

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education  
Winter 2005



**SCIENCE: DOUBLE AWARD A (MODULAR) 346006**  
**CHEMISTRY A (MODULAR)**  
**Earth Materials (Module 06)**

Thursday 24 November 2005 Morning Session

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

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

You may use a calculator.

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 16 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.

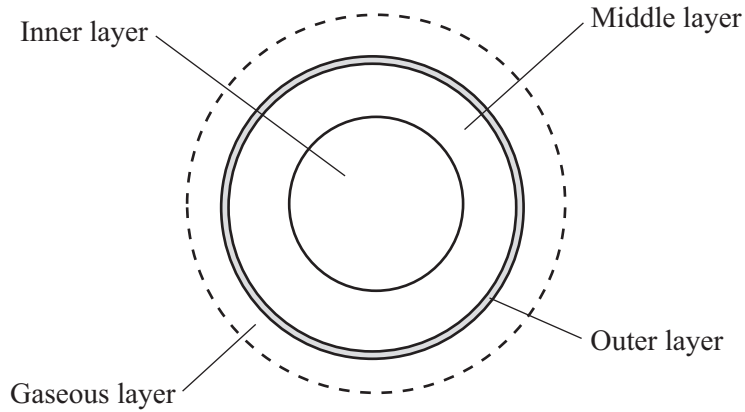
Use **each** answer only **once**.

Mark your choices on the answer sheet.

---

**QUESTION ONE**

The diagram shows the layered structures in and around the Earth.



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

**atmosphere**

**core**

**crust**

**mantle**

The gaseous layer is the . . . . . **1** . . . . .

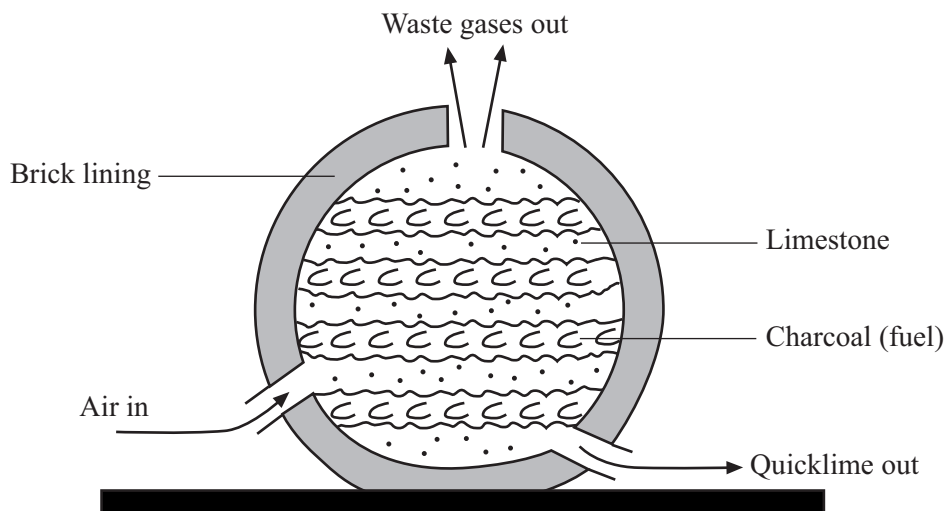
The outer layer is the . . . . . **2** . . . . .

The middle layer is the . . . . . **3** . . . . .

The inner layer is the . . . . . **4** . . . . .

**QUESTION TWO**

The diagram shows a simple lime kiln.  
When the limestone is heated, it decomposes.



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

**calcium carbonate**

**calcium hydroxide**

**calcium oxide**

**carbon dioxide**

Limestone is mainly . . . . . **1** . . . . .

In the lime kiln, the limestone decomposes into quicklime and . . . . . **2** . . . . .

The chemical name of quicklime is . . . . . **3** . . . . .

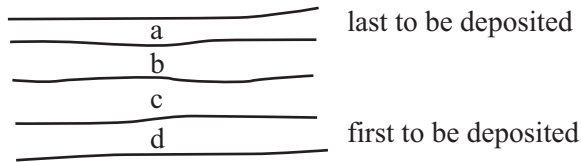
When water and quicklime are mixed, they react to form . . . . . **4** . . . . .

**Turn over ►**

**QUESTION THREE**

This question is about rocks near the Earth's surface that have been affected by large forces.

They were deposited in this order.



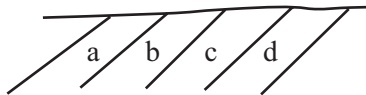
Match words from the list with the numbers 1–4 in the sentences.

**faulted**

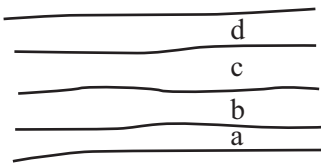
**folded**

**tilted**

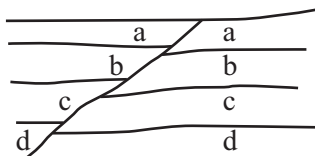
**turned upside down**



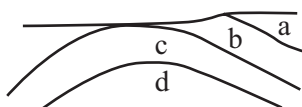
These rocks have been . . . . **1** . . . . .



These rocks have been . . . . **2** . . . . .



These rocks have been . . . . **3** . . . . .



These rocks have been . . . . **4** . . . . .

**QUESTION FOUR**

The diagram shows stages in the cracking of hydrocarbons.

