Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

General Certificate of Secondary Education
March 2007

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

ASSESSMENT and QUALIFICATIONS ALLIANCE

Wednesday 7 March 2007 Morning Session

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

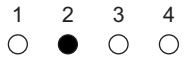
You may use a calculator.

Time allowed: 30 minutes

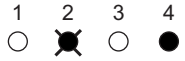
Instructions
- Fill in the boxes at the top of this page.
- Check that your name, candidate number and centre number are printed on the separate answer sheet.
- Check that the separate answer sheet has the title 'Earth Materials' printed on it.
- Attempt **one Tier only**, **either** the Foundation Tier **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

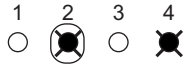
- Use a **black ball-point pen**.
- For each answer **completely fill in the circle** as shown:



- 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 from the list with the numbers.

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

Mark your choices on the answer sheet.

QUESTION ONE

This question is about the amounts of gases in the Earth's early atmosphere and in the Earth's atmosphere today.

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

almost all

four fifths

one fifth

small amounts of

The Earth's early atmosphere was . . . **1** . . . carbon dioxide.

The early atmosphere also contained . . . **2** . . . water vapour, ammonia and methane.

The atmosphere today is approximately . . . **3** . . . nitrogen and . . . **4** . . . oxygen.

QUESTION TWO

This question is about chemical compounds.

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

hydrocarbon

quicklime

soda

water

Compound	What we can say about the compound
1	it is a carbonate of sodium
2	it is a compound of hydrogen and carbon only
3	it is an oxide of calcium
4	it is an oxide of hydrogen

QUESTION THREE

This question is about cracking hydrocarbons.

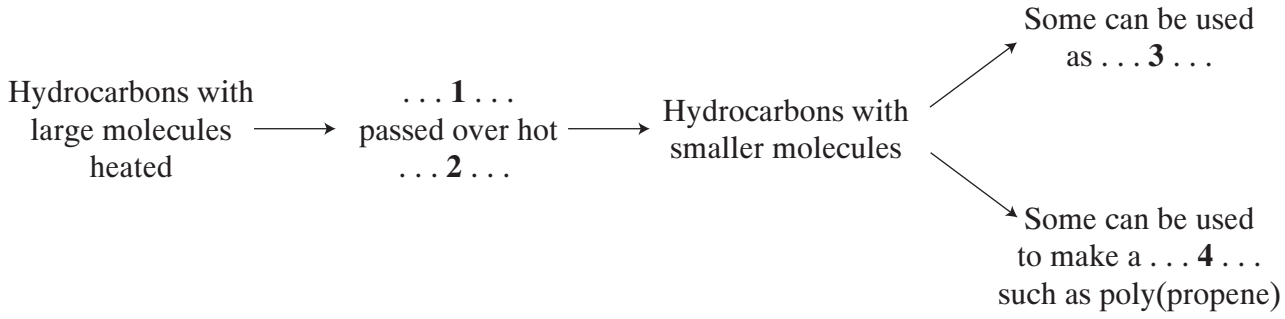
Match words from the list with the numbers **1–4** in the sequence.

catalyst

fuel

plastic

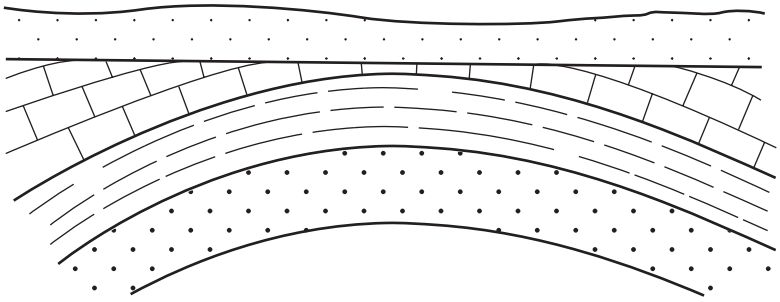
vapour



QUESTION FOUR

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

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



Rock type	What we can say about the rock type
1	it has not been affected by large forces in the Earth's crust
2	it is the youngest folded rock
3	it shows evidence of breaks in deposition
4	it shows evidence of waves or currents when it was deposited

QUESTION FIVE

This question is about chemical and physical processes.

