OCR
RECOGNISING ACHIEVEMENT

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

APPLIED SCIENCE: DOUBLE AWARD

Unit 2: Science for the needs of society
(Foundation Tier)

J649
B482/01

Candidates answer on the question paper
A calculator may be used for this paper

OCR Supplied Materials:
None

Other Materials Required:
- Pencil
- Ruler (cm/mm)

Thursday 15 January 2009
Afternoon

Duration: 1 hour

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

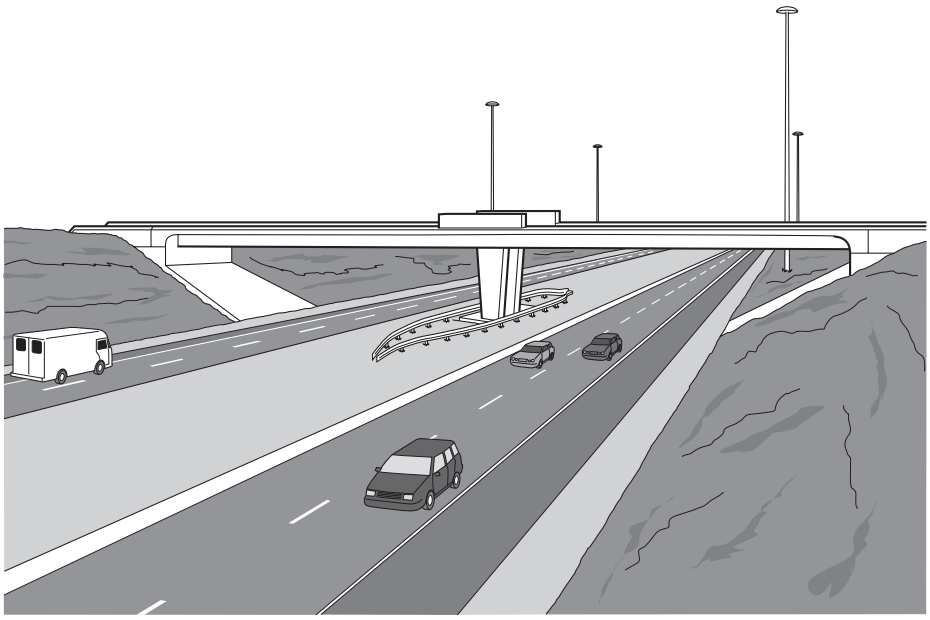
INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **60**.
- The marks allocated and the spaces provided are a good indication of the length of answers required.
- This document consists of **16** pages. Any blank pages are indicated.

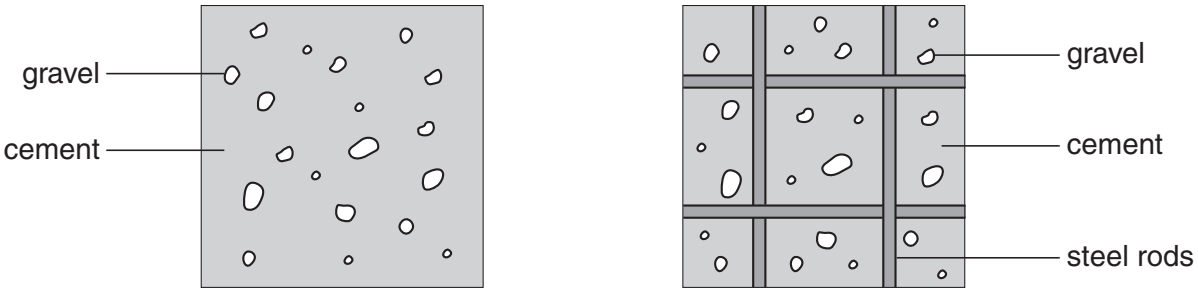
FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
1	**8**	
2	**10**	
3	**10**	
4	**12**	
5	**10**	
6	**10**	
TOTAL	**60**	

Answer **all** the questions.

