

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education  
Winter 2003



**SCIENCE: DOUBLE AWARD (MODULAR)  
CHEMISTRY (MODULAR)  
Earth Materials (Module 06)**

**346006**

Thursday 27 November 2003 Morning Session

**In addition to this paper you will require:**

- a black ball-point pen;
- an answer sheet.

Time allowed: 30 minutes

**Instructions**

- Fill in the boxes at the top of this page.
- Check that your name, candidate number and centre number are printed on the separate answer sheet.
- Check that the separate answer sheet has the title “Earth Materials” printed on it.
- Attempt **one Tier only, either** the Foundation Tier **or** the Higher Tier.
- Make sure that you use the correct side of the separate answer sheet; the Foundation Tier is printed on one side and the Higher Tier on the other.
- Answer **all** the questions for the Tier you are attempting.
- Record your answers on the separate answer sheet only. Rough work may be done on the question paper.

**Instructions for recording answers**

- Use a **black ball-point pen**.

- For each answer **completely fill in the circle** as shown:
 

1	2	3	4
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

- Do **not** extend beyond the circles.

- If you want to change your answer, **you must** cross out your original answer, as shown:
 

1	2	3	4
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

- If you change your mind about an answer you have crossed out and now want to choose it, draw a ring around the cross as shown:
 

1	2	3	4
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

**Information**

- The maximum mark for this paper is 36.

**Advice**

- Do **not** choose more responses than you are asked to. You will lose marks if you do.
- Make sure that you hand in both your answer sheet and this question paper at the end of the test.
- If you start to answer on the wrong side of the answer sheet by mistake, make sure that you cross out **completely** the work that is not to be marked.

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You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.  
The Higher Tier starts on page 14 of this booklet.

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**FOUNDATION TIER**

**SECTION A**

Questions **ONE** to **FIVE**.

In these questions match the words in the list with the numbers.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

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**QUESTION ONE**

This question is about gases.

Match words from the list with the numbers **1 – 4** in the table.

**carbon dioxide**

**nitrogen**

**oxygen**

**sulphur dioxide**

<b>Gas</b>	<b>What we can say about the gas</b>
<b>1</b>	it makes up about $\frac{4}{5}$ of the Earth's atmosphere
<b>2</b>	it is formed when sulphur burns in air
<b>3</b>	it reacts with carbon to form carbon dioxide
<b>4</b>	it is produced in the thermal decomposition of magnesium carbonate

**QUESTION TWO**

The diagram shows the layered structure of the Earth and its surroundings.

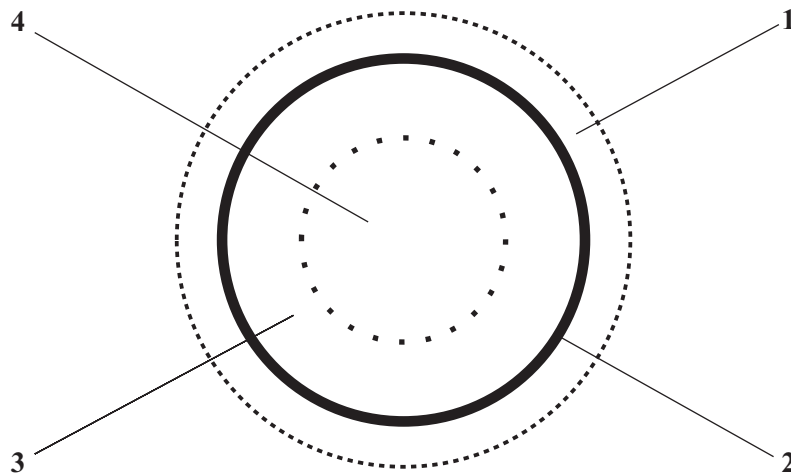
Match words from the list with the labels 1 – 4 on the diagram.

**atmosphere**

**core**

**crust**

**mantle**



**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION THREE**

This question is about crude oil.

Match words from the list with the spaces **1 – 4** in the sentences.

**compound**

**element**

**fraction**

**mixture**

Crude oil is a . . . . . **1** . . . . . made up mainly of hydrocarbons.

A hydrocarbon is a . . . . . **2** . . . . .

Hydrocarbons are made up of carbon combined with the . . . . . **3** . . . . . hydrogen.

When crude oil is distilled, each . . . . . **4** . . . . . contains hydrocarbons with similar boiling points.

**QUESTION FOUR**

This question is about processes and events associated with tectonic plates.

Match words from the list with the spaces **1 – 4** in the sentences.

**continental drift**

**convection currents**

**radioactive processes**

**volcanic eruptions**

Wegener suggested that in the past there was a single, large land mass.

This split up and the smaller land masses moved apart. We call this process . . . . . **1** . . . . .

Tectonic plates move because of . . . . . **2** . . . . . in the Earth's mantle.

The heat required for this movement to occur comes from natural . . . . . **3** . . . . .

At the boundaries between the tectonic plates there are often . . . . . **4** . . . . .

**QUESTION FIVE**

The diagram shows stages in the development of the Earth's atmosphere.

