Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

For Examiner's Use

General Certificate of Secondary Education
June 2009

APPLIED SCIENCE (DOUBLE AWARD) **APSC/2F**
Unit 2 Science for the Needs of Society
Foundation Tier

F

Thursday 4 June 2009 9.00 am to 10.30 am

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed: 1 hour 30 minutes

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The maximum mark for this paper is 90.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

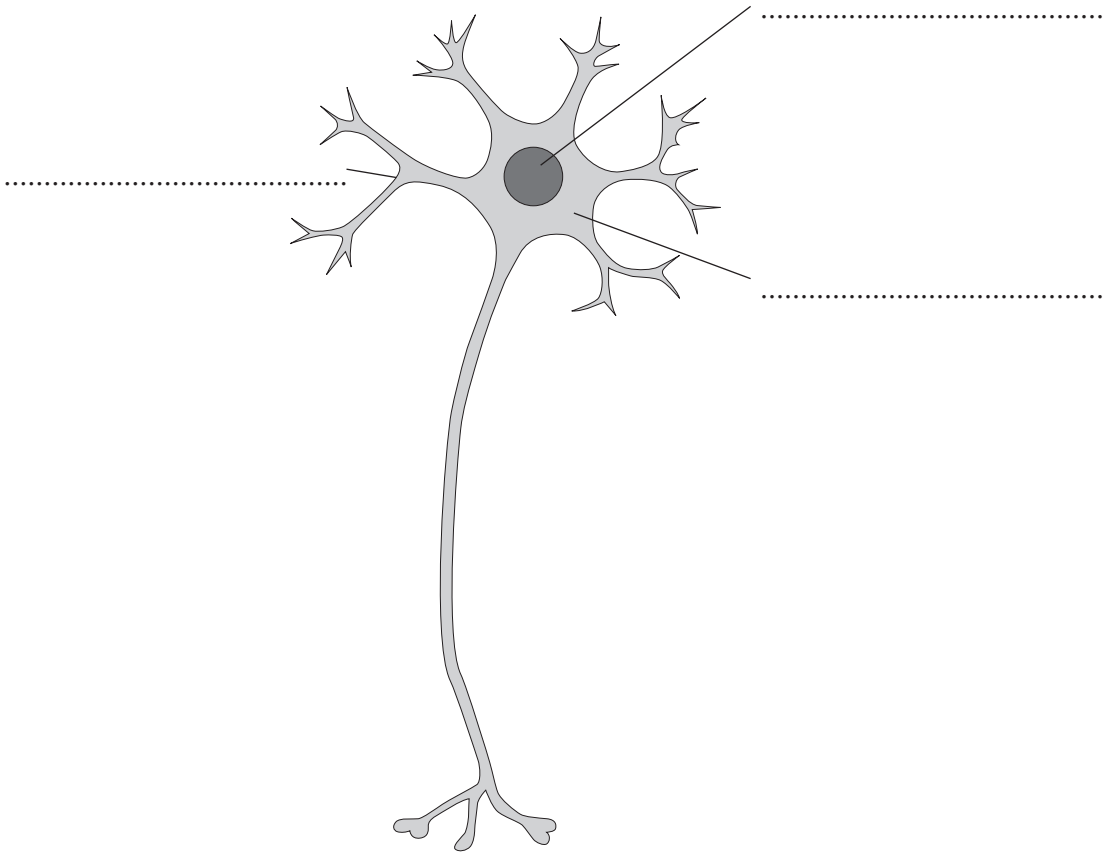
Advice
- In all calculations, show clearly how you work out your answer.

For Examiner's Use			
Question	Mark	Question	Mark
1		7	
2		8	
3		9	
4			
5			
6			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

Answer **all** questions in the spaces provided.

1 Our nervous system allows us to respond to changes in our environment.

1 (a) The diagram shows a nerve cell, which is part of our nervous system.



1 (a) (i) Use the correct words from the box to complete the labels on the diagram.

Cell membrane	**Cytoplasm**	**Nucleus**	**Vacuole**

(3 marks)

1 (a) (ii) Which part of the cell contains genes?

.....

(1 mark)

1 (a) (iii) The nerve cell carries messages to other cells.

Give **two** ways in which the shape of the nerve cell helps it to carry messages.

1 .....

.....

2 .....

.....