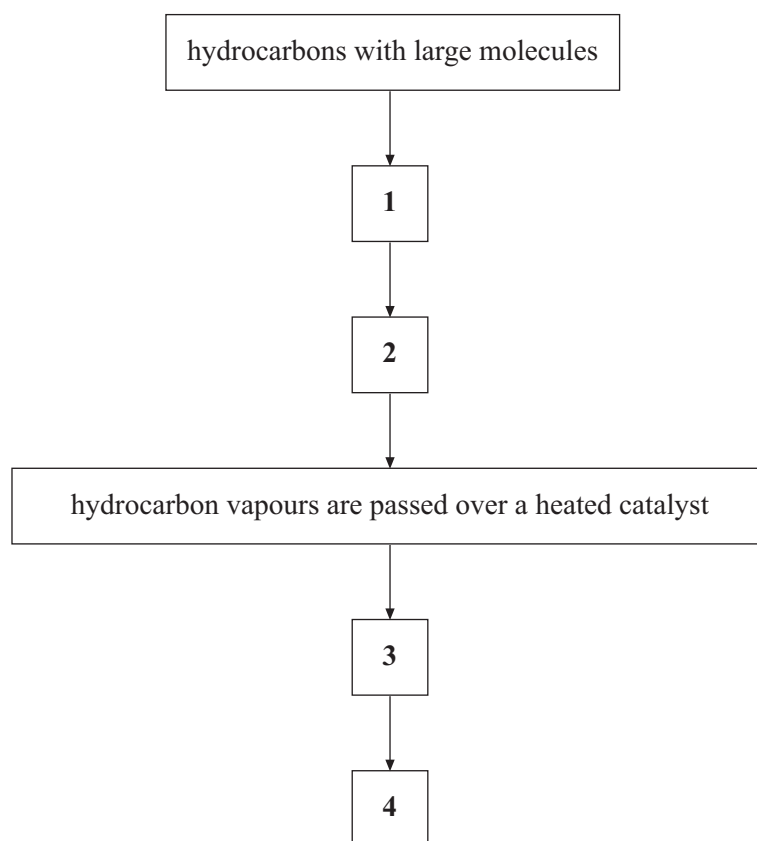
Match words from the list with the numbers 1–4 to show what happens in this process.

**hydrocarbons are heated**

**hydrocarbons vaporise**

**hydrocarbons with small molecules**

**thermal decomposition occurs**



**Turn over ►**

**QUESTION FIVE**

This question is about chemical and physical changes.

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

**burning**

**condensation**

**distillation**

**thermal decomposition**

<b>Process</b>	<b>What happens in the process</b>
<b>1</b>	a compound is split up into simpler substances by heating
<b>2</b>	a fuel reacts with oxygen, releasing thermal (heat) energy
<b>3</b>	a liquid is boiled and then the vapour is cooled to make a purer liquid
<b>4</b>	a vapour cools and changes to a liquid

**NO QUESTIONS APPEAR ON THIS PAGE**

**TURN OVER FOR THE NEXT QUESTION**

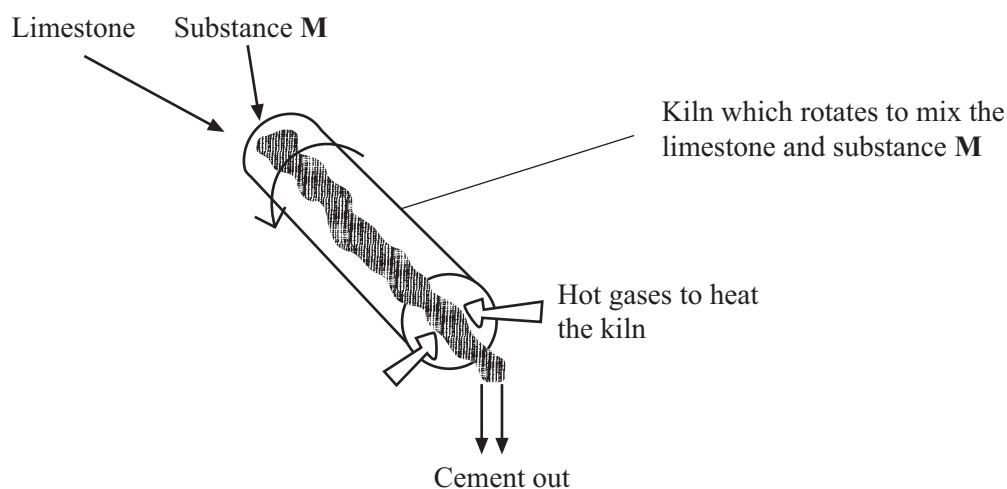
**Turn over ►**

**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.

**QUESTION SIX**

Cement is produced in a rotating kiln.

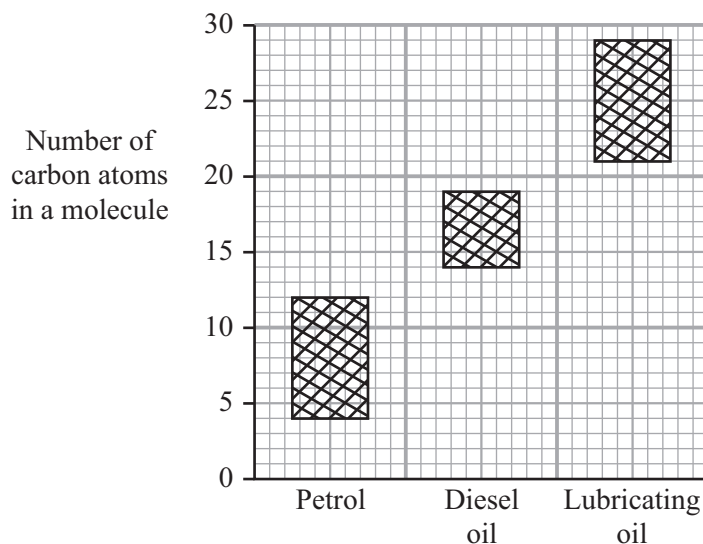
Which **two** of the following statements about the production of cement are correct?**limestone and substance M react when they are heated together****limestone and substance M react when they are mixed together****substance M is a mixture of clay and quicklime****substance M is a mixture of clay and slaked lime****substance M is clay**



**QUESTION SEVEN**

Petrol, diesel oil and lubricating oil are three of the fractions obtained by the fractional distillation of crude oil.

The shaded areas on the chart show the number of carbon atoms in the hydrocarbon molecules in these fractions.



Which **two** of the following statements are correct?

