Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

General Certificate of Secondary Education
June 2006

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

ASSESSMENT and QUALIFICATIONS ALLIANCE

Tuesday 27 June 2006 Morning Session

For this paper you must have:
- a black ball-point pen
- an objective test answer sheet

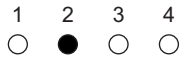
You may use a calculator.

Time allowed: 30 minutes

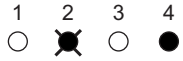
Instructions
- Fill in the boxes at the top of this page.
- Check that your name, candidate number and centre number are printed on the separate answer sheet.
- Check that the separate answer sheet has the title 'Earth Materials' printed on it.
- Attempt **one Tier only**, **either** the Foundation Tier **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.
- Do all rough work in this book, **not** on your answer sheet.

Instructions for recording answers

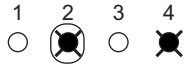
- Use a **black ball-point pen**.
- For each answer **completely fill in the circle** as shown:



- Do **not** extend beyond the circles.
- If you want to change your answer, **you must** cross out your original answer, as shown:



- 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:



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.

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

FOUNDATION TIER

SECTION A

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

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

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

Mark your choices on the answer sheet.

QUESTION ONE

The table is about gases found in the Earth's atmosphere.

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

carbon dioxide

methane

nitrogen

oxygen

Gas	What we can say about the gas
1	it is a hydrocarbon gas that was there in only small amounts in the Earth's early atmosphere
2	it makes up about $\frac{1}{5}$ of the atmosphere now
3	it makes up about $\frac{4}{5}$ of the atmosphere now
4	it was the main gas in the Earth's early atmosphere

QUESTION TWO

This question is about burning hydrocarbon fuels.

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

carbon dioxide

oxygen

sulphur dioxide

water (vapour)

When a hydrocarbon fuel burns, it is reacting with . . . **1** . . . .

Carbon in the fuel reacts to make . . . **2** . . . .

Hydrogen in the fuel reacts to make . . . **3** . . . .

Some hydrocarbon fuels also contain a little sulphur. So when they burn, they make . . . **4** . . . .

QUESTION THREE

This question is about crude oil.

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

atoms

fractions

hydrocarbons

molecules

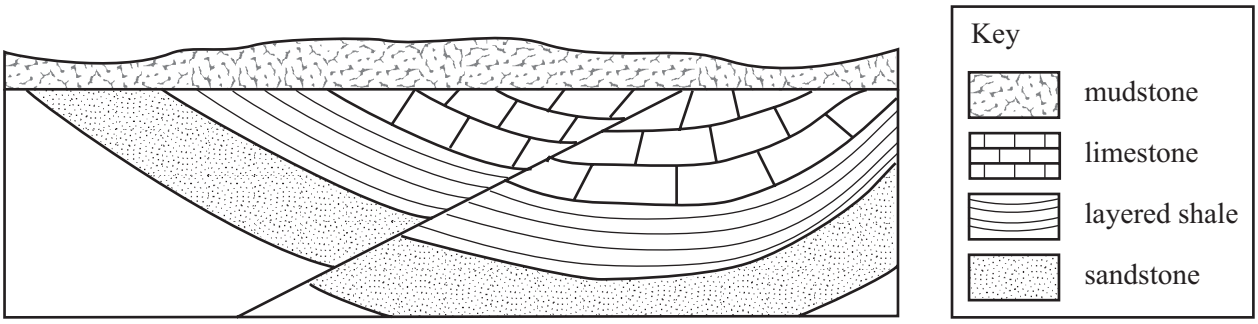
Crude oil is a mixture that contains a large number of compounds called . . . **1** . . . .

The crude oil is separated by fractional distillation into a number of parts called . . . **2** . . . .

In each of these parts, the compounds have . . . **3** . . . with similar numbers of carbon . . . **4** . . . .

QUESTION FOUR

The diagram shows the rocks in a section of the Earth's crust.



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

layered shale

limestone

mudstone

sandstone

Rock type	What we can say about the rock type
1	it has not been faulted
2	it is probably the oldest rock
3	it shows evidence of breaks in deposition
4	it was deposited immediately after the shale

QUESTION FIVE

The flow diagram shows how slaked lime is made.

