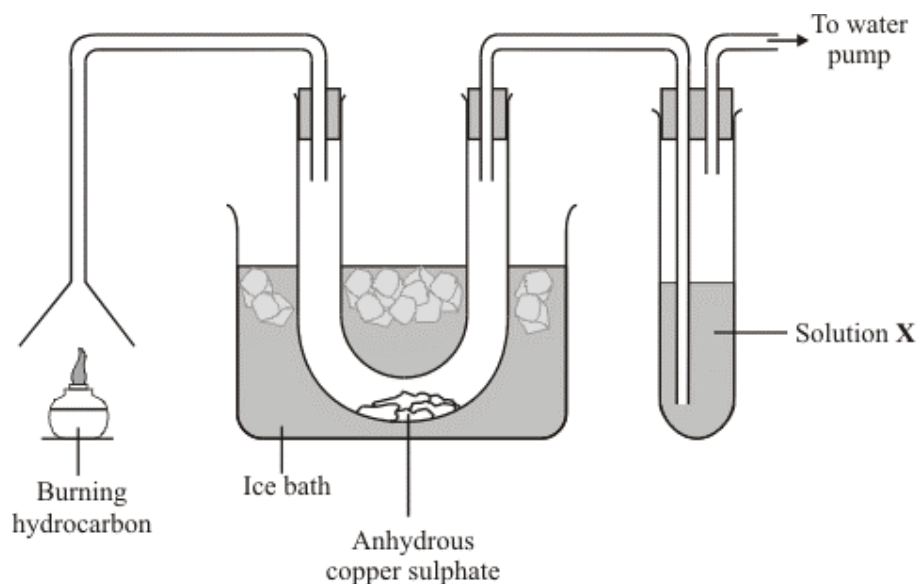
Q17. Petrol is a hydrocarbon fuel.

(a) Complete this sentence.

Hydrocarbons are compounds which are made from the elements
and only.

(2)

(b) This apparatus was used to study the combustion of a hydrocarbon fuel.



(i) Name the substance which changed the anhydrous copper sulphate from white to blue.

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(1)

(ii) Carbon dioxide is also produced when the hydrocarbon fuel is burned. Name the solution, labelled X on the diagram, which tests for carbon dioxide.

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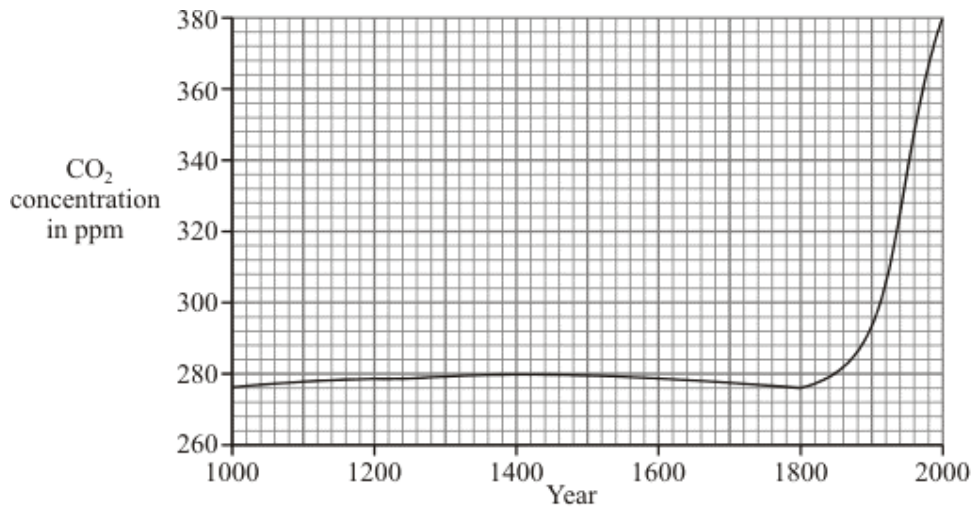
(1)

(iii) Complete this sentence.

Carbon dioxide turns solution X

(1)

- (c) The graph shows how the concentration of carbon dioxide in the air has varied since the year 1000.



- (i) Describe the changes in the concentration of carbon dioxide in the air since the year 1000.

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(3)

- (ii) Suggest why the concentration of carbon dioxide in the air has changed since the year 1800.

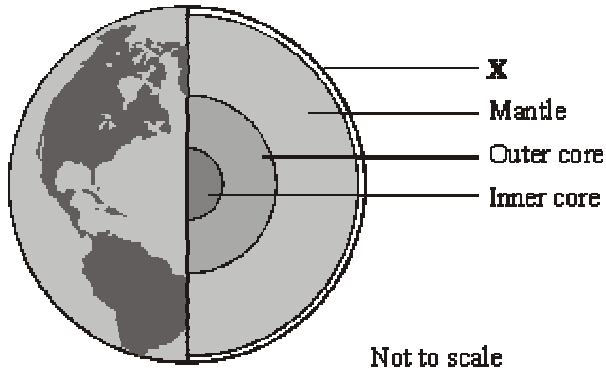
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(1)

(Total 9 marks)

Q18. (a) The diagram gives information about some of the layers that make up the Earth.



(i) What name is given to the outer layer of the Earth labelled **X**?

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(1)

(ii) What is the difference between the inner core and the outer core?

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(2)

(b) Which of the following is used to detect the waves produced by an earthquake?

Draw a ring around your answer.

barograph

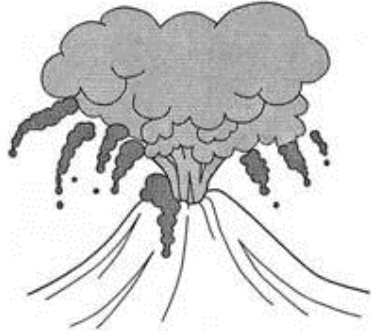
seismograph

tachograph

(1)

(Total 4 marks)

- Q19.** (a) During the first billion years of the Earth's existence, there were many active volcanoes. The volcanoes released the gases that formed the early atmosphere.



Describe how volcanoes caused the oceans to be formed.

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(2)

- (b) The atmosphere on Earth today is very different from the early atmosphere.

The pie chart shows the amounts of different gases in the air today. Choose gases from the box to label the pie chart.