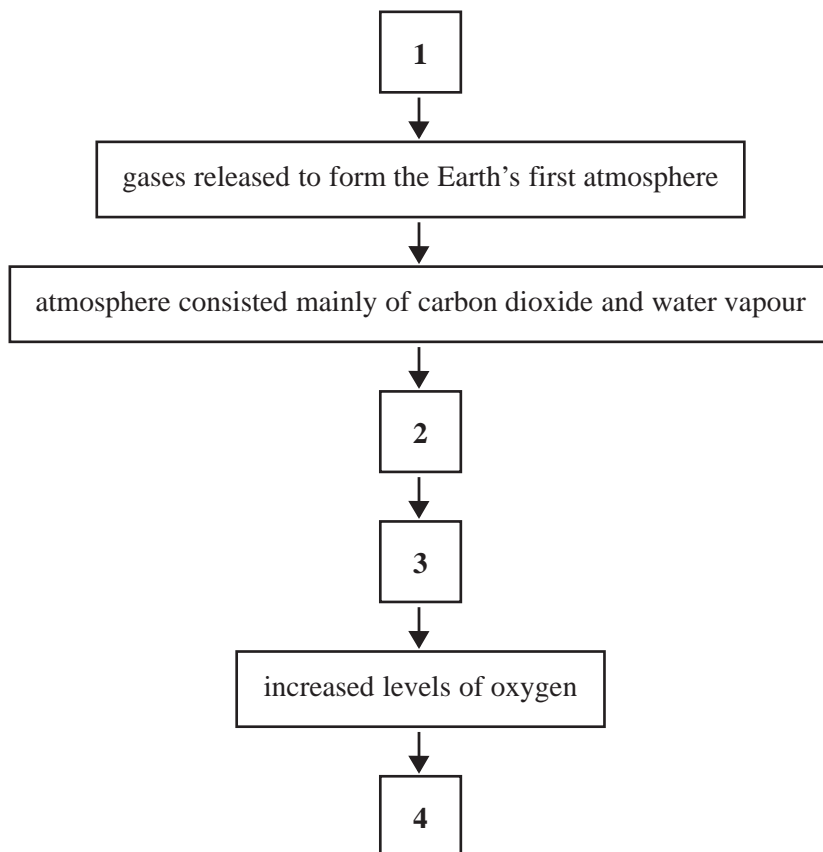
Match words from the list with the spaces 1 – 4 to describe what happened in this process.

**colonisation of the Earth by plants**

**intense volcanic activity**

**methane and ammonia reacted with oxygen**

**water vapour condensed to form the oceans**



Turn over ►

**SECTION B**Questions **SIX** and **SEVEN**.In these questions choose the best **two** answers.Do **not** choose more than two.Mark your choices on the answer sheet.

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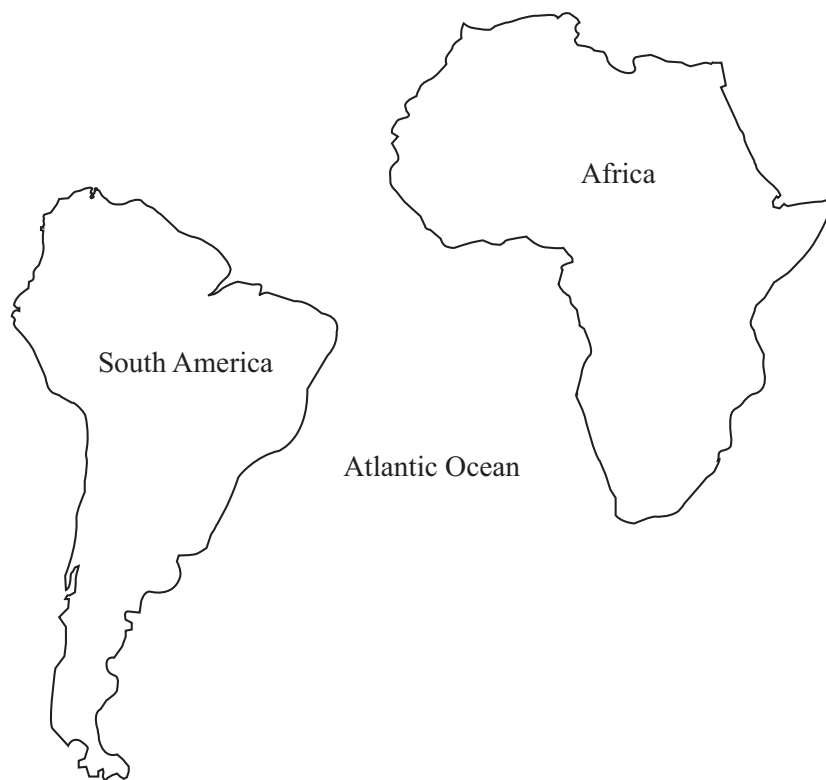
**QUESTION SIX**

This question is about the hydrocarbons in crude oil.