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

biodegraded

neutralised

oxidised

vaporised

Hydrogen is . . . **1** . . . to water when it burns in air.

When they are distilled, hydrocarbons with small molecules are easily . . . **2** . . . .

Most plastics are a problem for waste disposal because they are not easily . . . **3** . . . .

Acidity in lakes can be . . . **4** . . . by powdered limestone.

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

The gases released into the air when oil burns may include:

- carbon dioxide
- sulphur dioxide
- water vapour.

Which **two** statements are correct?

oil is a compound that contains oxygen

sulphur dioxide is an element

these three gases are oxides

water vapour is a fluoride of hydrogen

when oil burns, the carbon it contains reacts with oxygen

QUESTION SEVEN

This question is about the properties of two hydrocarbons, **K** and **L**, in crude oil.

Property	Hydrocarbon K	Hydrocarbon L
Boiling point	0 °C	216 °C
How it ignites	Ignites easily	Ignites with some difficulty

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

P **hydrocarbon K has fewer carbon atoms in a molecule than hydrocarbon L**

Q **hydrocarbon K has smaller molecules than hydrocarbon L**

R **hydrocarbon K is a liquid at room temperature (20 °C)**

S **hydrocarbon K is less volatile than hydrocarbon L**

T **hydrocarbon K is more viscous than hydrocarbon L**

Turn over for the next question

SECTION C

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

Each of these questions has four parts.

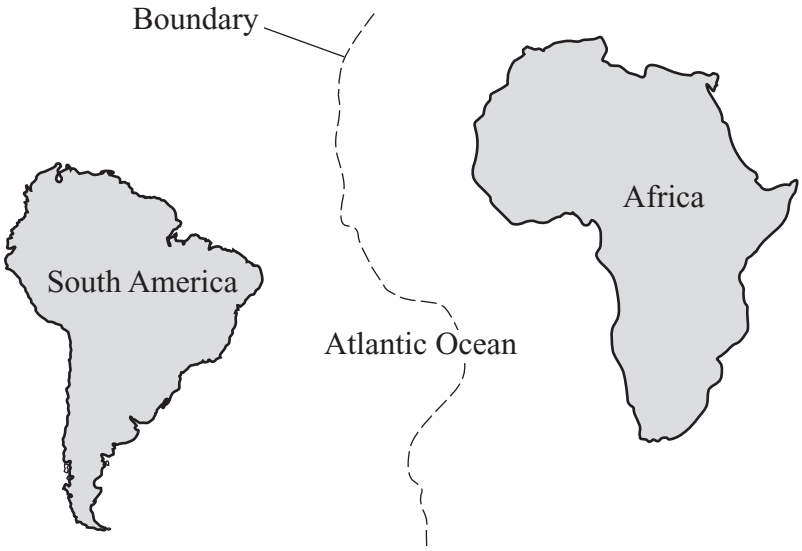
In each part choose only **one** answer.

Mark your choices on the answer sheet.

QUESTION EIGHT

The diagram shows the present positions of South America and Africa.

The position of the boundary between the tectonic plates on which they lie is also drawn.



8.1 The patterns of rocks on the east coast of South America and the west coast of Africa are very similar.

This suggests that . . .

A Africa and South America have been moving slowly towards each other.

B Africa and South America were once together and have been moving slowly away from each other.

C Africa has been slowly sliding beneath South America.

D South America has been slowly sliding beneath Africa.

8.2 Tectonic plates are constantly moving.

This movement is caused by . . .

A convection currents.

B shrinking of the Earth's crust.

C the gravitational attraction of the Sun.

D the rotation of the Earth.

8.3 The interior of the Earth remains hot because of . . .

A earthquakes.

B friction between the core and the mantle.

C friction between the moving plates.

D natural radioactive processes.

8.4 The plates move with speeds of . . .

A a few centimetres a day.

B a few centimetres a week.