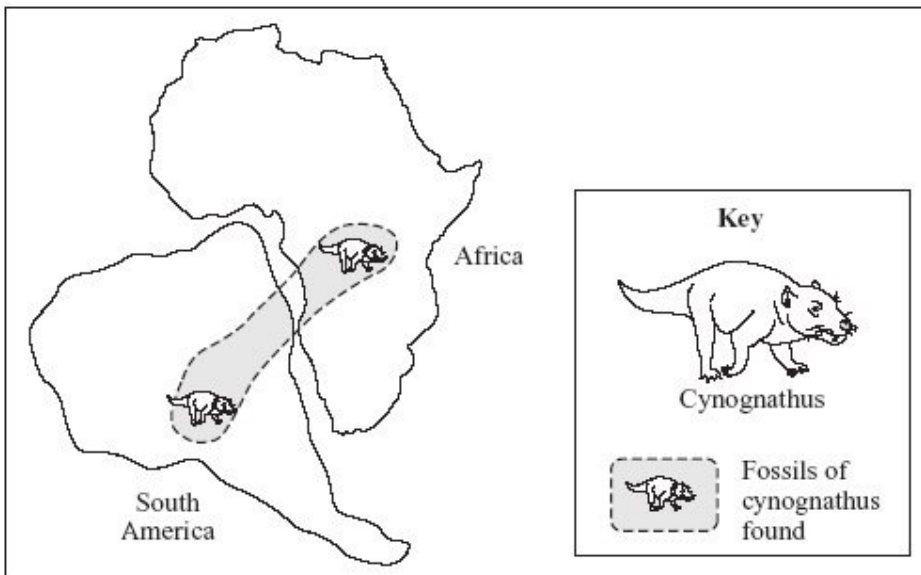
argon	carbon dioxide	hydrogen	nitrogen	oxygen
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1

2

(2)
(Total 6 marks)

Q21. (a) Scientists think that South America and Africa were once joined together. The diagram gives evidence for this idea.



Which **two** of the following statements give evidence that Africa and South America were once joined together?

Tick (✓) the box next to each of your choices.

There are active volcanoes in Africa and South America.

Fossils of cynognathus are found in Africa and South America.

The shapes of the west coast of Africa and the east coast of South America almost fit together.

There are deserts in Africa and South America.

Earthquakes occur in Africa and South America.

(2)

- (b) Complete these sentences by choosing the correct words from the box. Each word may be used once or not at all.

continental	crust	earthquake	evolution
mantle	mountain	tectonic	

The theory of drift can explain how Africa and South America

moved apart and why both have mountain ranges. Many scientists did not agree with the

theory. They thought that mountains were formed because the Earth had cooled down,

making the shrink. Many years later other scientists found that the

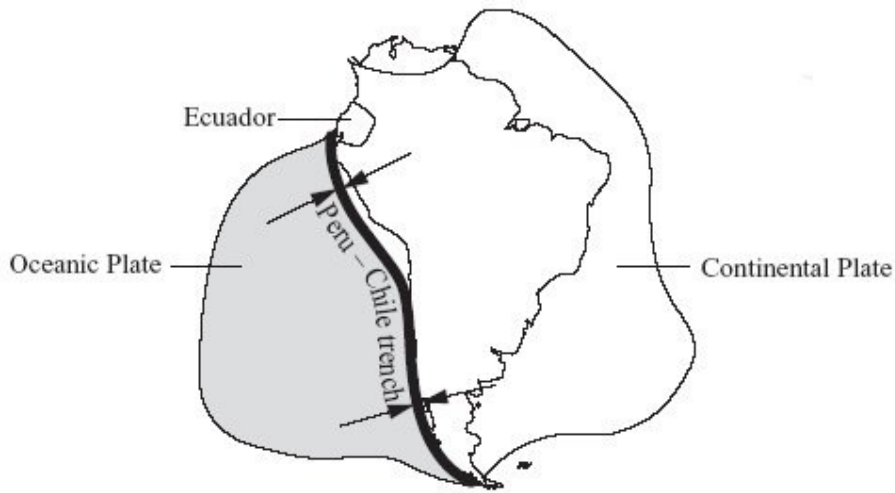
Earth's lithosphere was broken into a number of large pieces. These pieces, called

..... plates, are moving apart very slowly.

(3)

(Total 5 marks)

- Q22.** The Peru-Chile trench runs down the west coast of South America. It is the boundary between two tectonic plates that are slowly moving towards each other.



Source: Witney, Drozdowska and Maile, *AQA GCSE Physics* (Hodder & Stoughton) 2002.
Adapted and reproduced by permission of Hodder & Stoughton.

Explain what causes the tectonic plates to move.

.....

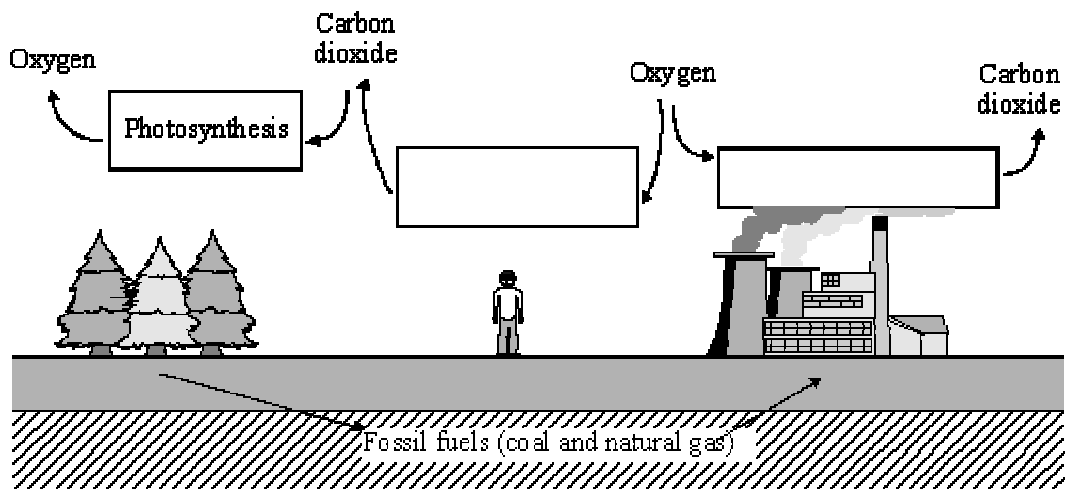
.....