1 Steel reinforced concrete is used to make bridges over motorways.



The diagrams below show the structures of concrete and steel reinforced concrete.



concrete steel reinforced concrete

(a) Motorway bridges made from steel reinforced concrete are safer than bridges made from ordinary concrete.

Explain why.

.....

..... **[2]**

(b) Steel reinforced concrete, cement and steel are different types of materials.

Complete the table about these different types of material.

Put a tick (✓) in **one** correct box in **each row**.

	metal	**ceramic**	**composite**	**polymer**
steel reinforced concrete				
cement				
steel				

[3]

(c) One disadvantage of using steel reinforced concrete is that the steel can rust.

The table shows information about samples of steel and rust taken from a bridge.

	steel	**rust (iron oxide)**
colour	grey	orange/red
electrical conductivity	high	does not conduct electricity
strength	high	low

(i) Old bridges sometimes have orange stains on the concrete, but new bridges do not.

Use information in the table to explain why.

.....

..... **[1]**

(ii) How could rusty steel in the bridge cause safety problems?

..... **[1]**

(iii) Engineers can test the steel rods in bridges to see if they have gone rusty by measuring the electrical conductivity of the rods.

Explain how measuring the electrical conductivity will show if the steel rods are rusty.

.....

..... **[1]**

[Total: 8]

2 Ann grows blackberry bushes in her garden.

She wants to add fertiliser to the soil to make sure her bushes have all the essential plant elements.

(a) (i) Which of the following elements are essential elements for plants?

Put (rings) around **two** correct answers.

chlorine **hydrogen** **nitrogen** **phosphorus** **sodium**

[2]

(ii) Where are minerals taken in by plants?

Put a tick (✓) in the box next to the correct statement.

through holes in the leaves ☐

through the root hairs ☐

through the chloroplasts ☐

through the stems ☐

[1]

(b) Ann is not sure whether or not to use fertiliser.

She knows that **large scale** use of fertilisers can cause problems.

(i) Give one advantage of using fertilisers.

..... **[1]**

(ii) Give two ways that using fertiliser may harm the environment.

1. .....

2. ..... **[2]**

(c) Ann does not want to use **artificial** fertiliser.

What else could she use?

..... **[1]**

(d) Ann picks blackberries to make some wine by fermentation.

She puts squashed blackberries into a container.

(i) Write down two other things that Ann adds to the container to make wine.

1. .....

2. ..... **[2]**

(ii) Ann notices that the fermentation is very slow.

What can she change to make it go faster?