Choose from the list the **two** statements that are correct.**all hydrocarbon molecules in crude oil are similar in size****hydrocarbons with small molecules flow easily****hydrocarbons with the largest molecules are easiest to ignite****hydrocarbons with the smallest molecules have the lowest boiling points****hydrocarbons with very large molecules are useful as fuels**

**QUESTION SEVEN**

This question is about the positions of the continents of Africa and South America.



Choose from the list the **two** statements that suggest that Africa and South America were once joined together.

- they both have mountain ranges**
- they have shapes which fit together quite closely**
- they have similar fossils in the rocks near coastlines**
- they have similar patterns of weather**
- they have similar shapes**

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**SECTION C**Questions **EIGHT** to **TEN**.

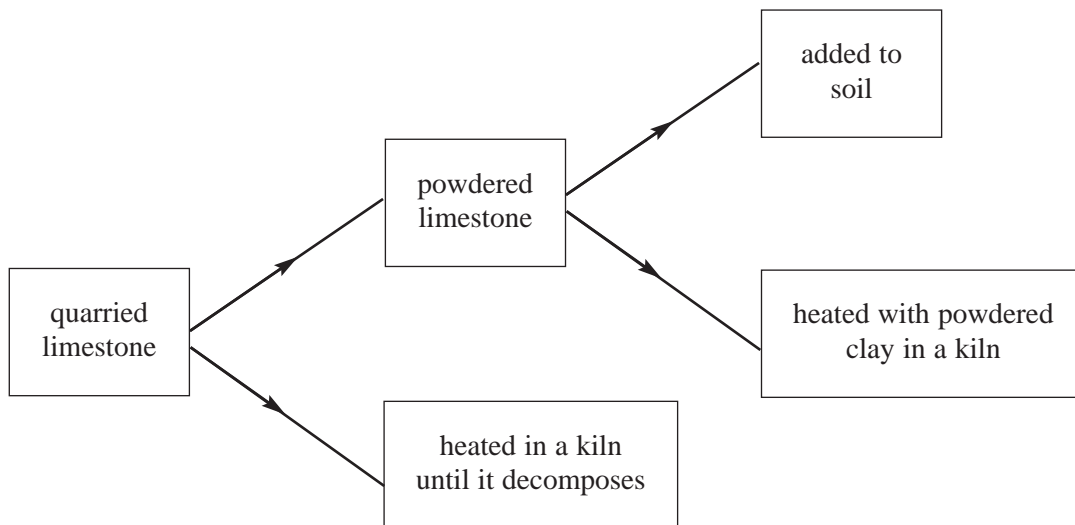
Each of these questions has four parts.

In each part choose only **one** answer.

Mark your choices on the answer sheet.

**QUESTION EIGHT**

The diagram shows some of the ways in which limestone can be used.

**8.1** Powdered limestone is added to soil . . . . .

- A** to improve the drainage.
- B** to make the soil fertile.
- C** to make the soil less acid.
- D** to make the soil less alkaline.



8.2 Powdered limestone is heated with powdered clay to produce . . . . .

- A cement.
- B glass.
- C quicklime.
- D soda.

8.3 Which word equation shows what happens when limestone decomposes?

- A calcium carbonate  $\longrightarrow$  calcium hydroxide + water
- B calcium carbonate  $\longrightarrow$  calcium oxide + water
- C calcium carbonate  $\longrightarrow$  calcium oxide + water + carbon dioxide
- D calcium carbonate  $\longrightarrow$  calcium oxide + carbon dioxide

8.4 Slaked lime is made by the reaction of water with . . . . .

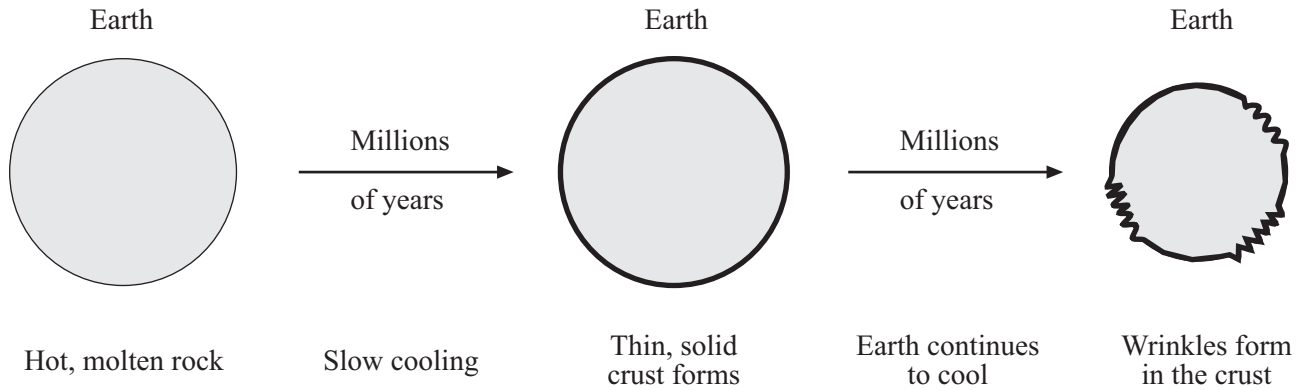
- A calcium carbonate.
- B calcium hydroxide.
- C calcium oxide.
- D cement.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

### QUESTION NINE

The diagrams show how one early theory attempted to explain the formation of mountains on the Earth.