**lubricating oil flows more easily than petrol**

**lubricating oil is more volatile than petrol**

**petrol ignites more easily than diesel oil**

**the boiling point of diesel oil is higher than the boiling point of petrol**

**the hydrocarbon molecules in petrol are larger than those in diesel oil**

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

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

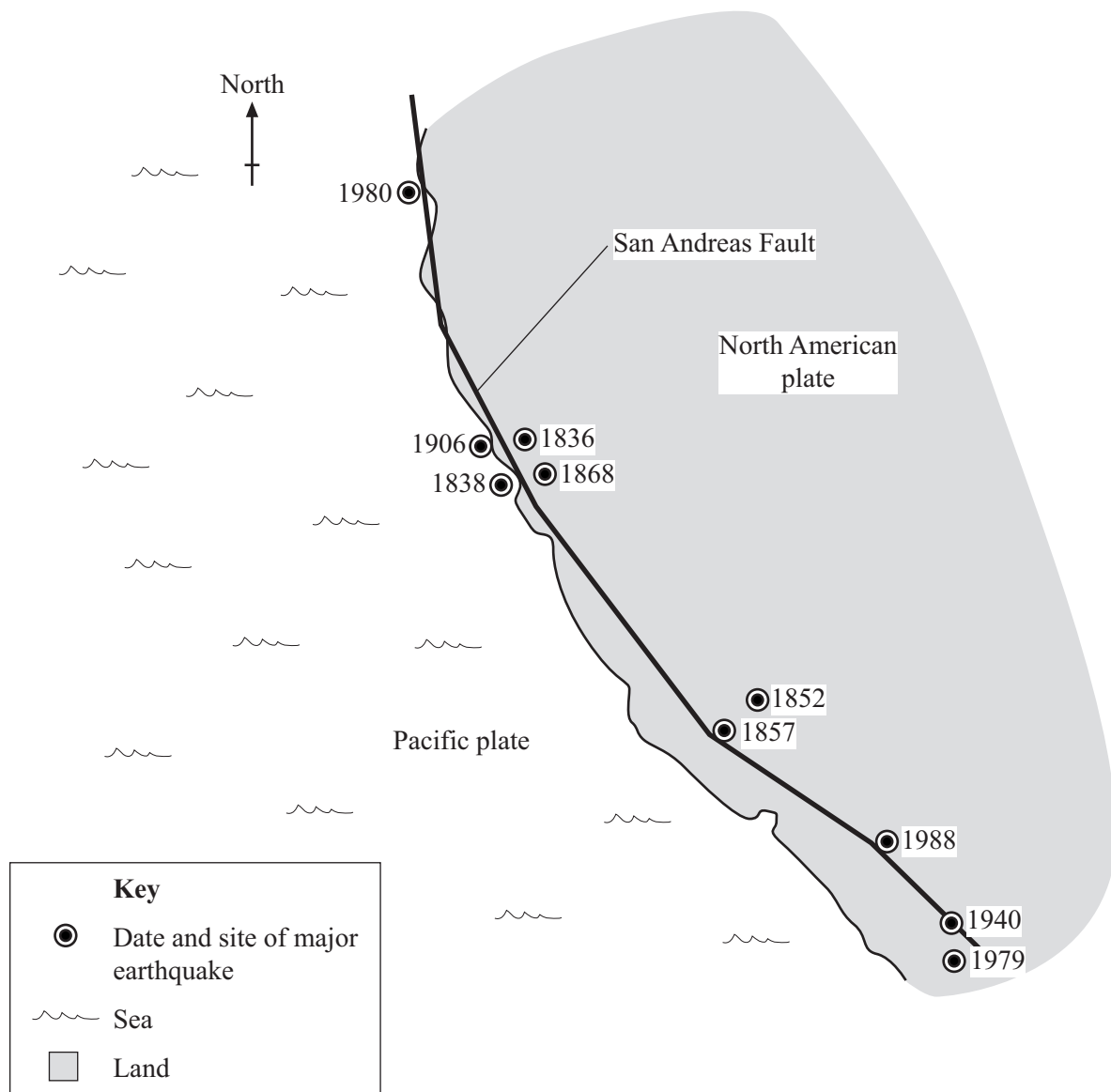
Each of these questions has four parts.

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

Mark your choices on the answer sheet.

**QUESTION EIGHT**

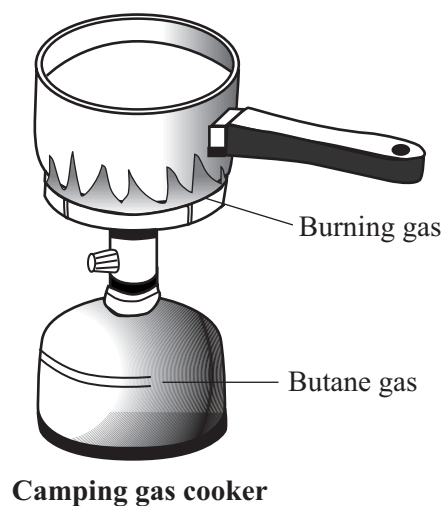
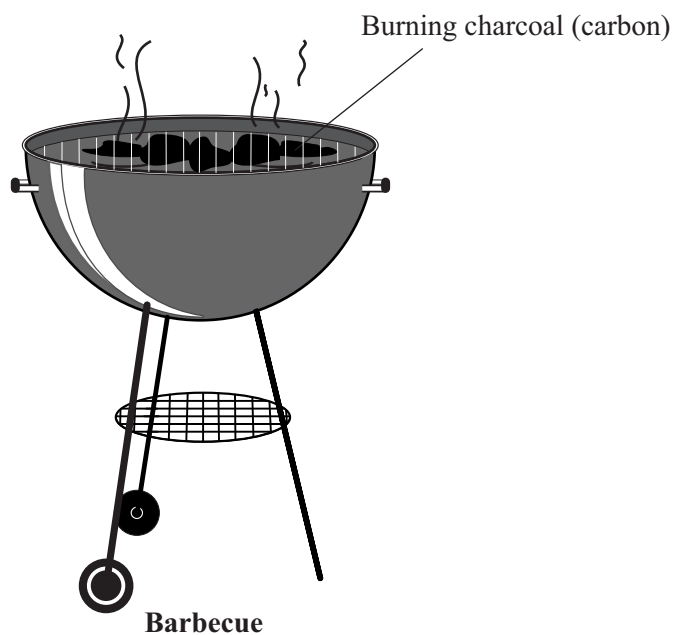
There have often been earthquakes along the Californian coast.