.....

.....

(Total 2 marks)

Q23. In the carbon cycle the amounts of carbon dioxide and oxygen in the air are changed by several processes.



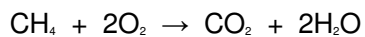
(a) The names of some processes are given in the box below.

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.



..... + oxygen → carbon dioxide +

Complete the word equation for this reaction

(2)

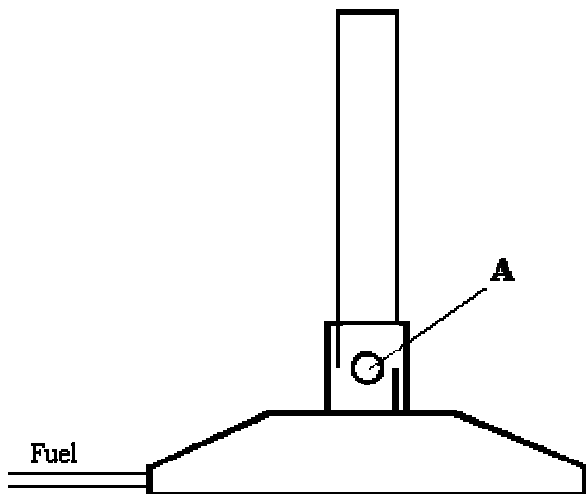
(c) What problem is caused by the formation of large amounts of carbon dioxide?

.....

(1)

(Total 5 marks)

Q24. The diagram below shows a bunsen burner.



Use words from the list to complete the passage about the Bunsen burner. You may use each word once, more than once or not at all.

- | | |
|-------------------|-------------------|
| air | methane |
| argon | mechanical energy |
| carbon dioxide | nitrogen |
| chemical | physical |
| electrical energy | potential energy |
| heat | oxygen |
| kinetic energy | water vapour |

In the Bunsen burner the fuel is mixed with
which enters through the hole labelled A.

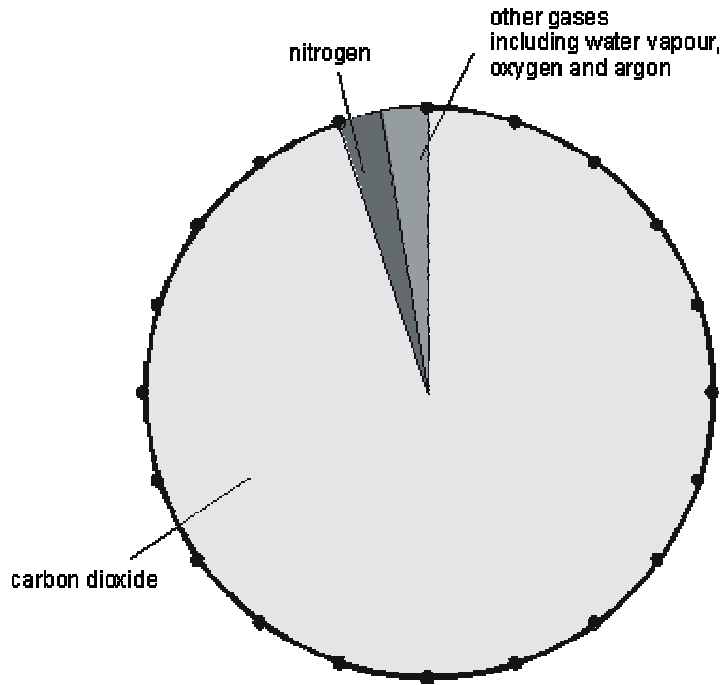
When the fuel burns it reacts with the gas called
and energy is given out as

The fuel used in the Bunsen burner contains carbon and hydrogen which are changed during burning into and

Burning is an example of a change because new substances are formed.

(Total 6 marks)

Q25. The pie chart below shows the composition of the atmosphere on the planet Mars.



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

.....
.....
..... %

(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.
.....

2.
.....

(2)

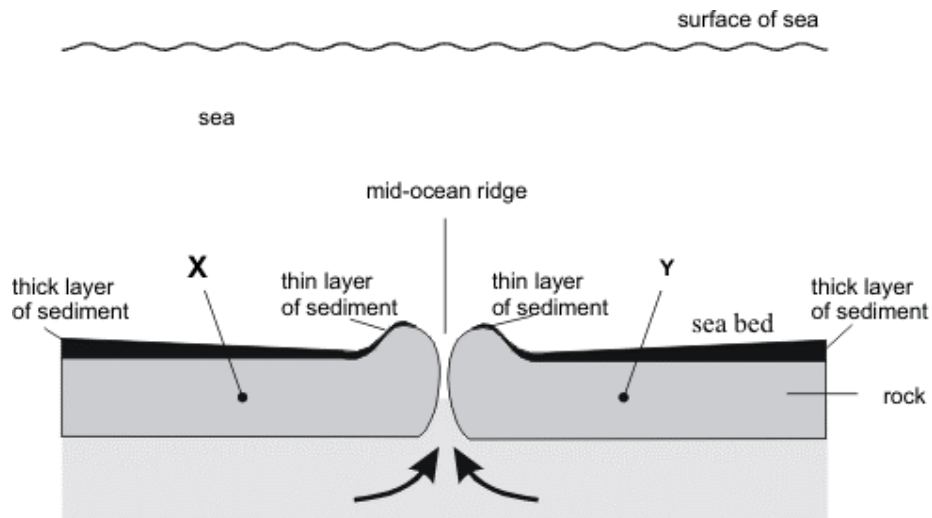
(c) When the Earth was formed its atmosphere is thought to have been similar to the atmosphere on Mars. Explain how green plants and other organisms have changed the composition of the Earth's atmosphere.

.....
.....
.....
.....
.....
.....
.....
.....

(4)

(Total 8 marks)

Q26. The diagram below shows a cross-section of a mid-ocean ridge.



(a) X and Y are two separate tectonic plates.

(i) The two plates are both moving. Explain, as fully as you can, what causes tectonic plates to move.

.....
.....
.....
.....
.....
.....

(3)

(ii) New ocean floor is created at the mid-ocean ridge. Explain, as fully as you can, how this happens.

.....
.....
.....
.....
.....
.....