- 9.1** This early theory suggests that the mountains are formed . . . . .
- A** as low density rock rises from the core.
  - B** as molten rock escapes from the core.
  - C** by the shrinking of the Earth.
  - D** by volcanic eruptions.
- 9.2** One reason that this theory is **not** accepted is because we now know that . . . . .
- A** radioactive processes in the Earth release heat.
  - B** the Earth is spherical.
  - C** the Earth's crust does not change its shape.
  - D** the material in the Earth's interior is less dense than the crust.
- 9.3** Scientists now think that mountains are formed . . . . .
- A** because the Earth is expanding as it heats up.
  - B** by earthquakes at plate bounda
  - C** by large scale movements of the Earth's c
  - D** by weathering and erosion of older mountain ran

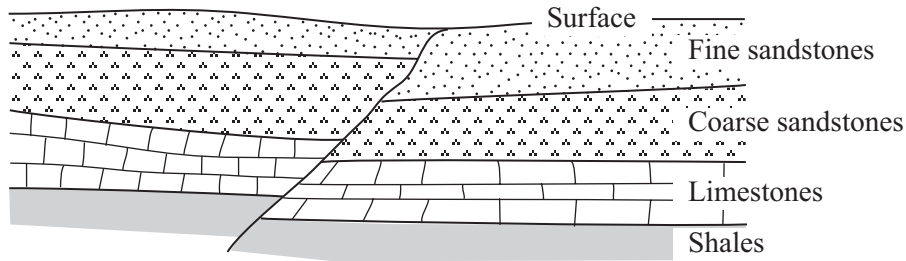
- 9.4** Metamorphic rocks are found in mountain ranges. These show that . . . . .
- A** high temperatures and pressures were involved in the formation of mountains.
  - B** the rocks were formed from molten material.
  - C** the rocks were formed from a magma.
  - D** volcanic eruptions occurred during the formation of mountains.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

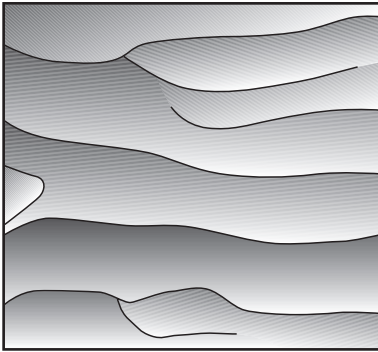
## QUESTION TEN

**Figure 1** shows the sequence of rocks in one part of the Earth's crust. Smaller details of the fine and coarse sandstones are shown in **Figures 2** and **3**.



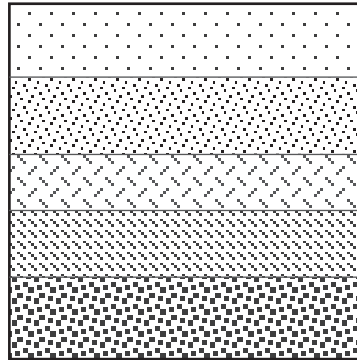
**Figure 1**

Ripple marks in the  
fine sandstones



**Figure 2**

Layers in the  
coarse sandstones



**Figure 3**

**10.1** The youngest rocks in **Figure 1** are probably . . . . .

- A the coarse sandstones.
- B the fine sandstones.
- C the limestones.
- D the shales.

**10.2** The ripple marks in the fine sandstones in **Figure 2** have probably been formed by . . . . .

- A currents or waves.
- B high temperatures and pressures.
- C large scale movements of the Earth's crust.
- D slow deposition.

**10.3** The layers in the coarse sandstones in **Figure 3** have probably been formed . . . . .

- A because of breaks in deposition.
- B by earthquake activity.
- C by volcanic activity.
- D when the rocks were turned upside down.

**10.4** The sandstones, limestones and shales in **Figure 1** have been . . . . .

- A folded.
- B faulted.
- C tilted.
- D turned upside down.

**END OF TEST**

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You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.

The Foundation Tier is earlier in this booklet.

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### HIGHER TIER

#### SECTION A

Questions **ONE** and **TWO**.

In these questions match the words in the list with the numbers.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

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#### QUESTION ONE

The diagram shows stages in the development of the Earth's atmosphere.