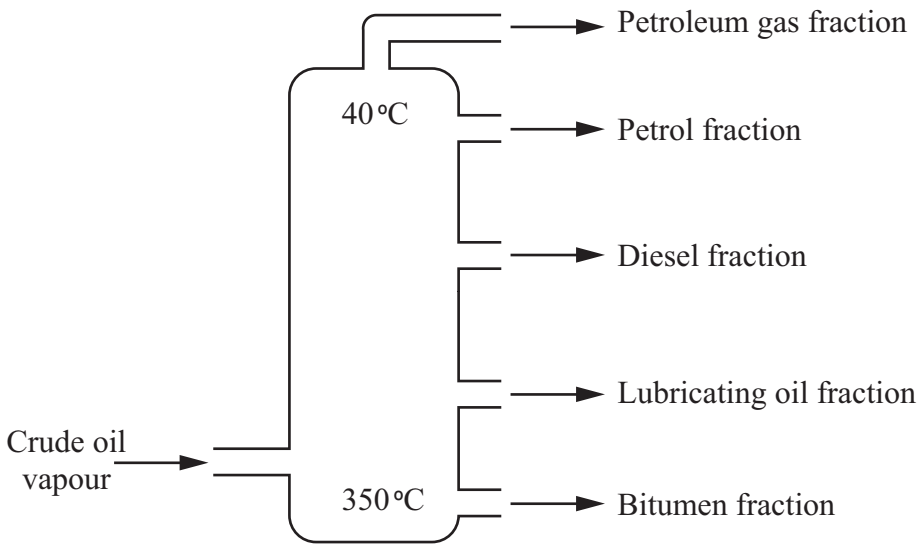
C a few centimetres a month.

D a few centimetres a year.

Turn over for the next question

QUESTION NINE

Fractional distillation is used to separate crude oil into fractions.



9.1 Crude oil can be separated into fractions by fractional distillation because the fractions have different . . .

A boiling points.

B chemical properties.

C densities.

D viscosities.

9.2 The hydrocarbons in the petrol fraction have . . .

A a similar number of oxygen atoms in each molecule.

B different chemical properties.

C different colours.

D similar boiling points.

9.3 The hydrocarbons in the petrol fraction have 4 – 12 carbon atoms in each molecule.

In which fraction will the hydrocarbons CH_4 and C_2H_6 be found?

A Bitumen fraction

B Diesel fraction

C Lubricating oil fraction

D Petroleum gas fraction

9.4 Which line describes the properties of a hydrocarbon in the bitumen fraction?

A Boiling point 40 °C, very volatile

B Boiling point 100 °C, ignites fairly easily

C Boiling point 200 °C, difficult to ignite, flows quite easily

D Boiling point over 300 °C, viscous

Turn over for the next question

QUESTION TEN

This question is about limestone and substances made from it.

10.1 The word equation shows the breakdown of limestone when it is heated in a lime kiln.

calcium carbonate → substance **Y** + carbon dioxide

Substance **Y** is . . .

A calcium chloride.

B calcium hydrogencarbonate.

C calcium hydroxide.

D calcium oxide.

10.2 Powdered limestone can be mixed with powdered clay and heated in a rotary kiln.

The main useful product is . . .

A cement.

B concrete.

C glass.

D quicklime.

10.3 The chemical name for slaked lime is . . .

A calcium chloride.

B calcium hydroxide.

C calcium oxide.

D calcium sulphate.

10.4 One use of slaked lime is to . . .

A make concrete.

B make quicklime.

C make soil less acidic.

D neutralise alkaline lake water.

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**.

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Mark your choices on the answer sheet.

QUESTION ONE

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biodegraded

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Hydrogen is . . . **1** . . . to water when it burns in air.

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Most plastics are a problem for waste disposal because they are not easily . . . **3** . . . .

Acidity in lakes can be . . . **4** . . . by powdered limestone.

QUESTION TWO

This question is about four gases.

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

carbon dioxide (CO_2)

ethene (C_2H_4)

methane (CH_4)

nitrogen (N_2)

Gas	What we can say about the gas
1	it is a hydrocarbon, present in small amounts in the Earth's early atmosphere
2	it is an alkene
3	it is produced by denitrifying bacteria
4	it is produced in the thermal decomposition of magnesium carbonate

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 properties of two hydrocarbons, **K** and **L**, in crude oil.