- 8.1** There are earthquakes in this region because . . . . .
- A** the Earth's crust is shrinking.
  - B** the Earth's crust is thin.
  - C** the Earth's mantle lies close to the surface.
  - D** there is a boundary between tectonic plates.
- 8.2** People in California expect another large earthquake in the future. They are not sure when this will be because . . . . .
- A** earthquakes occur in five or ten year cycles.
  - B** earthquakes occur only when there is drilling for oil.
  - C** scientists cannot accurately predict when an earthquake will occur.
  - D** scientists have not yet completed their research.
- 8.3** Tectonic plates are made up of . . . . .
- A** the crust and mantle.
  - B** the crust and upper part of the mantle.
  - C** the crust only.
  - D** the mantle only.
- 8.4** Tectonic plates move . . . . .
- A** a few centimetres a day.
  - B** a few centimetres a year.
  - C** a few metres a day.
  - D** a few metres a year.

**QUESTION NINE**

Campers sometimes cook food on a barbecue or on a camping gas cooker.



**9.1** Which gas is produced when charcoal (carbon) burns?

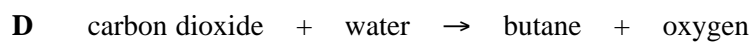
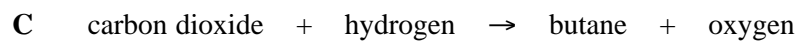
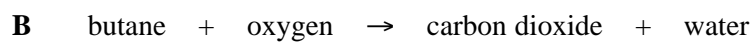
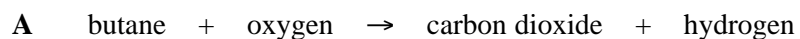
- A Carbon dioxide
- B Nitrogen
- C Oxygen
- D Water (vapour)

**9.2** Butane is a hydrocarbon.

Which elements does butane contain?

- A Carbon and hydrogen
- B Carbon and oxygen
- C Carbon, hydrogen and oxygen
- D Hydrogen and oxygen

**9.3** Which word equation shows the reaction when butane burns?



**9.4** Some fuels also produce sulphur dioxide when they burn.

This is because they contain . . . . .

**A** dioxide.

**B** oxygen.

**C** sodium.

**D** sulphur.

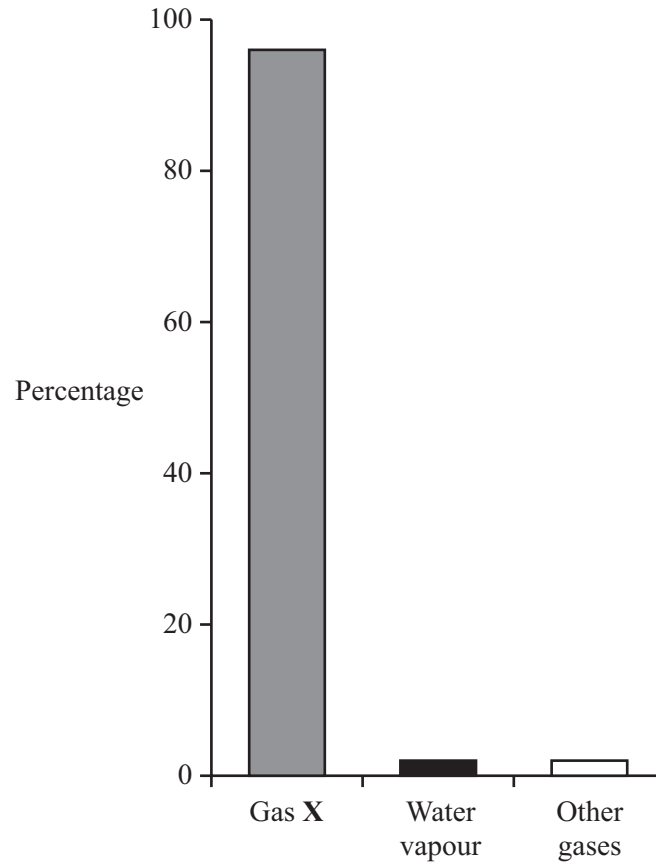
**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION TEN**

The Earth was formed about 4600 million years ago. Sometime afterwards the early atmosphere was created.

The diagram shows the composition of the Earth's early atmosphere.



**10.1** What is Gas X?

- A Carbon dioxide
- B Methane
- C Nitrogen
- D Oxygen

**10.2** How were the gases which formed Earth's early atmosphere released?

- A By bacteria
- B By burning fossil fuels
- C By decomposition of sea water
- D By volcanic activity

**10.3** What happened to most of the water vapour which was produced as the Earth's atmosphere formed?

- A It combined with carbon dioxide to form the ozone layer
- B It condensed to form the oceans
- C It evaporated
- D It reacted with ammonia

**10.4** The amount of oxygen in the atmosphere gradually increased because of . . . . .

- A global warming.
- B the activity of animals.
- C the activity of plants.
- D the formation of the ozone layer.

**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**

This question is about chemical and physical changes.