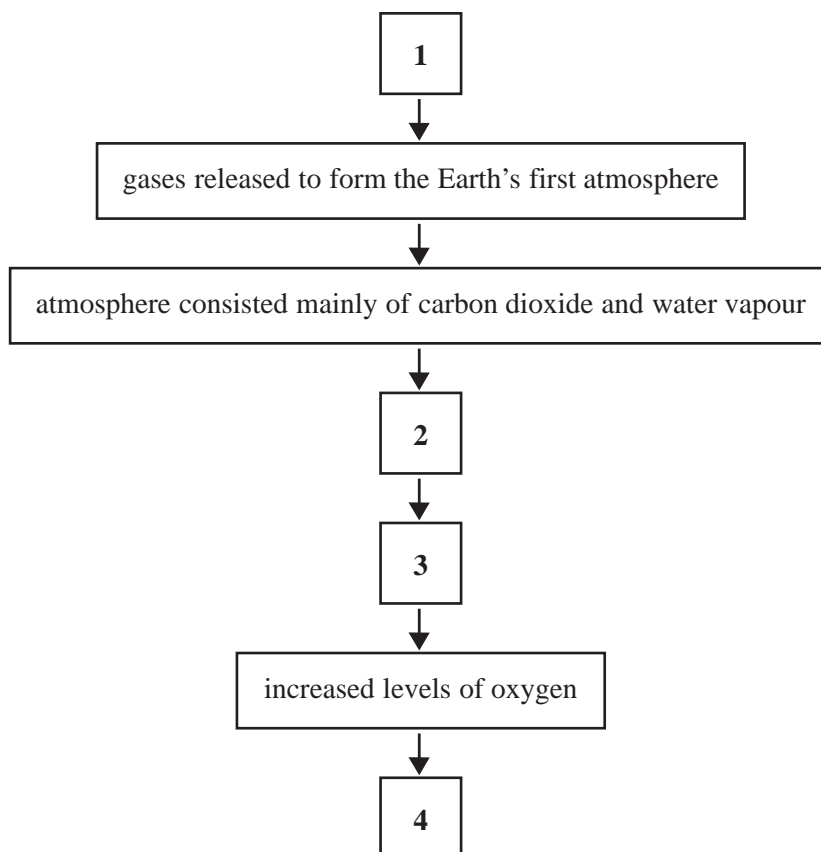
Match words from the list with the spaces **1 – 4** to describe what happened in this process.

**colonisation of the Earth by plants**

**intense volcanic activity**

**methane and ammonia reacted with oxygen**

**water vapour condensed to form the oceans**



## QUESTION TWO

This question is about the structural formulae of four hydrocarbons.

Match words from the list with the numbers 1 – 4 below.

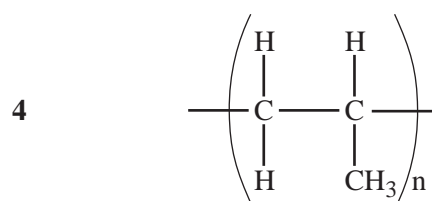
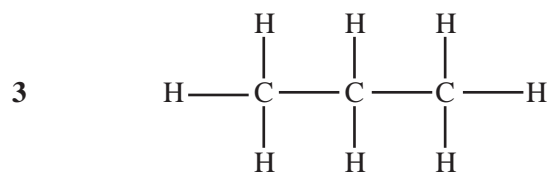
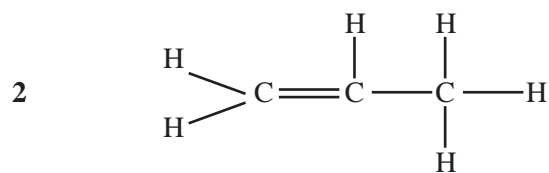
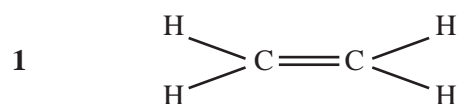
**a polymer**

**an alkane**

**an unsaturated hydrocarbon with 3 carbon atoms in each molecule**

**ethene**

**Hydrocarbon      Formula for one molecule of the hydrocarbon**



Turn over ►

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**SECTION B**Questions **THREE** and **FOUR**.In these questions choose the best **two** answers.Do **not** choose more than two.Mark your choices on the answer sheet.

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**QUESTION THREE**

This question is about the positions of the continents of Africa and South America.

Choose from the list the **two** statements that suggest that Africa and South America were once joined together.

- they both have mountain ranges**
- they have shapes which fit together quite closely**
- they have similar fossils in the rocks near coastlines**
- they have similar patterns of weather**
- they have similar shapes**



**QUESTION FOUR**

This question is about poly(ethene).

Which **two** statements are correct?

**in poly(ethene), the carbon atoms are linked by double bonds**

**in poly(ethene), the carbon atoms are linked by ionic bonds**

**poly(ethene) can be produced during the cracking of large hydrocarbon molecules**

**poly(ethene) can be produced by joining together alkene monomers**

**poly(ethene) is not biodegradable**

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**SECTION C**Questions **FIVE** to **TEN**.