Property	Hydrocarbon K	Hydrocarbon L
Boiling point	0 °C	216 °C
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R **hydrocarbon K is a liquid at room temperature (20 °C)**

S **hydrocarbon K is less volatile than hydrocarbon L**

T **hydrocarbon K is more viscous than hydrocarbon L**

QUESTION FOUR

This question is about carbon dioxide and the Earth's atmosphere.

Which **two** of the statements, **V**, **W**, **X**, **Y** and **Z**, are correct?

V **carbon dioxide is locked up as carbonates in igneous rocks**

W **carbon dioxide reacts with sea-water to form sediments containing calcium carbonate in the ocean basins**

X **carbon dioxide reacts with sea-water to form soluble calcium hydrogencarbonate**

Y **igneous rocks decompose deep in the Earth's crust, releasing carbon dioxide**

Z **the percentage of carbon dioxide in the Earth's atmosphere is gradually decreasing**

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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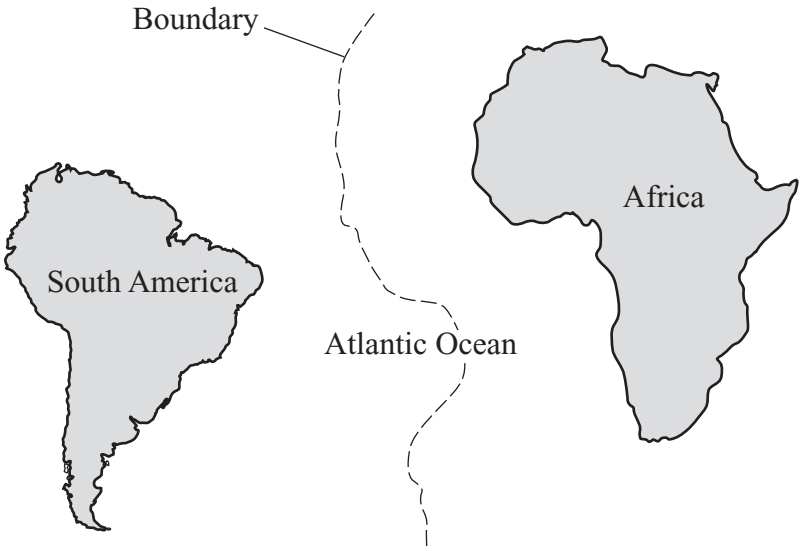
QUESTION FIVE

The diagram shows the present positions of South America and Africa.

The position of the boundary between the tectonic plates on which they lie is also drawn.



5.1 The patterns of rocks on the east coast of South America and the west coast of Africa are very similar.

This suggests that . . .

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Turn over for the next question

QUESTION SIX

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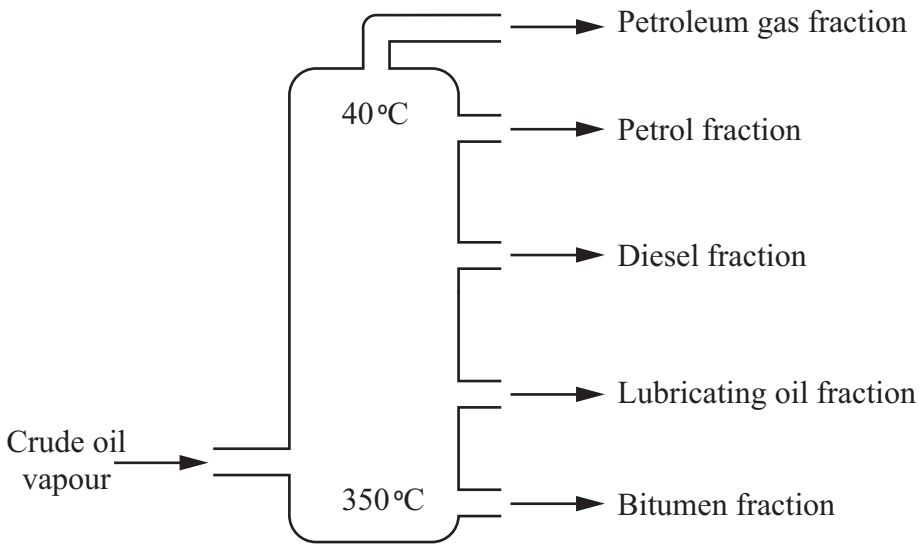

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In which fraction will the hydrocarbons CH_4 and C_2H_6 be found?