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

**burning**

**condensation**

**distillation**

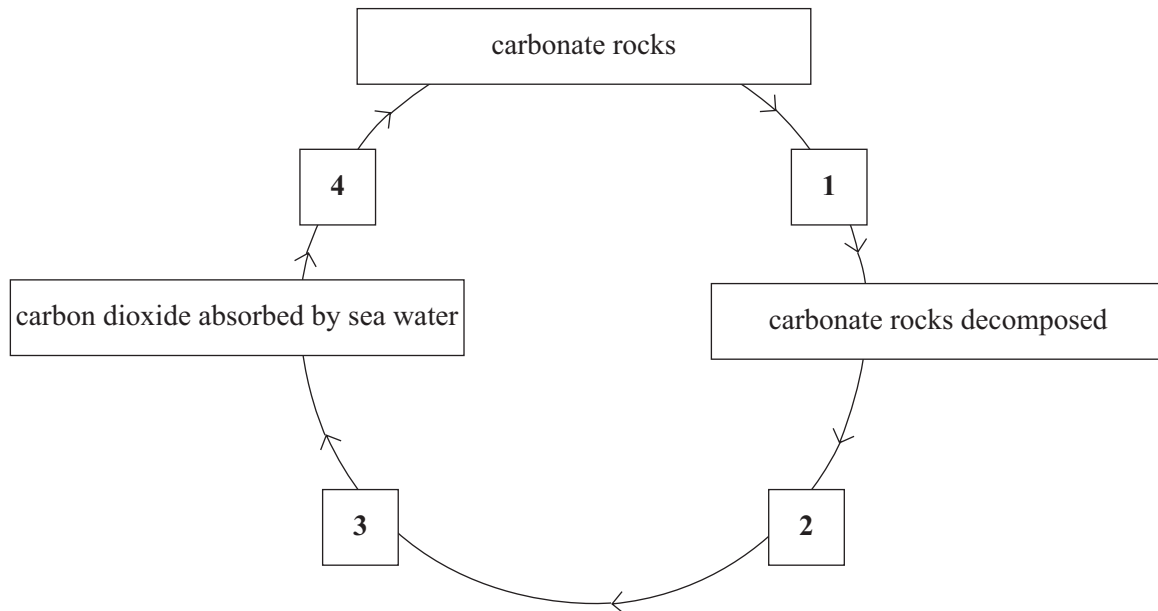
**thermal decomposition**

<b>Process</b>	<b>What happens in the process</b>
<b>1</b>	a compound is split up into simpler substances by heating
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<b>3</b>	a liquid is boiled and then the vapour is cooled to make a purer liquid
<b>4</b>	a vapour cools and changes to a liquid



**QUESTION TWO**

The diagram shows stages in the decomposition and formation of carbonate rocks.



Match words, **J**, **K**, **L** and **M**, from the list with the numbers **1–4** in the diagram.

- J** carbon dioxide produced
- K** carbon dioxide released into the atmosphere by volcanoes
- L** deep burial and heating of carbonate rocks
- M** formation of insoluble carbonates

**TURN OVER FOR THE NEXT QUESTION**

Turn over ►

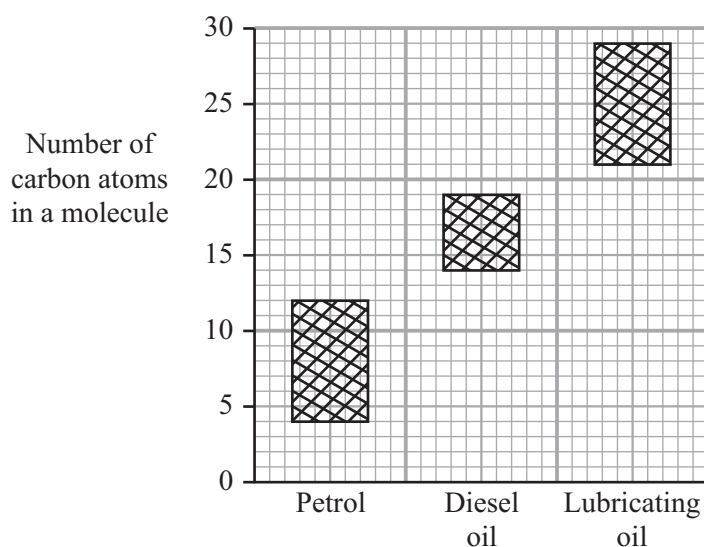
**SECTION B**Questions **THREE** and **FOUR**.In these questions choose the best **two** answers.Do **not** choose more than two.

Mark your choices on the answer sheet.

**QUESTION THREE**

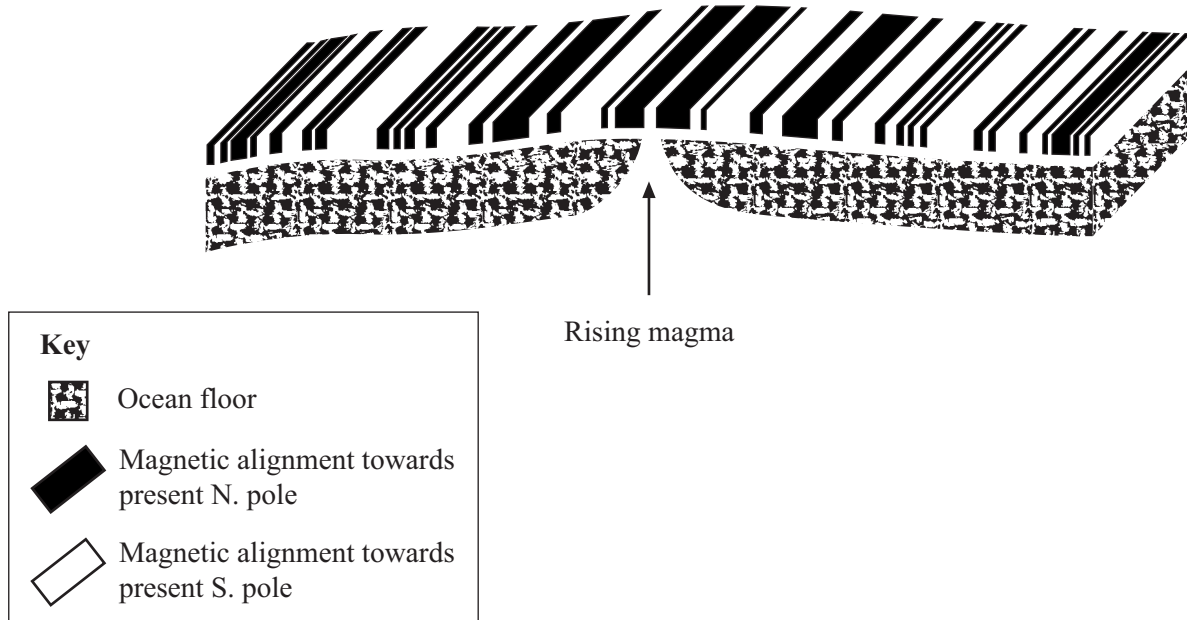
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**QUESTION FOUR**

The Earth's magnetic field reverses from time to time.  
 These magnetic reversal patterns are found in some areas in the oceanic crust.