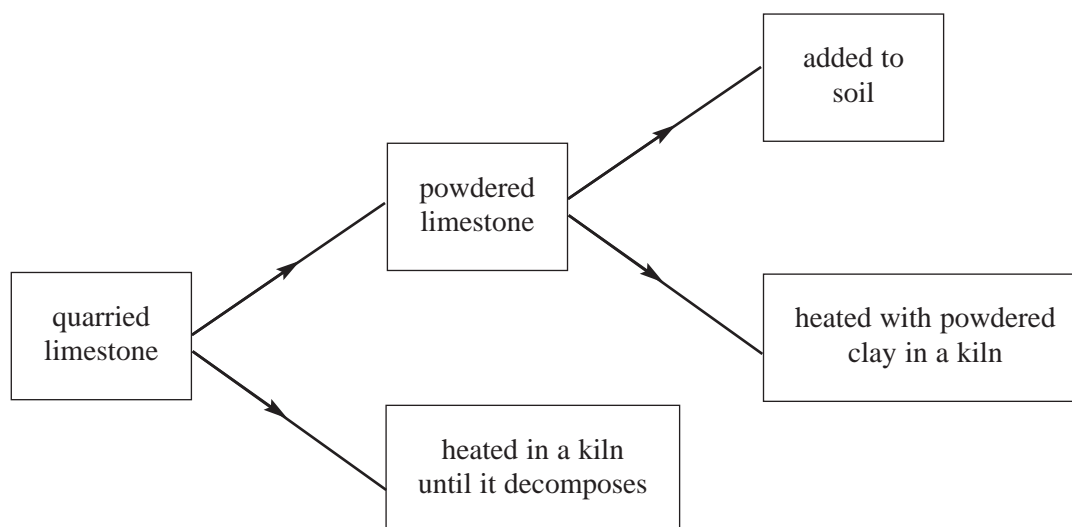
Each of these questions has four parts.

In each part choose only **one** answer.

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**QUESTION FIVE**

The diagram shows some of the ways in which limestone can be used.

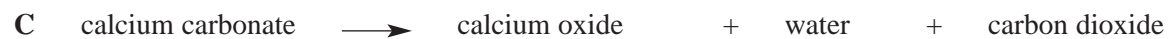
**5.1** Powdered limestone is added to soil . . . . .

- A to improve the drainage.
- B to make the soil fertile.
- C to make the soil less acid.
- D to make the soil less alkaline.

**5.2** Powdered limestone is heated with powdered clay to produce . . . . .

- A cement.
- B glass.
- C quicklime.
- D soda.

5.3 Which word equation shows what happens when limestone decomposes?



5.4 Slaked lime is made by the reaction of water with . . . . .

A calcium carbonate.

B calcium hydroxide.

C calcium oxide.

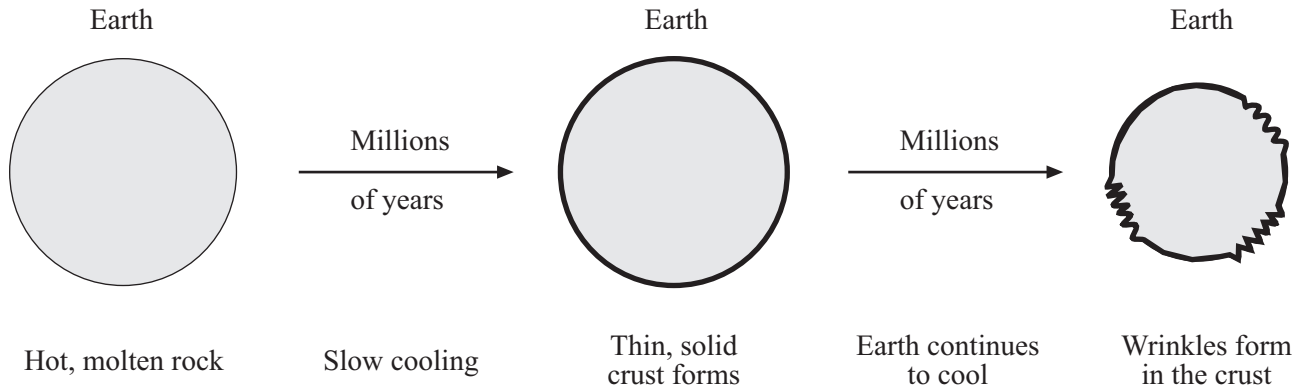
D cement.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

## QUESTION SIX

The diagrams show how one early theory attempted to explain the formation of mountains on the Earth.



- 6.1** This early theory suggests that the mountains are formed . . . . .
- A as low density rock rises from the core.
  - B as molten rock escapes from the core.
  - C by the shrinking of the Earth.
  - D by volcanic eruptions.
- 6.2** One reason that this theory is **not** accepted is because we now know that . . . . .
- A radioactive processes in the Earth release heat.
  - B the Earth is spherical.
  - C the Earth's crust does not change its shape.
  - D the material in the Earth's interior is less dense than the crust.
- 6.3** Scientists now think that mountains are formed . . . . .
- A because the Earth is expanding as it heats up.
  - B by earthquakes at plate boundaries.
  - C by large scale movements of the Earth's crust.
  - D by weathering and erosion of older mountain ranges.