(3)

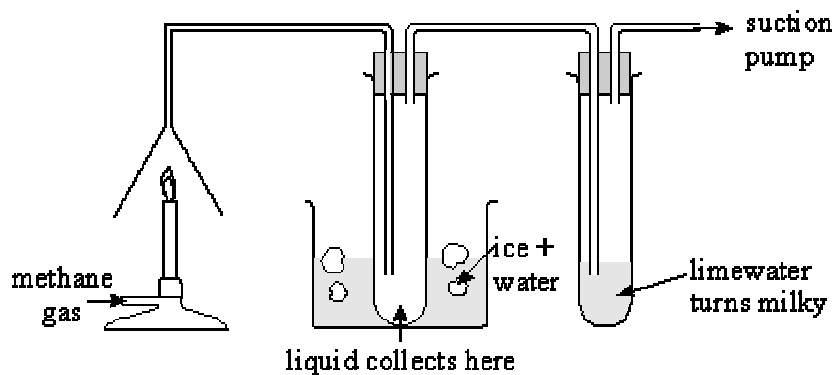
(b) The layer of sediment that has collected on the ocean floor increases in depth the further it is from the mid-oceanic ridge. Suggest a reason for this.

.....
.....
.....
.....

(2)

(Total 8 marks)

Q27. Methane CH_4 contains the elements carbon and hydrogen only. A student wanted to find out which new substances are produced when methane is burned. The student set up the apparatus shown below.



(a) Which gas in the air reacts with methane when it burns?

.....

(1)

(b) Name the liquid collected.

.....

(1)

(c) Name the gas which turns limewater milky.

.....

(1)

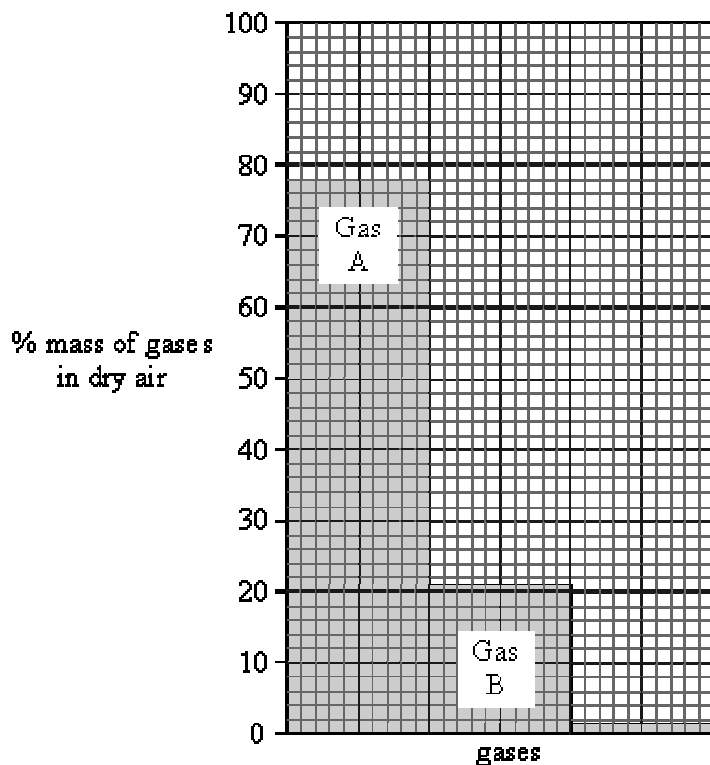
(d) When methane burns an exothermic reaction takes place. What is meant by an exothermic reaction?

.....

(2)

(Total 5 marks)

Q28. The bar chart below shows the percentage by mass of gases in dry air. Two of the gases are labelled as A and B.



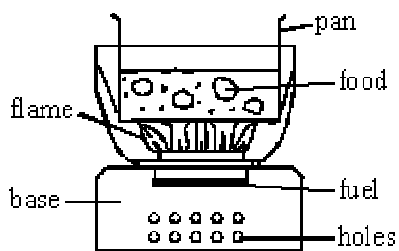
What are the names of gas A and gas B?

Gas A is

Gas B is

(Total 2 marks)

Q29. The diagram below shows a camping stove used by some students.



A student wrote the report below to explain how the stove works. The report has had some words removed. Complete the report using words from the list.

air	chemical change	liquids	physical change
argon	gases	nitrogen	solid
carbon dioxide	heat energy	oxygen	water vapour

To use the stove a fuel called methylated spirits is poured into the burner and lit with a match.

The holes in the base let into the stove. This contains the gas called which is needed for the fuel to burn.

When the fuel burns, new substances are formed. This shows that a takes place.

When all of the methylated spirits has burned nothing is left in the burner. This shows that the new substances must all be

Methylated spirits contains carbon and hydrogen. When the fuel burns the carbon is changed

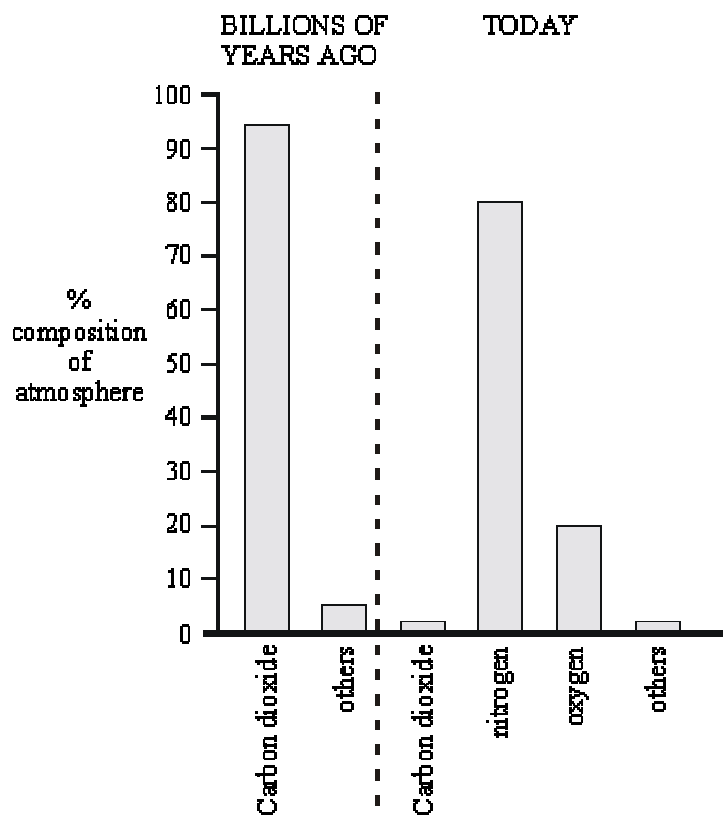
into

The hydrogen is changed into

When the fuel burns it gives out which cooks the food in the pan.