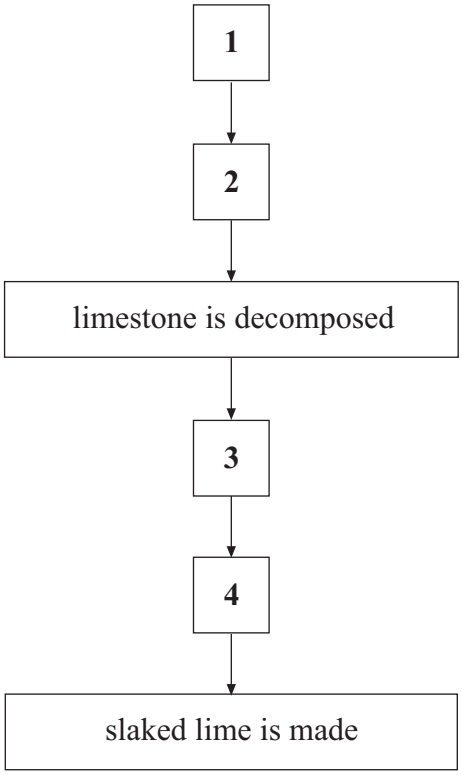
Match words from the list with the numbers **1–4** in the diagram.

carbon dioxide and quicklime are made

limestone is heated in a kiln

limestone is quarried and powdered

quicklime is reacted with water



Turn over for the next question

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

This question is about the Earth's crust.

Which **two** statements are correct?

large-scale movements of the Earth's crust may cause mountains to form

the Earth's crust and mantle together form the lithosphere

the Earth's crust is made up entirely of sedimentary rocks

the Earth's crust is solid and never moves

the material of the Earth's crust is less dense than that of the Earth's interior

QUESTION SEVEN

This question is about the hydrocarbons in crude oil.

Which **two** of the statements, **P**, **Q**, **R**, **S** and **T**, are correct?

P **all hydrocarbon molecules contain the same number of carbon atoms**

Q **the hydrocarbon molecules in crude oil vary in size**

R **the hydrocarbons in crude oil can be separated by fractional distillation**

S **the hydrocarbons with the lowest boiling points are those with the largest molecules**

T **the most viscous hydrocarbons are those with the smallest molecules**

Turn over for the next question

SECTION C

Questions **EIGHT** to **TEN**.

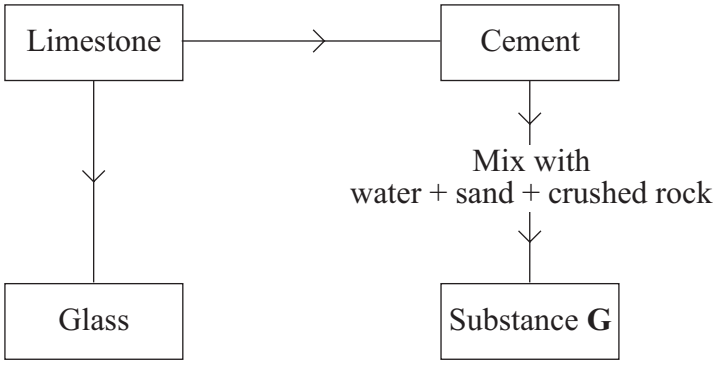
Each of these questions has four parts.

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

Mark your choices on the answer sheet.

QUESTION EIGHT

The chart shows some of the substances that can be made from limestone.



8.1 To make cement, powdered limestone is heated in a rotary kiln with . . .

A clay.

B quicklime.

C sand.

D soda.

8.2 Substance **G** is . . .

A calcium hydroxide.

B calcium oxide.

C clay.

D concrete.

8.3 Glass is made by heating a mixture of . . .

A clay, limestone and soda.

B clay, quicklime and sand.

C limestone, sand and soda.

D quicklime and soda.

8.4 Limestone (calcium carbonate) breaks down when it is heated strongly.
Copper carbonate breaks down in a similar way.

What are the products from the breakdown of copper carbonate?

A Copper + carbon dioxide

B Copper + water

C Copper oxide + carbon dioxide

D Copper oxide + water

Turn over for the next question

QUESTION NINE

There is a hydrocarbon called decane.
Its formula is $C_{10}H_{22}$
A molecule of decane can be cracked to make two different hydrocarbons with smaller molecules.

$$\underset{\text{decane}}{C_{10}H_{22}} \rightarrow \underset{\text{octane}}{C_8H_{18}} + \underset{\text{ethene}}{C_2H_4}$$

9.1 Decane can be cracked by . . .

A condensation.

B distillation.

C thermal decomposition.

D vaporisation.

9.2 Octane is used as a fuel in car engines.

When octane burns in plenty of air, the products are . . .