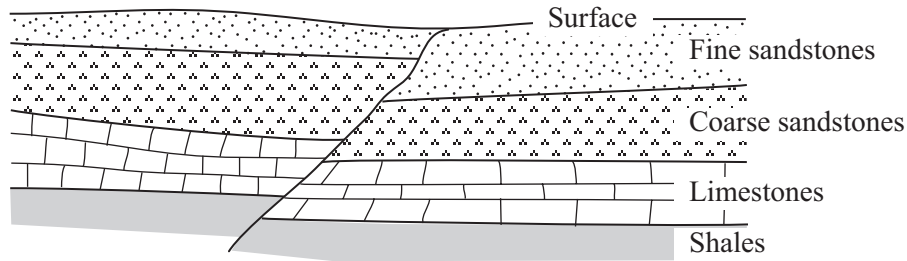
- 6.4** Metamorphic rocks are found in mountain ranges. These show that . . . . .
- A** high temperatures and pressures were involved in the formation of mountains.
  - B** the rocks were formed from molten material.
  - C** the rocks were formed from a magma.
  - D** volcanic eruptions occurred during the formation of mountains.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

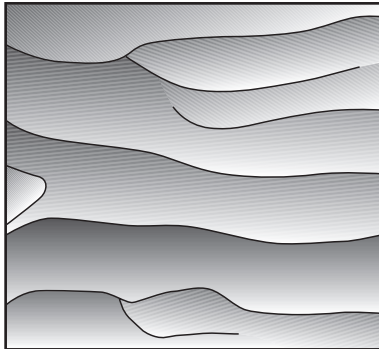
## QUESTION SEVEN

**Figure 1** shows the sequence of rocks in one part of the Earth's crust. Smaller detail of the fine and coarse sandstones are shown in **Figures 2** and **3**.



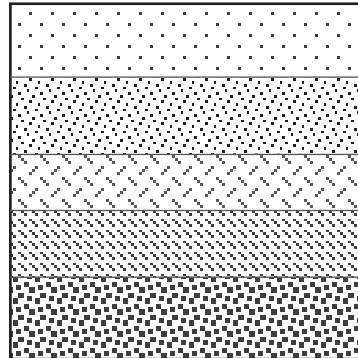
**Figure 1**

Ripple marks in the  
fine sandstones



**Figure 2**

Layers in the  
coarse sandstones



**Figure 3**

- 7.1 The youngest rocks in **Figure 1** are probably . . . . .
- A the coarse sandstones.
  - B the fine sandstones.
  - C the limestones.
  - D the shales.
- 7.2 The ripple marks in the fine sandstones in **Figure 2** have probably been formed by . . . . .
- A currents or waves.
  - B high temperatures and pressures.
  - C large scale movements of the Earth's crust.
  - D slow deposition.

**7.3** The layers in the coarse sandstones in **Figure 3** have probably been formed . . . . .

- A because of breaks in deposition.
- B by earthquake activity.
- C by volcanic activity.
- D when the rocks were turned upside down.

**7.4** The sandstones, limestones and shales in **Figure 1** have been . . . . .

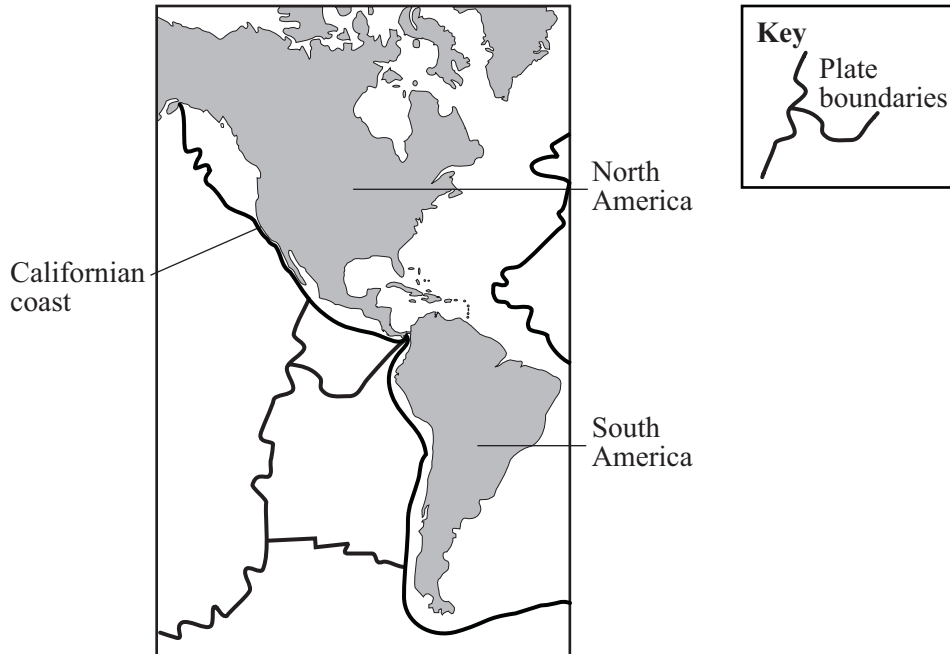
- A folded.
- B faulted.
- C tilted.
- D turned upside down.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION EIGHT**

The map shows some of the tectonic plates associated with the continents of North and South America.