(Total 7 marks)

Q30. 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.

.....

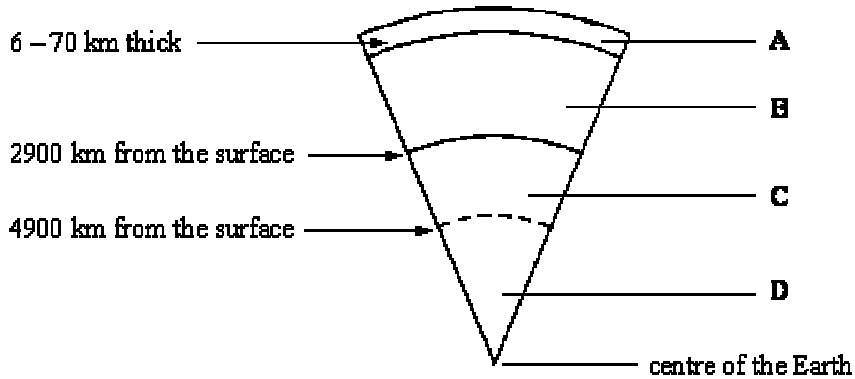
.....

.....

.....

(2)

Q32. The diagram represents a section through the Earth showing the layers which are labelled **A**, **B**, **C** and **D**.



(a) Give the name of:

(i) layer **A**

(ii) layer **B**

(2)

(b) Give one difference between layer **C** and layer **D**.

.....

(1)

(Total 3 marks)

Q33. For 200 million years the proportions of the different gases in the atmosphere have been much the same as today. Over the past 150 years the amount of carbon dioxide in the atmosphere has increased from 0.03% to 0.04%.

(a) Describe how carbon dioxide is released into the atmosphere:

(i) by human and industrial activity;

.....

.....
.....
.....

(2)

(ii) from carbonate rocks by geological activity.

.....
.....
.....
.....

(2)

(b) Explain how the seas and oceans can decrease the amount of carbon dioxide in the atmosphere.

.....
.....
.....
.....
.....
.....

(3)

(c) (i) Give **one** reason why the amount of carbon dioxide in the atmosphere is increasing gradually.

.....
.....

(1)

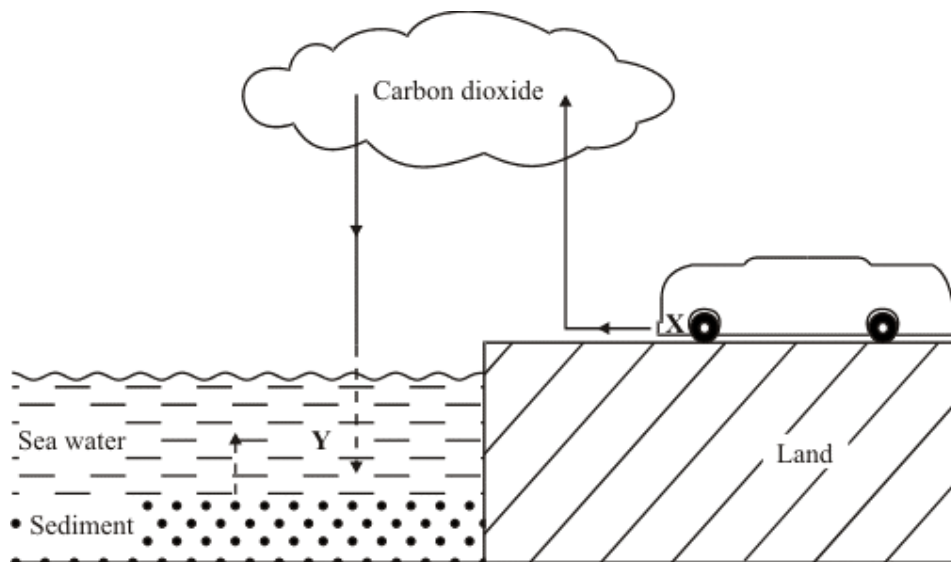
(ii) Give **one** effect that increasing levels of carbon dioxide in the atmosphere may have on the environment.

.....
.....

(1)

(Total 9 marks)

Q34. The amount of carbon dioxide in the atmosphere is increased by reactions that occur in internal combustion engines (**X**) and is decreased by reactions in sea water (**Y**).



Describe, in as much detail as you can, the reactions which take place at **X** and **Y**.

(a) **X**

.....

.....

.....

(2)

(b) **Y**

.....

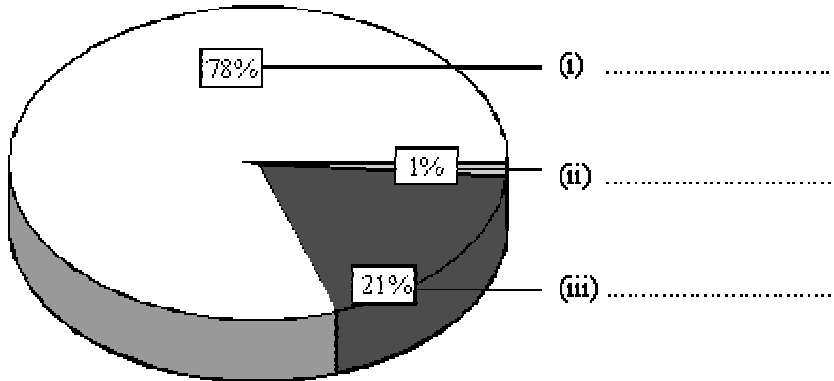
.....

.....

(3)

(Total 5 marks)

Q35. (a) Air is a mixture of gases. The pie chart shows the percentages, by volume, of the main gases in dry air. Complete the chart by adding the names of these **three** gases.



(3)

(b) Complete each of the **four** spaces in the sentences by choosing the best word from the box.

condenses condensing evaporates evaporating

melts sea trees vapour

The air in the atmosphere above this country always contains
 Most of this is the result of water from the surface of the
 Some of it to form millions of tiny
 drops of water in clouds.