Which **two** of the following statements about these reversal patterns are correct?

- they are caused by changes in the direction of the Earth's rotation**
- they are formed where two tectonic plates are moving towards each other**
- they are found parallel to oceanic ridges**
- they are recorded by iron-rich minerals in the rocks**
- they can be found on the western side of South America**

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

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

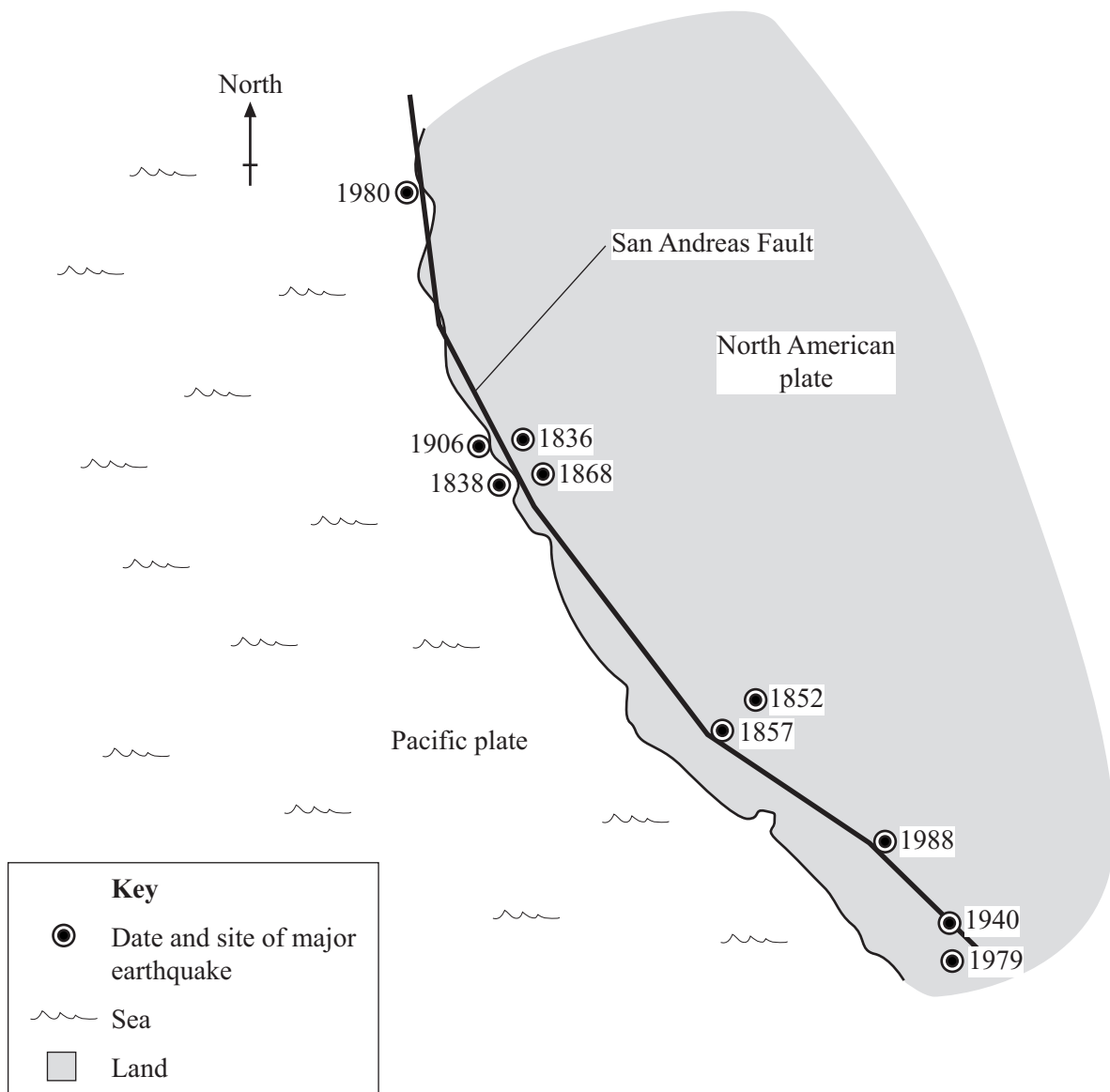
Each of these questions has four parts.

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**QUESTION FIVE**

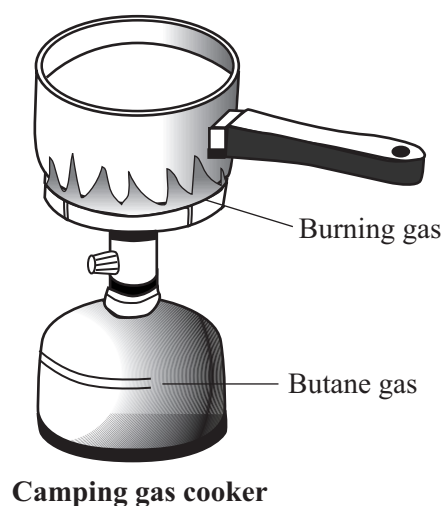
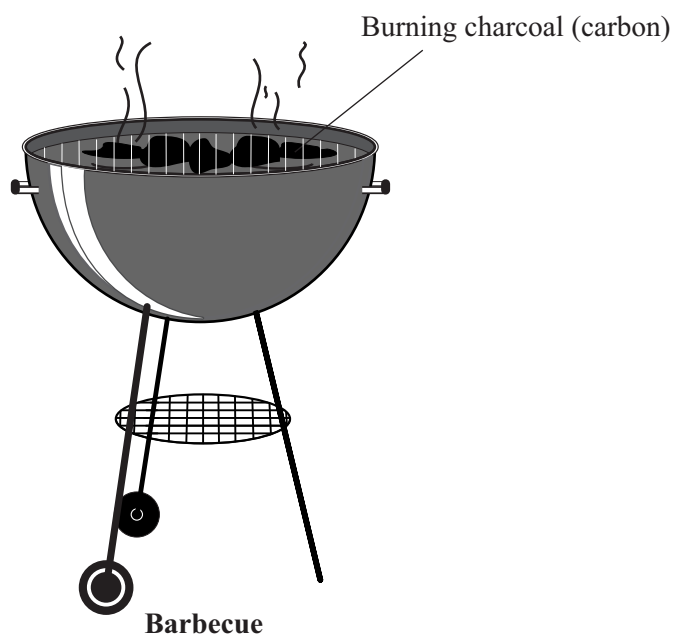
There have often been earthquakes along the Californian coast.