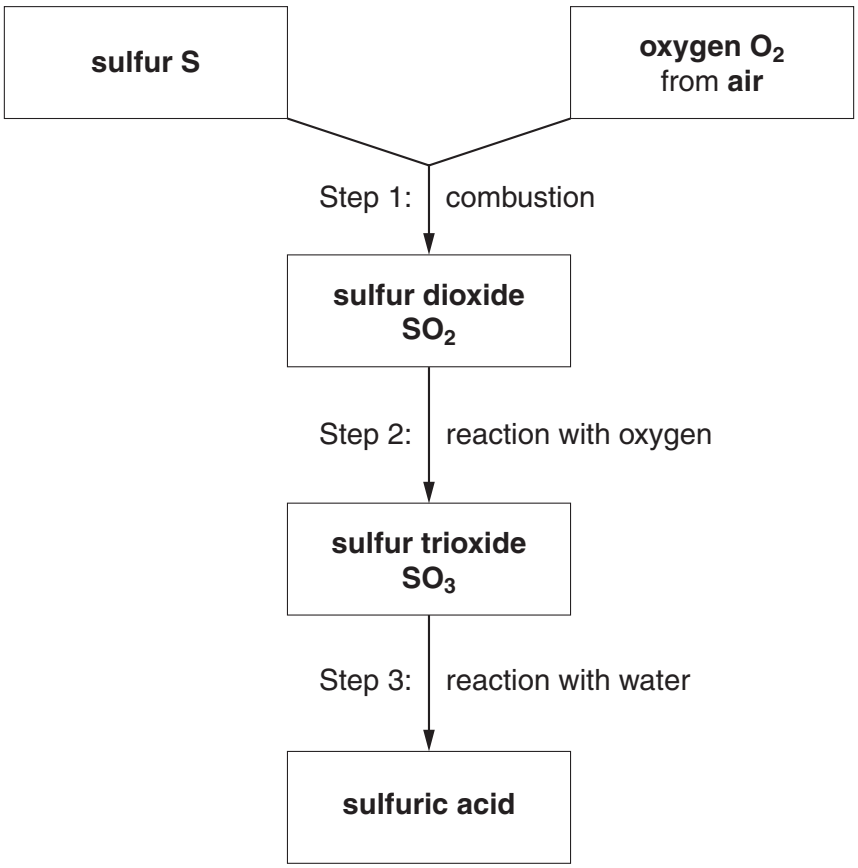
..... **[1]**

[Total: 10]

3 This information comes from a website about sulfuric acid.

Almost 2 million tonnes of sulfuric acid are made in the UK every year. Sulfuric acid is used to make products such as fertilisers, dyes, paints and detergents.

The flow chart shows how sulfuric acid is manufactured.



(a) Which **two** substances are used as starting materials to make sulfuric acid?

..... and ..... **[1]**

(b) Most of the products made from sulfuric acid are bulk chemicals.

What is meant by **bulk** chemicals?

..... **[1]**

(c) The formula for sulfuric acid is missing from the flow chart.

What is the correct formula?

Put a (ring) around the correct answer.

S_8 H_2SO_4 HCl H_2S

[1]

(d) Look at the flow chart. What type of reaction happens in **step 2**?

Put a (ring) around the correct answer.

neutralisation **oxidation** **precipitation** **reduction**

[1]

(e) **(i)** A catalyst is used in step 2 to speed up the reaction.

What are the benefits of using a catalyst?

Put a tick (✓) in the boxes next to the **two** correct statements.

the chemicals last longer	☐
the products form faster	☐
less energy is needed for the reaction	☐
there is less waste	☐
the products formed are more pure	☐

[2]

(ii) Give two **other** ways that reactions can be made to go faster.

1. .....

2. ..... **[2]**

(f) Elements, mixtures and compounds are involved in making sulfuric acid.

Draw a straight line from each **substance** to its correct **type**.

substance	type
sulfur dioxide	element
air	mixture
sulfur	compound

[2]

[Total: 10]

4 The government is thinking about building new nuclear power stations.

(a) (i) A nuclear power station uses nuclear fuel.

Put a tick (✓) in the box next to the **best** description of a nuclear fuel.

a radioactive element that gives out energy	☐
the nucleus of a plant cell	☐
a fuel made from the remains of living things	☐

[1]

(ii) Which two of the following statements describe a **disadvantage** of nuclear fuels.

Put a tick (✓) in the boxes next to the **two** correct statements.

Light is a type of radiation.	☐
Nuclear fuels produce ionising radiation.	☐
The Sun uses nuclear fuel to produce light.	☐
Ionising radiation can harm living things.	☐

[2]

(b) Nuclear power stations produce electricity. Electricity is a form of energy.

(i) Name two **other** types of energy.

..... and ..... **[2]**

(ii) Explain why electricity is such a useful way of providing energy to houses.

.....

.....

..... **[2]**

(iii) How is electricity passed from the power stations to consumers?

Put a tick (✓) in the correct box.

the National Grid	☐
lorries on road	☐
radio waves in the air	☐
pipes underground	☐

[1]

(c) Using nuclear power is only one way of providing energy.

Other ways include using:

biofuel

coal

crude oil

natural gas

solar cells

wave power

wind farms

Answer the following questions using words from the list.

(i) Write down **two** fossil fuels.

..... and ..... **[2]**

(ii) Write down **two** that involve a renewable energy source.