(4)

(c) Thousands of millions of years ago the Earth's early atmosphere was formed. Complete the following sentence.

The carbon dioxide in this early atmosphere probably came from

(1)

(Total 8 marks)

Q36. Read the passage, which is from the start of a magazine article. It will help you to answer the questions.

Third rock from the Sun

Geologists now have evidence that the Earth's crust began to form about four and a half billion years ago. The surface of the Earth was then at temperatures well above 100 °C and the atmosphere was mostly carbon dioxide with some ammonia, methane and water vapour. About a quarter of a billion years after it had first formed, the crust had become thicker and had cooled down to below 100 °C.

Slowly, over a period of about three billion years, oxygen became established in the atmosphere. Some was released from the Earth's interior by volcanoes and some was produced, by the process of photosynthesis, by algae which had evolved in the seas.

(a) Explain how the first seas formed.

.....
.....
.....

(2)

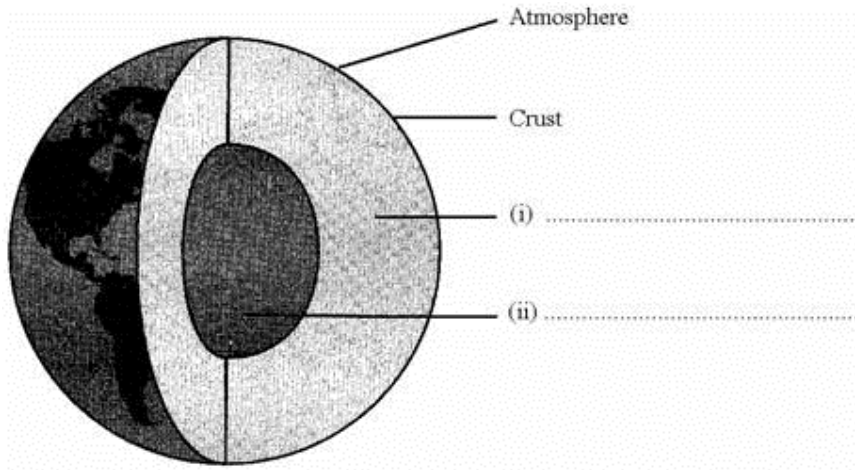
(b) Briefly describe **two** processes which reduced the proportion of carbon dioxide in the Earth's atmosphere over the period of three billion years.

1.
.....
2.
.....

(2)

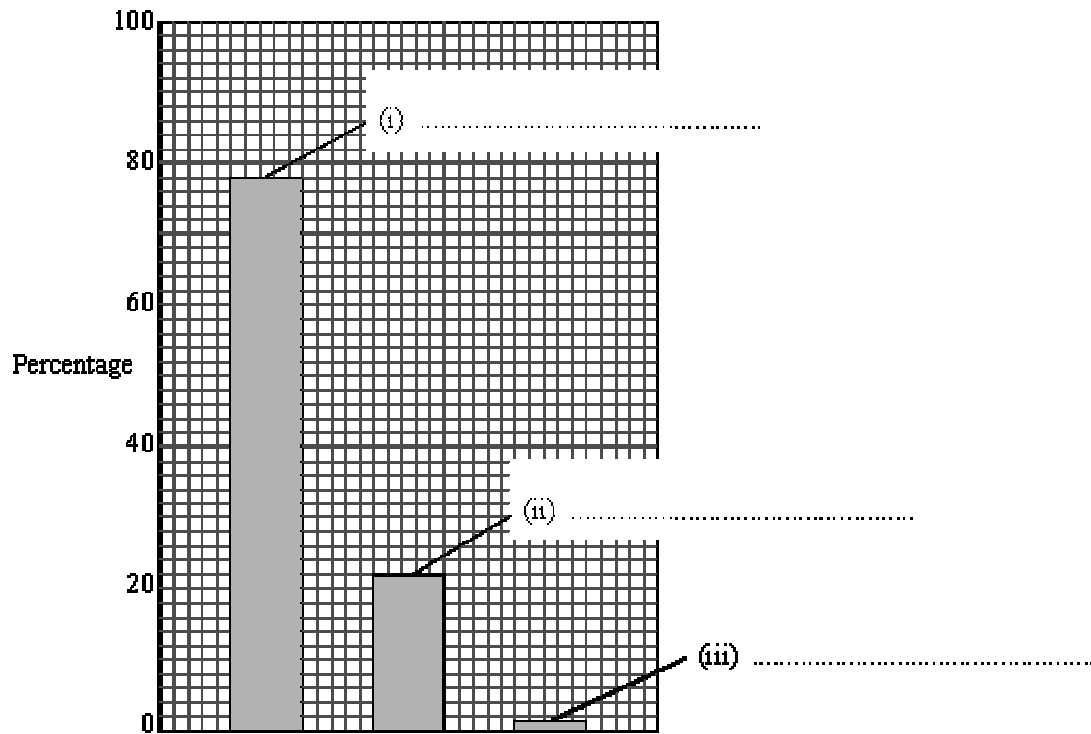
(Total 4 marks)

- Q37.** (a) The diagram shows the Earth's layered structure.
Name parts (i) and (ii).



(2)

- (b) The bar chart shows the composition of a sample of dry air from the Earth's atmosphere. Name the **three** gases shown in the bar chart.



(3)

- (c) The Earth's crust is a set of slow-moving plates. There are fold mountains at some places where the plates meet.

Give examples of **two** other types of geological features or activities which usually occur at these places.

1

2

(2)

- (d) One carbon compound is methane. Its chemical formula is CH_4 .

- (i) What is the name of the element which is combined with carbon in methane?

.....