A Bitumen fraction

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6.4 Which line describes the properties of a hydrocarbon in the bitumen fraction?

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QUESTION SEVEN

This question is about limestone and substances made from it.

7.1 The word equation shows the breakdown of limestone when it is heated in a lime kiln.

calcium carbonate → substance **Y** + carbon dioxide

Substance **Y** is . . .

A calcium chloride.

B calcium hydrogencarbonate.

C calcium hydroxide.

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7.2 Powdered limestone can be mixed with powdered clay and heated in a rotary kiln.

The main useful product is . . .

A cement.

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C glass.

D quicklime.

7.3 The chemical name for slaked lime is . . .

A calcium chloride.

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C calcium oxide.

D calcium sulphate.

7.4 One use of slaked lime is to . . .

A make concrete.

B make quicklime.

C make soil less acidic.

D neutralise alkaline lake water.

Turn over for the next question

QUESTION EIGHT

There was very little oxygen in the Earth's atmosphere until about 2000 million years ago.

After that time, the amount of oxygen increased until it reached today's level.

8.1 What caused the increase in the amount of oxygen in the Earth's atmosphere?

A Activity of plants

B Activity of simple animals

C Decomposition of carbon dioxide

D Volcanic activity

8.2 Some of the oxygen reacted with ammonia.

ammonia + oxygen → water + substance **X**

Substance **X** is . . .

A carbon dioxide.

B methane.

C nitrogen.

D sulphur dioxide.

8.3 About 800 million years ago, enough ozone had been produced for it to form a layer in the Earth's atmosphere.

Ozone is produced from . . .

A ammonia.

B carbon dioxide.

C methane.

D oxygen.

8.4 The ozone layer allowed the evolution of new organisms because it . . .

A filtered out harmful infra red radiation.

B filtered out harmful ultraviolet radiation.

C prevented harmful bacteria from entering the atmosphere.

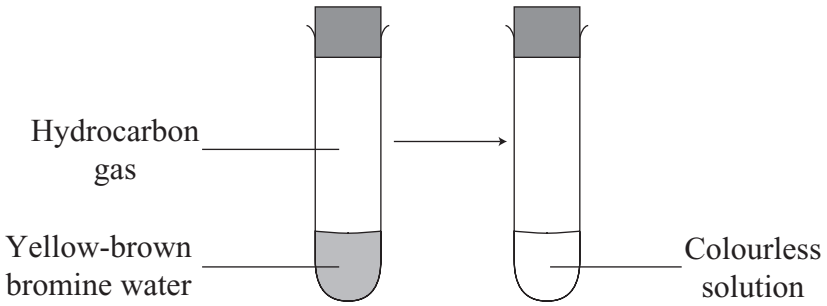
D prevented oxygen escaping from the atmosphere.

Turn over for the next question

QUESTION NINE

This question is about hydrocarbons.

9.1 The diagram shows the result when a hydrocarbon gas is shaken with bromine water.



This reaction shows that the hydrocarbon is . . .

A a polymer.

B an alkane.

C saturated.

D unsaturated.

9.2 Which of the following could be a saturated hydrocarbon?

A All the carbon atoms in its molecule are linked by double covalent bonds.

B All the carbon atoms in its molecule are linked by single covalent bonds.

C It can form addition polymers.