..... and ..... **[2]**

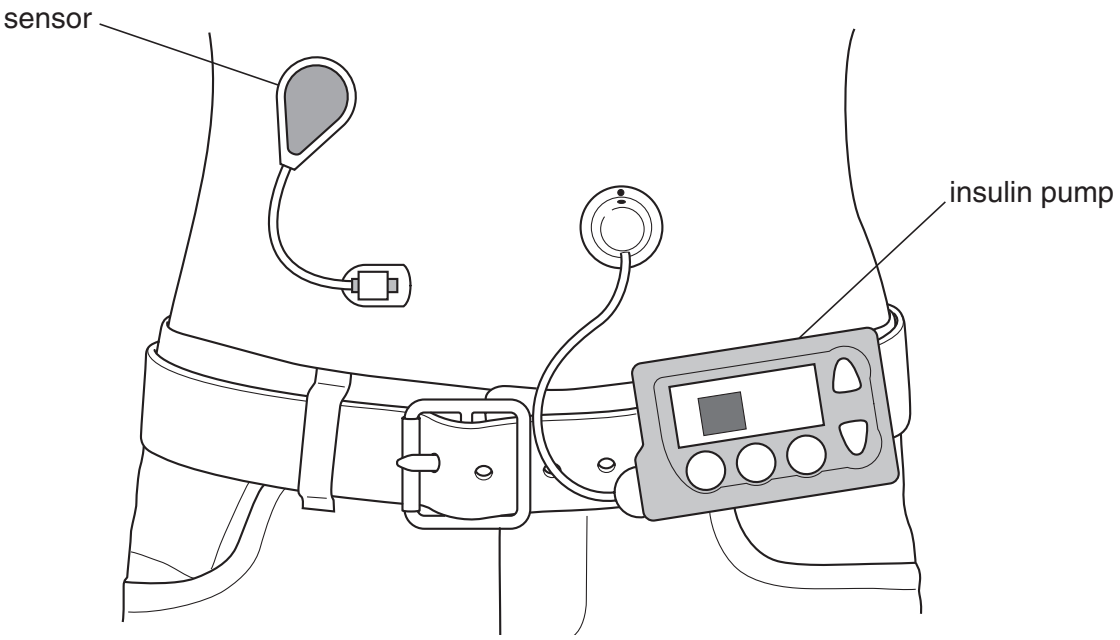
[Total: 12]

5 People with diabetes do not produce enough insulin.

A new device has been developed for people with type 1 diabetes.

The device works in three stages.

1. A sensor tests a drop of blood.
2. A mini-computer works out how much insulin the body needs.
3. The correct dose of insulin is pumped into the blood.



(a) The sensor tests the blood so that the correct dose of insulin can be worked out.

(i) What substance does the sensor test the blood for?

..... **[1]**

(ii) Explain why it is necessary for people with diabetes to test their blood for this substance.

.....

..... **[1]**

(iii) Many people with diabetes have blood test kits to test their own blood.

They can also inject themselves with doses of insulin.

Give **two** reasons that these people may think that the new device is better.

.....

.....

..... **[2]**

(b) (i) The new device does the job of an organ in the human body.

Which organ?

Put a (ring) around the correct answer.

heart **kidney** **liver** **pancreas**

[1]

(ii) Insulin is transported around the body in the blood.

Which part of the blood transports insulin?

Put a (ring) around the correct answer.

plasma **platelets** **red blood cells** **white blood cells**

[1]

(iii) The changes that insulin causes in the body happen more slowly than those that are caused by the nervous system.

Why is this?

Put ticks (✓) in the boxes next to the **two** correct answers.

Nerve impulses are carried by red blood cells. ☐

Insulin is carried in the blood. ☐

Nerve impulses pass through the spinal cord. ☐

Blood travels more slowly than nerve impulses. ☐

The brain does not control nerve impulses. ☐

[2]

(c) Some types of diabetes can be controlled without taking insulin.

Explain how.

.....