- 5.1** There are earthquakes in this region because . . . . .
- A** the Earth's crust is shrinking.
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**QUESTION SIX**

Campers sometimes cook food on a barbecue or on a camping gas cooker.



**6.1** Which gas is produced when charcoal (carbon) burns?

- A Carbon dioxide
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- C Oxygen
- D Water (vapour)

**6.2** Butane is a hydrocarbon.

Which elements does butane contain?

- A Carbon and hydrogen
- B Carbon and oxygen
- C Carbon, hydrogen and oxygen
- D Hydrogen and oxygen

**6.3** Which word equation shows the reaction when butane burns?

**A** butane + oxygen → carbon dioxide + hydrogen

**B** butane + oxygen → carbon dioxide + water

**C** carbon dioxide + hydrogen → butane + oxygen

**D** carbon dioxide + water → butane + oxygen

**6.4** Some fuels also produce sulphur dioxide when they burn.

This is because they contain . . . . .

**A** dioxide.

**B** oxygen.

**C** sodium.

**D** sulphur.

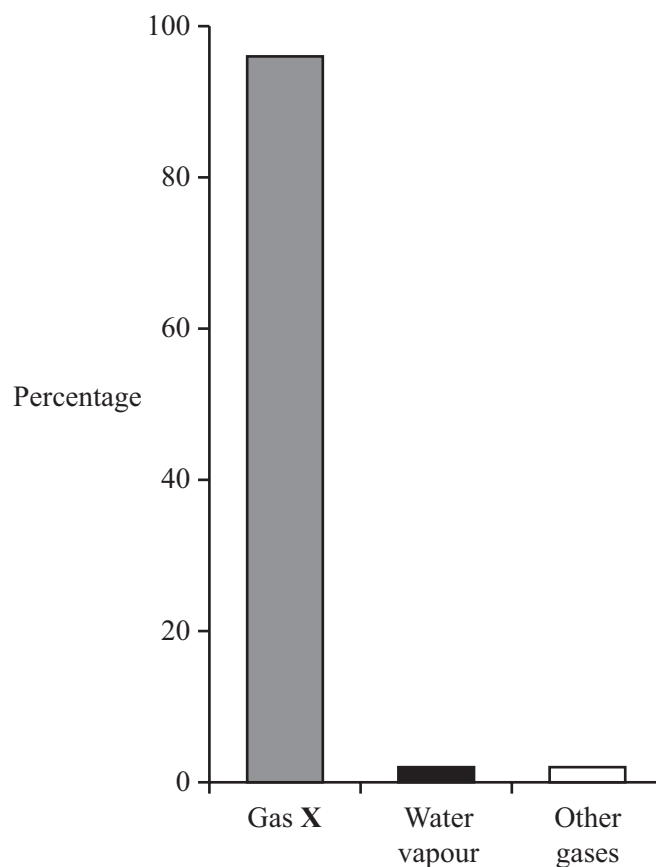
**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION SEVEN**

The Earth was formed about 4600 million years ago. Sometime afterwards the early atmosphere was created.

The diagram shows the composition of the Earth's early atmosphere.



**7.1** What is Gas X?

- A Carbon dioxide
- B Methane
- C Nitrogen
- D Oxygen

**7.2** How were the gases which formed Earth's early atmosphere released?

- A By bacteria
- B By burning fossil fuels
- C By decomposition of sea water
- D By volcanic activity



**7.3** What happened to most of the water vapour which was produced as the Earth's atmosphere formed?

- A** It combined with carbon dioxide to form the ozone layer
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- C** It evaporated
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**7.4** The amount of oxygen in the atmosphere gradually increased because of . . . . .

- A** global warming.
- B** the activity of animals.
- C** the activity of plants.
- D** the formation of the ozone layer.

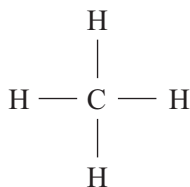
**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION EIGHT**

The alkanes are a series of hydrocarbons.

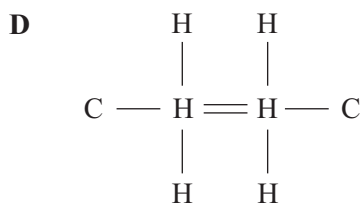
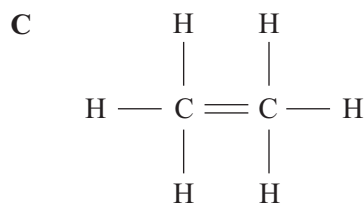
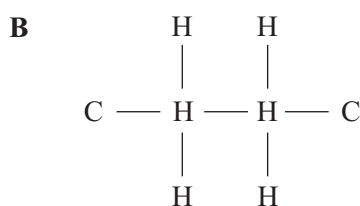
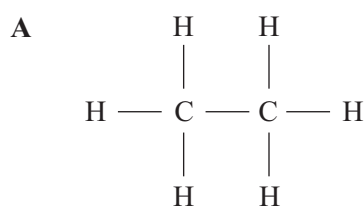
The alkane with the smallest molecules is called methane.



**Structural formula of methane  
showing the bonds between the atoms**

**8.1** The next alkane in the series is ethane,  $\text{C}_2\text{H}_6$

What is the structural formula for ethane?



**8.2** Which line shows the number of bonds to each carbon and hydrogen atom in an alkane molecule?

	<b>Bonds to each carbon atom</b>	<b>Bonds to each hydrogen atom</b>
<b>A</b>	1	1
<b>B</b>	1	4
<b>C</b>	4	1
<b>D</b>	4	4

**8.3** The simplest alkene is . . . . .

- A butane.
- B ethane.
- C ethene.
- D propene.