D It has the formula C_2H_4

9.3 How are polymers formed?

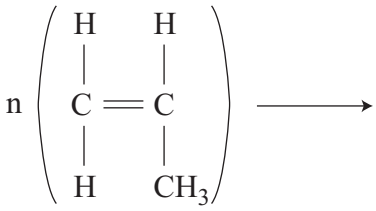
A By cracking saturated hydrocarbons

B By joining together many small alkane molecules

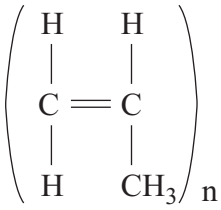
C By joining together many small molecules of monomers

D By thermal decomposition of saturated hydrocarbons

9.4 What is formed in this polymerisation reaction?



A



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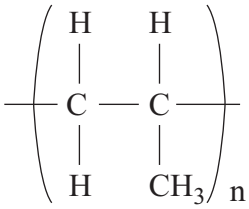

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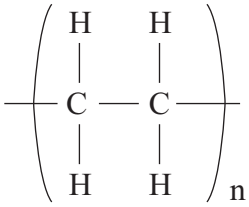

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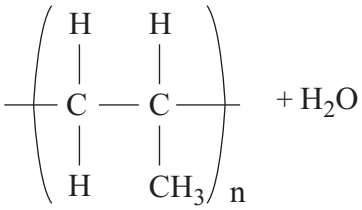
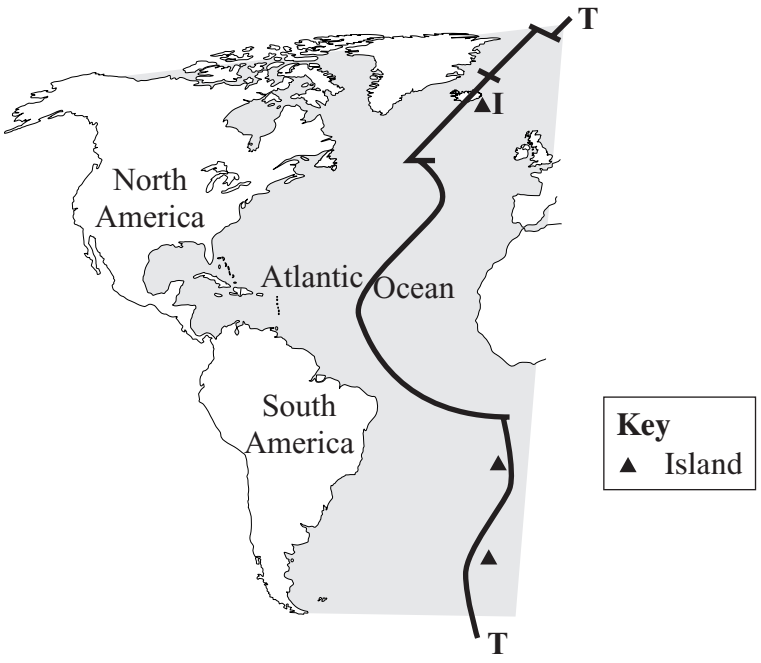


Turn over for the next question

QUESTION TEN

The diagram shows a major structure, **T–T**, in the Atlantic Ocean.



10.1 On what type of structure do the islands marked ▲ lie?

A A continental plate

B A subduction zone

C An ancient mountain belt

D An oceanic ridge

10.2 Why do islands develop along the structure **T–T**?

A The edge of a continental plate is rising.

B Magma rises and solidifies.

C The rocks are being folded and metamorphosed.

D Tectonic plates are moving together.

10.3 The islands are made of rocks that are . . .

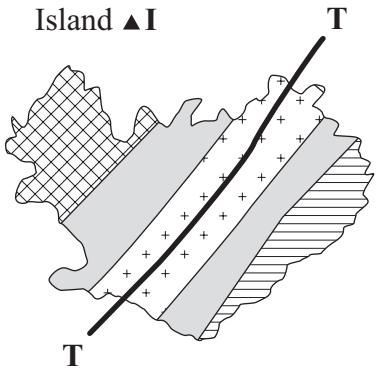
A basaltic.

B granitic.

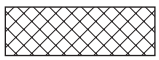
C metamorphic.

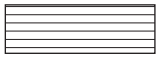
D sedimentary.

10.4 The diagram shows an enlarged map of island **▲I**.



In which area will the youngest rocks be found?

A 

B 

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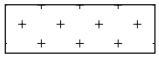
D 

END OF TEST

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