A carbon dioxide and oxygen.

B carbon dioxide and water (vapour).

C oxygen and water (vapour).

D sulphur dioxide and oxygen.

9.3 Poly(ethene) is made from ethene by polymerisation.

Poly(ethene) is used for making . . .

A cardboard.

B crates.

C plastic bags.

D ropes.

9.4 In some hydrocarbon molecules, the carbon atoms are arranged in a chain.
The more carbon atoms in the molecule, the longer the chain.

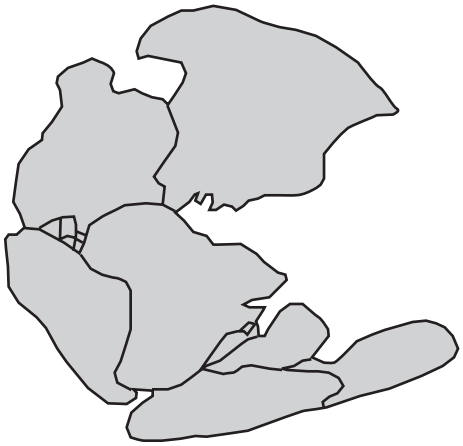
Which line correctly describes the change in the length of the chain, caused by cracking and polymerisation of hydrocarbons?

	Cracking	**Polymerisation**
A	decreased	decreased
B	decreased	increased
C	increased	decreased
D	increased	increased

Turn over for the next question

QUESTION TEN

In 1915, the German scientist, Alfred Wegener, suggested that all the continents had once been joined together.



10.1 One piece of evidence for Wegener's suggestion is that the edges of some continents . . .

A have coastlines which fit together quite closely.

B have mountain ranges.

C have similar patterns of weather.

D have similar shapes.

Wegener also suggested that over millions of years the continents had split up and separate pieces had moved apart.

10.2 What name was given to this theory?

A Continental drift

B Crustal shrinking

C Earthquake activity

D Metamorphism

10.3 At the time, few scientists agreed with Wegener.

More recent evidence has suggested that large pieces of the Earth's lithosphere are moved by . . .

A convection currents in the core.

B convection currents in the mantle.

C earthquakes.

D the rotation of the Earth.

10.4 These large pieces of the Earth's lithosphere move with relative speeds of . . .

A a few centimetres a day.

B a few centimetres a week.

C a few centimetres a month.

D a few centimetres a year.

END OF TEST

You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.
The Foundation Tier is earlier in this booklet.

HIGHER TIER

SECTION A

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

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

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

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QUESTION ONE

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carbon dioxide and quicklime are made

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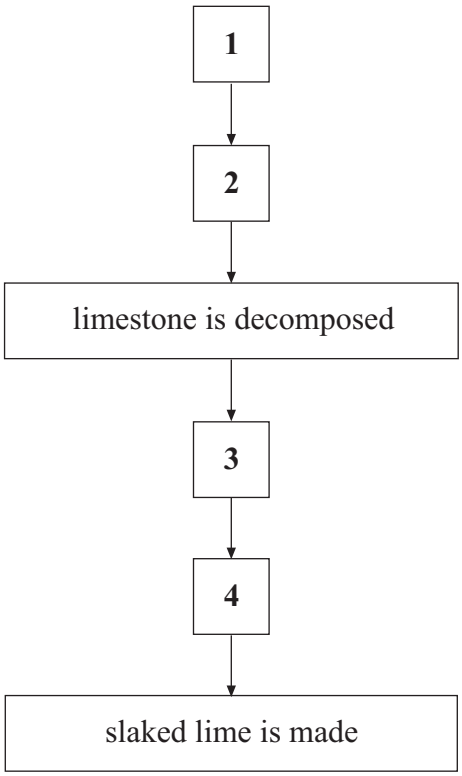

QUESTION TWO

This question is about reactions in the Earth's atmosphere and crust.

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

calcium carbonate

calcium hydrogencarbonate

methane

oxygen

Carbon dioxide and water were formed in the atmosphere when . . . **1** . . . reacted with oxygen.

Green plants give off . . . **2** . . . into the atmosphere.

When carbon dioxide reacts with sea water, it forms the soluble compound . . . **3** . . . .

Insoluble . . . **4** . . . is deposited as sediment in the oceans.

Turn over for the next question

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

This question is about the hydrocarbons in crude oil.

Which **two** of the statements, **P**, **Q**, **R**, **S** and **T**, are correct?