**8.4** Alkene molecules are different from alkane molecules because . . . . .

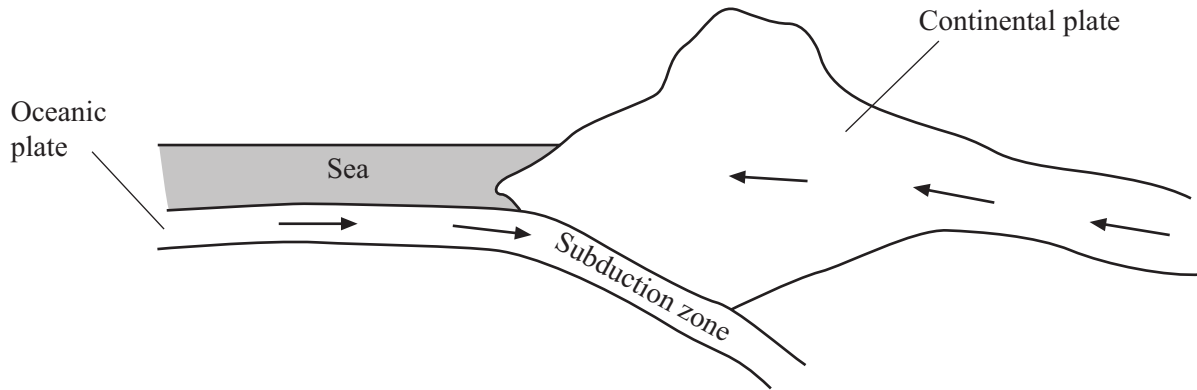
- A they are larger.
- B they have a double bond between two of the carbon atoms.
- C they have a double bond between two of the hydrogen atoms.
- D they have covalent bonds.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION NINE**

The diagram shows an oceanic plate and a continental plate moving towards each other.



- 9.1** As the plates move together, . . . . .
- A** an oceanic ridge is formed.
  - B** magnetic reversal patterns are formed.
  - C** sea floor spreading takes place.
  - D** the oceanic plate is driven downwards.
- 9.2** What happens in the subduction zone?
- A** A large fault develops
  - B** A new sedimentary rock is formed
  - C** New continental crust is formed
  - D** The oceanic plate partially melts to form magma
- 9.3** At the plate boundary, the continental plate is forced upwards to form . . . . .
- A** a mountain chain.
  - B** an oceanic ridge.
  - C** new basaltic crust.
  - D** new oceanic crust.

**9.4** As the continental plate is forced upwards, the sediments in the plate . . . . .

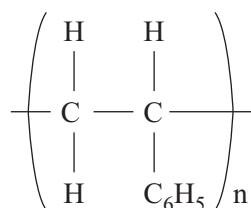
- A** are folded and metamorphosed.
- B** are melted.
- C** become less dense.
- D** form a basaltic magma.

**TURN OVER FOR THE NEXT QUESTION**

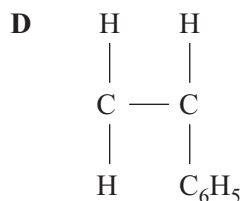
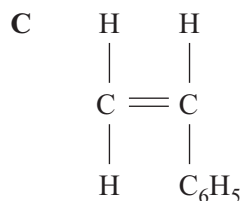
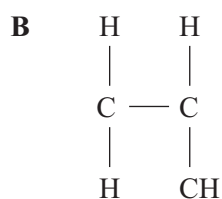
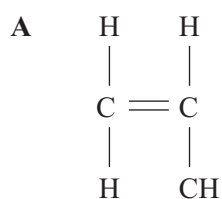
**Turn over ►**

## QUESTION TEN

The polymer, poly(styrene), can be represented like this:



10.1 The monomer from which this polymer is formed is . . . . .



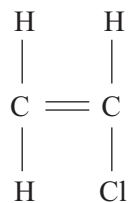
10.2 The monomer is . . . . .

- A** a saturated alkane.
- B** a saturated alkene.
- C** an unsaturated alkane.
- D** an unsaturated hydrocarbon.

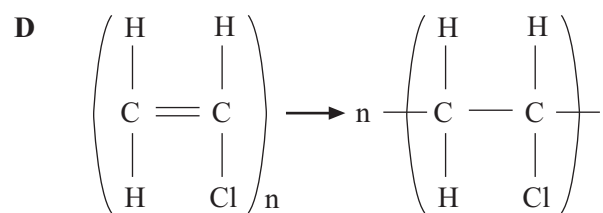
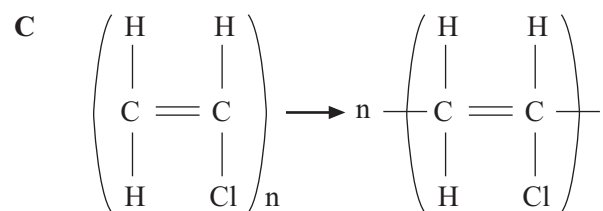
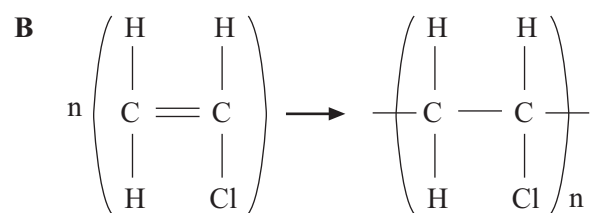
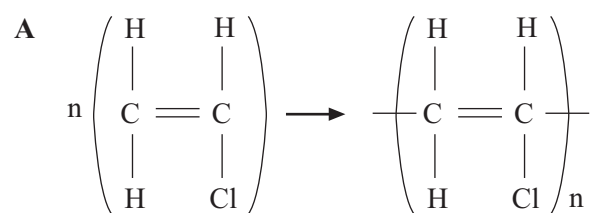
10.3 Monomer molecules can join together to form polymer molecules because . . . . .

- A** they are reactive.
- B** they are saturated.
- C** they have a double carbon carbon bond.
- D** they have covalent bonds.

**10.4** A vinyl chloride molecule can be represented like this:



Which is the correct equation for the formation of the polymer, polyvinylchloride?



**END OF TEST**

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