(1)

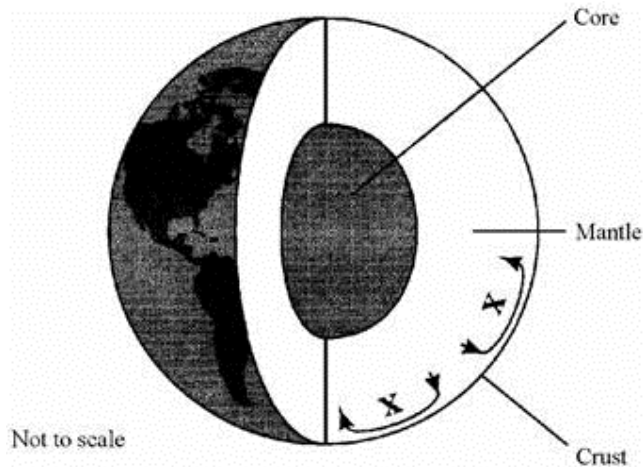
- (ii) Complete the word equation for the chemical reaction which usually takes place when methane burns.

methane + \rightarrow carbon dioxide + water

(1)

(Total 9 marks)

Q38. The diagram shows a view of the inside of the Earth.



Adapted from Physics for You (1996) by Keith Johnson, Nelson Thornes

(a) The curved lines marked **X** show two of the slow currents in the mantle.

(i) What sort of currents are these?

.....

(1)

(ii) How do these currents occur and what is their energy source?

.....
.....
.....
.....
.....
.....

(3)

(b) Movements of the plates of the Earth's crust can result in earthquakes.

Give **two** other geological results of these movements.

1

2

(2)

(Total 6 marks)

Q39.

(a) Apart from water vapour, two gases account for about 99% of the present atmosphere of our planet.

What are the names of these gases?

..... and

(1)

(b) Scientists now have evidence that, over three billion years ago, our planet's atmosphere was mostly a mixture of water vapour, carbon dioxide, methane and ammonia. Since then the mixture has gradually changed.

(i) Suggest why there is now less water vapour in the atmosphere.

.....
.....
.....
.....

(2)

(ii) Suggest why there is now less carbon dioxide in the atmosphere.

.....
.....
.....
.....

(2)

(c) The following information suggests that the continents of Africa and South America were once joined together but then began to move apart.

Fossilised remains of a large fern-like plant called *Glossopteris* have been found in the rocks of the Carboniferous period in both Africa and South America.

Fossilised remains of a freshwater reptile called *Mesosaurus* have been found in the rocks of the Permian period in both Africa and South America.

No fossils of identical organisms have been found in the rocks of the Jurassic or the Cretaceous period in Africa or South America.

The following table gives the names of some of the periods in our planet's geological history.

Start of the period millions of years ago	Name of the period
2	Quaternary
65	Tertiary

136	Cretaceous
190	Jurassic
225	Triassic
280	Permian
345	Carboniferous
395	Devonian
435	Silurian
500	Ordovician
570	Cambrian

- (i) Use this information to suggest when Africa and South America began to move apart.

About million years ago.

(1)

- (ii) What conditions were necessary for Africa and South America to move apart?

.....

.....

.....

.....

.....

.....

(3)

(Total 9 marks)

Q40. Choose words from this list to complete the sentences below.

a chemical an electrical a physical hydrogen nitrogen oxygen

(a) Burning is change. (1)

(b) When substances burn, they are reacting with from the air. (1)
(Total 2 marks)

Q41. Wax is a fuel.

A young child watched a candle burning and wondered where the wax had gone.



(a) Complete the sentence below.
When wax burns, energy is released as (1)

(b) Why does the wax disappear as it burns?
.....
..... (1)
(Total 2 marks)

Q42. Petrol burns in oxygen from the air in a car engine.

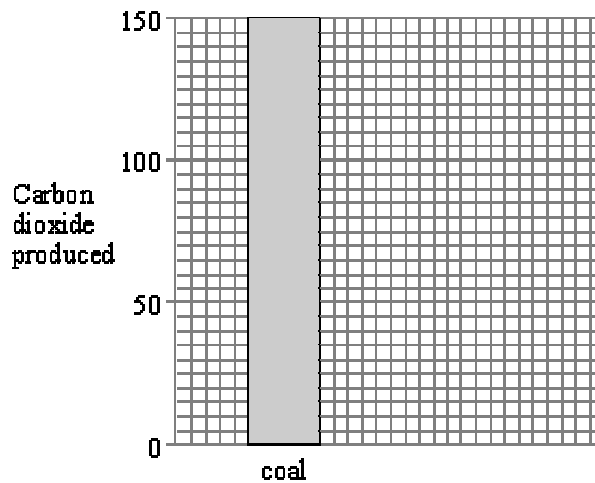
Two of the gases in the exhaust fumes are carbon dioxide and water vapour.

This indicates that petrol contains the elements and

(Total 2 marks)

Q43. The table shows how much carbon dioxide is produced when you transfer the same amount of energy by burning coal, gas and oil.

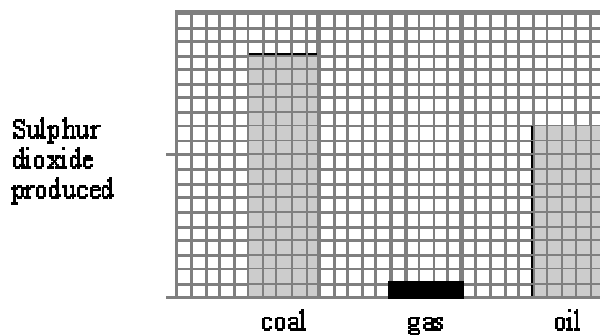
	Carbon dioxide (based on oil = 100)
coal	150
gas	75
oil	100



(a) Use the information from the table to complete the bar-chart.

(3)

(b) The second bar-chart shows how much sulphur dioxide is produced by burning the same three fuels.



Compare the amount of sulphur produced by burning gas with the amount produced by burning coal.

.....
.....

(2)

- (c) (i) Coal and oil produce carbon dioxide and sulphur dioxide when they burn. What elements must they contain?

.....
.....

(2)

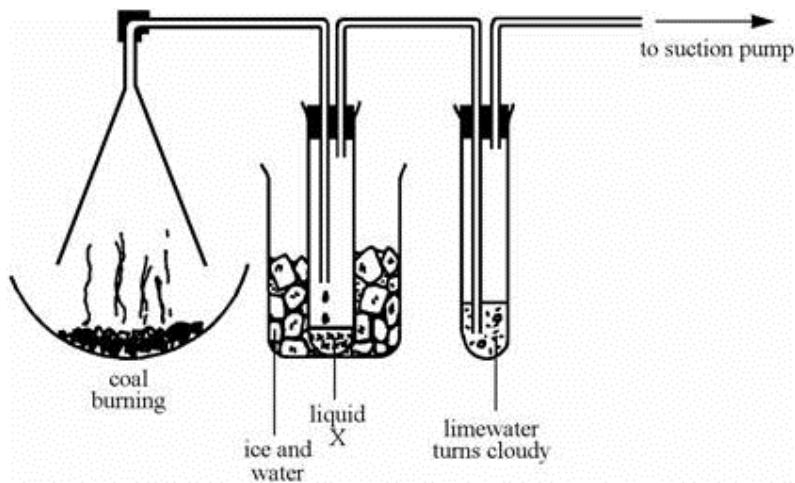
- (ii) Burning fuels also produce nitrogen oxides, even though the fuels contain no nitrogen. Explain why this happens.