P **all hydrocarbon molecules contain the same number of carbon atoms**

Q **the hydrocarbon molecules in crude oil vary in size**

R **the hydrocarbons in crude oil can be separated by fractional distillation**

S **the hydrocarbons with the lowest boiling points are those with the largest molecules**

T **the most viscous hydrocarbons are those with the smallest molecules**

QUESTION FOUR

This question is about a hydrocarbon.

The chemical formula for the hydrocarbon is C_2H_6

Which **two** statements about this hydrocarbon are correct?

it is an alkane

it is unsaturated

it reacts with bromine water, turning it colourless

the carbon atoms are joined by a covalent bond

the carbon atoms are joined by a double bond

Turn over for the next question

SECTION C

Questions **FIVE** to **TEN**.

Each of these questions has four parts.

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

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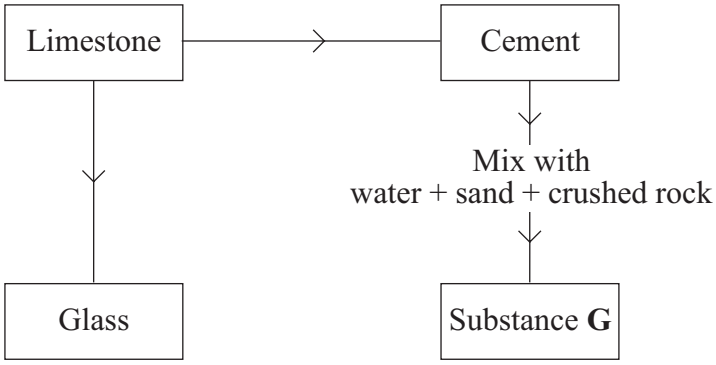
QUESTION FIVE

The chart shows some of the substances that can be made from limestone.



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Turn over for the next question

QUESTION SEVEN

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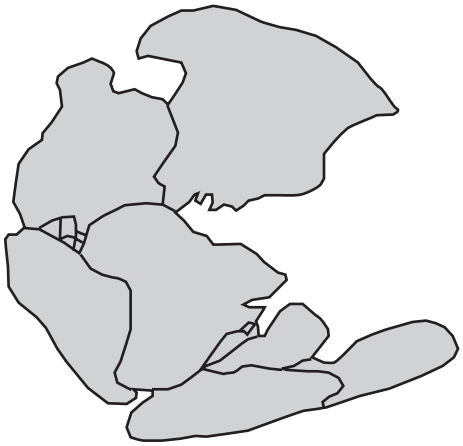

7.1 One piece of evidence for Wegener's suggestion is that the edges of some continents . . .

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B have mountain ranges.

C have similar patterns of weather.

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Wegener also suggested that over millions of years the continents had split up and separate pieces had moved apart.

7.2 What name was given to this theory?

A Continental drift

B Crustal shrinking

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D Metamorphism

7.3 At the time, few scientists agreed with Wegener.

More recent evidence has suggested that large pieces of the Earth's lithosphere are moved by . . .

A convection currents in the core.

B convection currents in the mantle.

C earthquakes.

D the rotation of the Earth.

7.4 These large pieces of the Earth's lithosphere move with relative speeds of . . .

A a few centimetres a day.

B a few centimetres a week.

C a few centimetres a month.

D a few centimetres a year.

Turn over for the next question

QUESTION EIGHT

The Earth's early atmosphere contained very little nitrogen or oxygen.

The amounts of both these gases have increased and now they make up most of the Earth's atmosphere.

8.1 Some of this nitrogen was given off . . .

A by burning fossil fuels.

B by denitrifying bacteria.

C by the reaction between ammonia and carbon dioxide.

D by the reaction between methane and oxygen.

8.2 Nitrogen was also made by the reaction of ammonia with oxygen.

Which word equation shows this reaction?

A ammonia + oxygen → nitrogen + carbon dioxide

B ammonia + oxygen → nitrogen + carbon dioxide + water

C ammonia + oxygen → nitrogen + hydrogen + water

D ammonia + oxygen → nitrogen + water

8.3 The amount of oxygen in the atmosphere increased because of . . .

A the activity of plants.

B the decomposition of carbonate rocks.

C the formation of fossil fuels.

D the reaction between carbon dioxide and sea water.

8.4 As the amount of oxygen in the atmosphere increased, ozone was formed.

Scientists believe that one important effect of the ozone layer was to . . .

A allow the evolution of new living organisms.

B filter out infra red radiation.