- 8.1** The plates along the Californian coast are . . . . .
- A moving away from each other.
  - B moving towards each other.
  - C sliding one over the other.
  - D sliding past each other.
- 8.2** When the plates along the Californian coast move, they often give rise to . . . . .
- A earthquakes.
  - B sea floor spreading.
  - C the development of oceanic ridges.
  - D the formation of new continental crust.



**8.3** Along the west coast of South America, the oceanic plate is being driven below the continental plate.

This is because the continental plate is . . . . .

- A less dense and thinner.
- B less dense and thicker.
- C more dense and thicker.
- D more dense and thinner.

**8.4** What happens to the sedimentary rocks of the continental crust along the west coast of South America?

- A They are folded and metamorphosed
- B They are subducted
- C They form new oceanic crust
- D They melt to form magma

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION NINE**

When the Earth's atmosphere was first formed it consisted mainly of carbon dioxide.

The percentage of carbon dioxide reduced, quickly at first, then more gradually until it settled at about 0.03%. This is a balance between the amount released into and the amount removed from the atmosphere.

**9.1** Carbon dioxide is released into the atmosphere when . . . . .

- A ammonia and oxygen combine.
- B carbonate rocks are forming in the oceans.
- C fossil fuels are forming.
- D limestone decomposes in the Earth's crust.

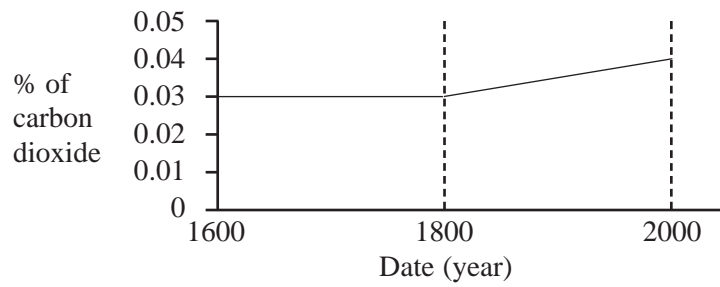
**9.2** Carbon dioxide is removed from the atmosphere . . . . .

- A by ultraviolet radiation from the Sun.
- B when it reacts with methane.
- C when it reacts with sea water to form calcium carbonate.
- D when it reacts with sea water to form calcium oxide.

**9.3** Carbon dioxide is also removed from the atmosphere when . . . . .

- A fossil fuels are burned.
- B fossil fuels are formed.
- C large areas of woodland are cut down.
- D methane reacts with oxygen.

9.4 The amount of carbon dioxide in the atmosphere has slightly increased in the last 200 years.



What is the main cause of this?

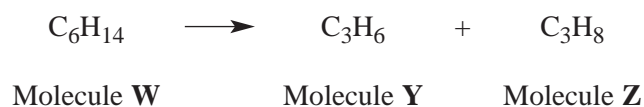
- A An increased use of fossil fuels
- B Increased volcanic activity
- C Larger areas of land planted with crops
- D Replanting of tropical rain forests

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

### QUESTION TEN

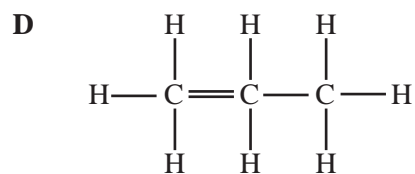
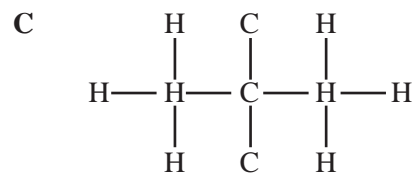
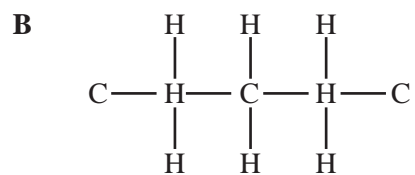
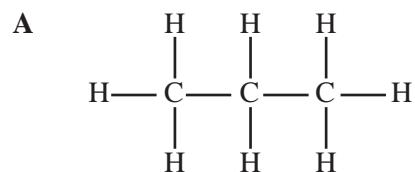
A molecule of a hydrocarbon, formula  $C_6H_{14}$  can be cracked to produce two different hydrocarbons with smaller molecules.



**10.1** The large hydrocarbon molecule can be cracked by . . . . .

- A distillation.
- B polymerisation.
- C thermal decomposition.
- D vaporisation.

**10.2** The structural formula for molecule **Z** is . . . . .



**10.3** Which of the three molecules **W**, **Y** and **Z**, have double bonds?

- A**    **W** and **Y**
- B**    **W** and **Z**
- C**    **W** only
- D**    **Y** only

**10.4** What colour will bromine water be after shaking with hydrocarbons **Y** and **Z**?

	<b>With hydrocarbon Y</b>	<b>With hydrocarbon Z</b>
<b>A</b>	colourless	colourless
<b>B</b>	colourless	yellow-brown
<b>C</b>	yellow-brown	colourless
<b>D</b>	yellow-brown	yellow-brown

**END OF TEST**

**THERE ARE NO QUESTIONS PRINTED ON THIS PAGE**

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