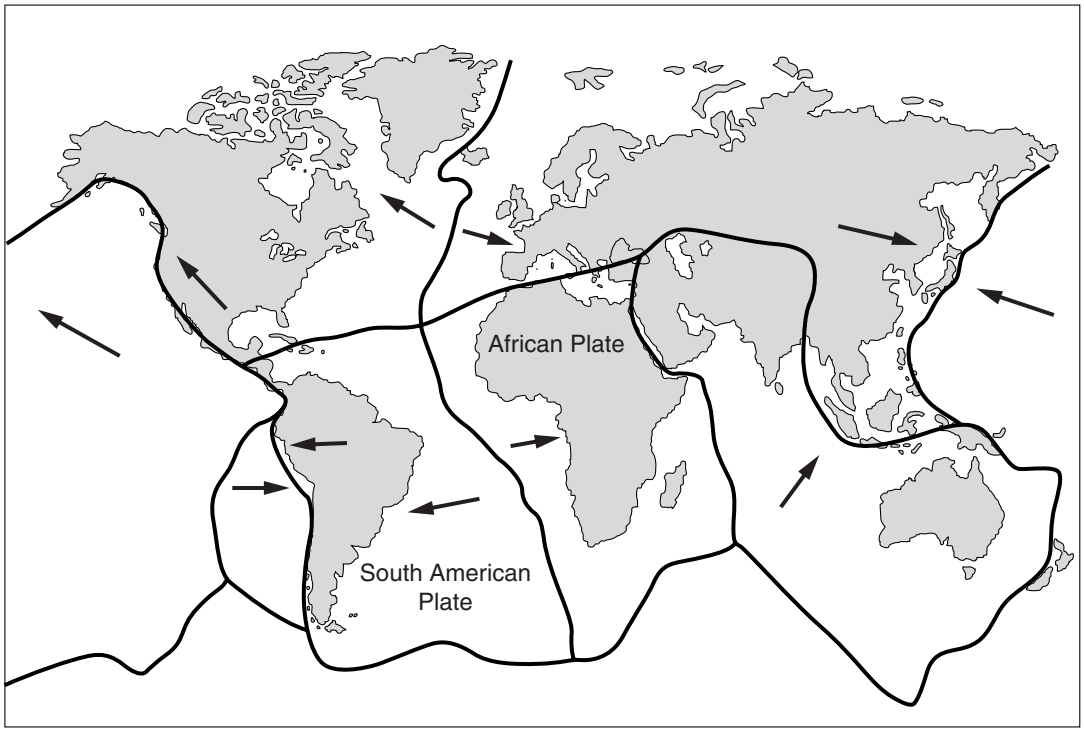
..... **[2]**

[Total: 10]

6 Scientists study the Earth to try and predict earthquakes.

They know that the surface of the Earth is made up of plates. The plates move.

The arrows on the map show which direction each plate is moving.



(a) What are these type of plates called?

Put a (ring) around your answer.

ceramic **geographic** **magnetic** **oceanic** **tectonic**

[1]

(b) Scientists believe many earthquakes are caused by the movement of the plates.

(i) Put an **X** on the map to show a likely place for an earthquake caused by movement of the plates. **[1]**

(ii) To make predictions about earthquakes scientists measure the movement of the plates.

Describe how scientists measure the movement of plates.

.....

.....

..... **[2]**

(c) Scientists made the following observations at three different plate boundaries.

A plates moving apart

B plates moving along in same direction

C plates moving past each other in opposite directions

(i) At which place are new rocks likely to form?

Choose from **A**, **B** or **C**.

..... **[1]**

(ii) Which place is least likely to have had a big earthquake?

Choose from **A**, **B** or **C**.

..... **[1]**

(d) The movement of the plates causes other changes in the Earth as well as earthquakes.

(i) Put a tick (✓) in the boxes next to the **two** correct changes.

mountain formation	☐
drought	☐
volcanoes	☐
melting icecaps	☐
mountain erosion	☐

[2]

(ii) South America and Africa are moving apart.

Explain why.

.....

.....

..... **[2]**

[Total: 10]

END OF QUESTION PAPER

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