C increase the amount of ultraviolet radiation reaching the Earth.

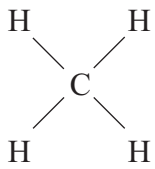
D reduce global warming.

Turn over for the next question

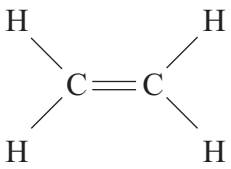
QUESTION NINE

The diagrams show the structural formulae of the molecules of four hydrocarbon compounds, **J**, **K**, **L** and **M**.

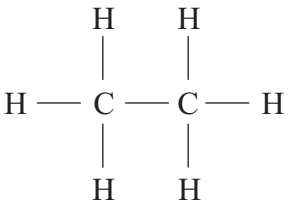
Hydrocarbon J



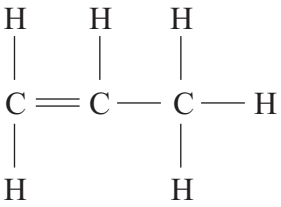
Hydrocarbon K



Hydrocarbon L



Hydrocarbon M



9.1 Which of these compounds can form polymers?

A Hydrocarbons **J** and **K**

B Hydrocarbons **K** and **M**

C Hydrocarbons **L** and **M**

D Hydrocarbon **K** only

9.2 Each small hydrocarbon molecule from which a polymer is made is called . . .

A a monomer.

B an alkane.

C an ester.

D an oxide.

9.3 From which of the four hydrocarbons can poly(ethene) be made?

A Hydrocarbon **J**

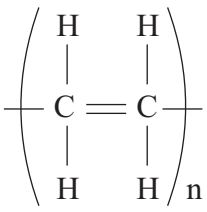
B Hydrocarbon **K**

C Hydrocarbon **L**

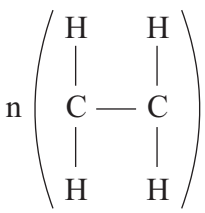
D Hydrocarbon **M**

9.4 Which formula represents poly(ethene)?

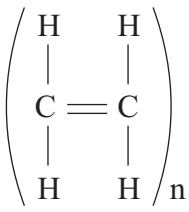
A



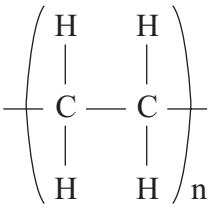
B



C



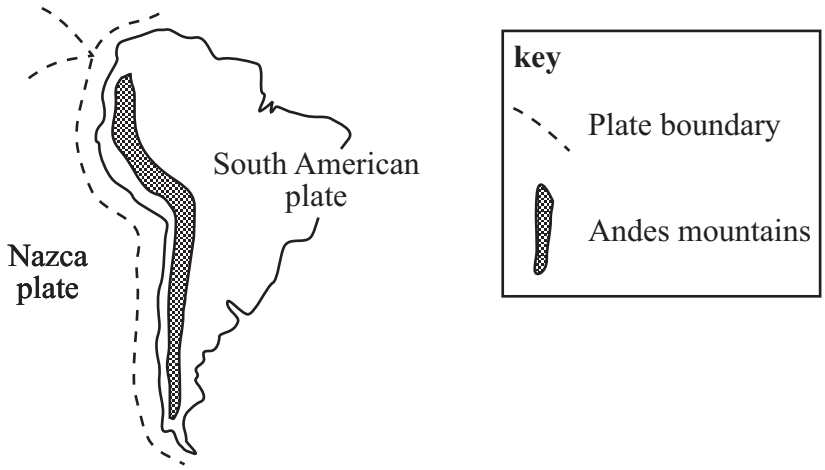
D



Turn over for the next question

QUESTION TEN

The boundary between two tectonic plates is close to the west coast of South America.



10.1 The Nazca plate lies beneath the South American plate at their boundary.

This is because the Nazca plate is . . .

A folded.

B molten.

C more dense.

D thicker.

10.2 The Andes mountains were formed because . . .

A a severe earthquake occurred.

B magma rose up between the two plates.

C the continental crust was raised and folded.

D there was sea floor spreading.

10.3 Magma sometimes rises from volcanoes in the Andes.

The magma forms from . . .

A the Earth’s core.

B the Earth’s mantle.

C the molten Nazca plate.

D the molten South American plate.

10.4 The Nazca and South American plates must be . . .

A moving away from each other.

B moving towards each other.

C sliding past each other.

D stationary.

END OF TEST

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