.....
.....

(2)

(Total 9 marks)

Q44. The gases produced when coal burns are cooled by ice and then bubbled through limewater.



- (a) Complete these sentences.

- (i) The coal is reacting with when it burns.
- (ii) During burning, elements in the coal are converted to compounds called
- (2)

(b) Choose words from this list to complete the sentences.

carbon carbon dioxide sulphur sulphur dioxide
sodium water

- (i) Liquid X is a compound made from hydrogen and oxygen.
It is called
- (ii) Sulphur dioxide is an acidic gas. It is given off when coal burns, because coal contains the element
- (iii) Most fuels are compounds of hydrogen and
- (3)

(c) Burning coal is an exothermic reaction.

Explain what "exothermic" means.

.....
.....

(1)

(d) (i) Which gas turns limewater cloudy?

.....

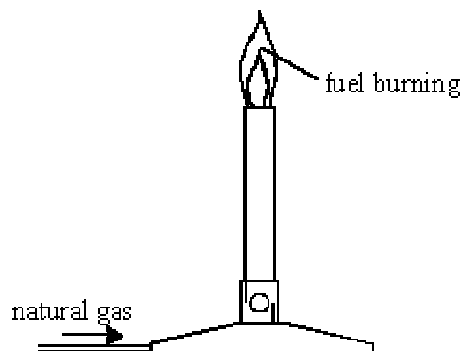
(ii) Which element in the coal is oxidised to form this gas?

.....

(2)

(Total 8 marks)

Q45. Natural gas is a fuel.



(a) Complete these sentences.

When the fuel burns completely, we cannot see the new substances produced because

they are mainly colourless

The energy of the fuel is released as

(3)

(b) Choose words from this list to complete the sentence below.

carbon carbon dioxide hydrogen nitrogen
oxygen sulphur dioxide water vapour

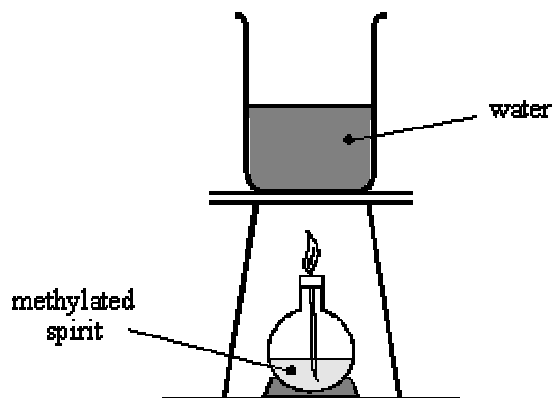
Three gases which can be produced when fuels burn are:

1.
2.
3.

(3)

(Total 6 marks)

Q46. A student is using a spirit burner to heat some water.



(a) Complete these sentences.

Substances like methylated spirit which we burn to give out energy, are called The energy is given out as energy.

(2)

(b) Choose a word from this list to complete the sentence below.

gases liquids solids


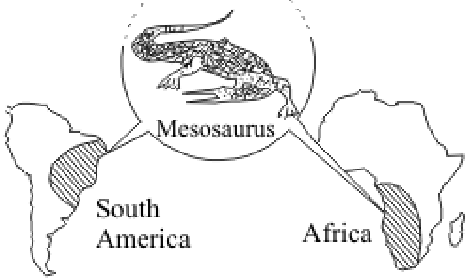
The methylated spirit seems to disappear as it burns.

The new substances produced during burning are mainly

(1)

(Total 3 marks)

Q47. The following information suggests that South America and Africa were once attached and then moved apart.

<p>Fossil remains of a large fern-like plant are found in Carboniferous rocks of S. Africa and S. America.</p>	 <p>Glossopteris</p>
<p>Fossil remains of a freshwater alligator-type reptile are found in the Permian rocks of S. America and Africa.</p>	 <p>Mesosaurus</p> <p>South America Africa</p>
<p>No fossils of similar organisms are found in Jurassic/Cretaceous rocks of S. Africa and S. America.</p>	

Suggest **when** South America and Africa began to move apart.

[Make use of dates in your answer, where possible.]

.....

.....

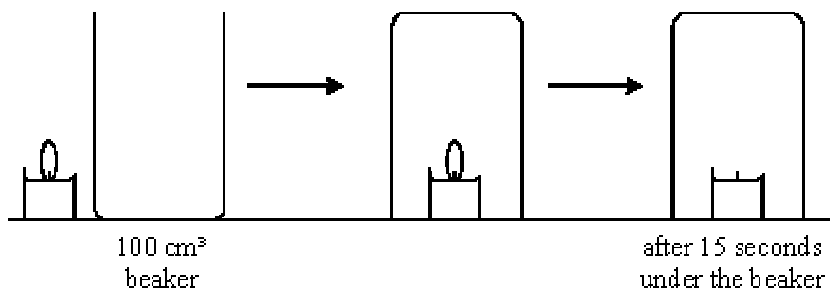
.....

.....

.....

(Total 3 marks)

Q48. This experiment shows a candle burning then going out.



(a) Choose words from this list to complete the sentences in parts (i) and (ii) below.

air carbon dioxide hydrogen nitrogen oxygen

(i) When the candle wax is burning it is reacting with from the (2)

(ii) One product of the reaction is (1)

(b) Complete the following sentence.

In another experiment a 200 cm³ beaker is used. The candle will then burn for about seconds.

(1)
(Total 4 marks)

Q49. In a car engine petrol burns in oxygen from the air. Two of the gases in the exhaust fumes are carbon dioxide and water vapour.

This indicates that petrol contains the elements and (Total 2 marks)