(2 marks)

1 (b) Some organs contain cells that detect changes in our environment.

Complete the table by writing in the name of the organ that detects each change.
One has been done for you.

Change	Organ
Light	
Sound	
Smell	
Taste	
Temperature	Skin

(4 marks)

10

Turn over for the next question

2 The uses of metals and metal alloys depend on their properties.

2 (a) The four metals listed in the box are used in the home.

Use words from the box to answer the questions.

copper	**gold**	**lead**	**steel**

2 (a) (i) Which metal is an alloy? .....

(1 mark)

2 (a) (ii) Which metal comes straight from the ground? .....

(1 mark)

2 (a) (iii) Which metal has the chemical symbol Pb? .....

(1 mark)

2 (b) Complete the table showing some properties and some uses of metals.

Metal	Properties	Uses
copper		Electrical wiring
gold		Wedding ring
lead	Easy to bend and cut, unreactive and waterproof	
steel	High tensile strength	

(4 marks)

2 (c) Ores are rocks that are obtained from the Earth.

Lead is extracted from ore in a chemical process.

Complete the sentences by drawing a ring around the correct word in each box.

2 (c) (i) Lead oxide is a compound containing lead and

carbon
oxygen
sulfur

.

(1 mark)

2 (c) (ii) Lead is extracted from lead oxide by heating the ore with

carbon
oxygen
sulfur

.

(1 mark)

2 (c) (iii) This type of chemical reaction is known as

combustion
neutralisation
reduction

.

(1 mark)

2 (d) Materials scientists develop ways to extract metals from the Earth without causing too much damage to the environment.

Give **one** way in which obtaining ores and metals causes damage to the environment.

.....

.....

(1 mark)

11

Turn over for the next question

3 Many road accidents occur when young people are walking to and from school.

The table shows the number of pedestrians killed in car accidents between 1998 and 2002.

Year	**1998**	**1999**	**2000**	**2001**	**2002**
Child	103	107	107	107	109
Adult	803	760	750	719	696

3 (a) How did the number of adult pedestrians killed change between 1998 and 2002?

.....

.....

(1 mark)

3 (b) The speed limit outside some schools has been reduced to 20 miles per hour.

3 (b) (i) How might reducing the speed limit affect the number of accidents?

.....

.....

(1 mark)

3 (b) (ii) Give **one** disadvantage of reducing the speed limit to 20 miles per hour.

.....

.....

(1 mark)

3 (b) (iii) Give **two other** road safety measures that could be put outside a school.

1 .....

.....

2 .....

.....

(2 marks)

3 (c) At 20 miles per hour the overall stopping distance is 12 metres.

What would happen to the stopping distance if the speed of the car was 30 miles per hour?

.....

.....

(1 mark)

3 (d) The overall stopping distance depends on the driver's reaction time and the vehicle's braking distance.

3 (d) (i) Give **two** factors that could affect the driver's reaction time.

1 .....

2 .....

(2 marks)

3 (d) (ii) Give **two** factors that could affect the vehicle's braking distance.

1 .....

2 .....

(2 marks)

10

Turn over for the next question

4 An organic farmer says that her business is increasing because more customers are choosing organic products instead of products from intensive farming.

4 (a) (i) Intensive farmers use herbicides, pesticides and other artificial chemicals to improve crop yields.

Match each type of chemical with its function by drawing **one** line between the boxes.

Type of chemical	**Function**
Herbicide	Provides plants with nutrients needed
	Kills insects that may damage crops
Pesticide	Kills microorganisms that may damage crops
	Kills other plants that compete with crops for resources

(2 marks)

4 (a) (ii) Tick **two** methods that are used to increase yields in intensive farming of animals.

Tick **two** boxes.

- Use of antibiotics ☐
- Free range ☐
- Restrict movement ☐
- Lower temperature ☐

(2 marks)

4 (b) Organic farmers and gardeners use alternative methods to improve crop growth.

Some examples of alternative methods are:

A Using natural predators to eat insects

B Pulling weeds up by hand

C Applying cow manure

D Applying compost

E Putting netting over crops

Which method is a natural alternative to the following?

Write the correct letter in the box.

Herbicides ☐

Pesticides ☐

Fertilisers ☐

(3 marks)

4 (c) Plants make food by photosynthesis. The word equation for photosynthesis is given below.

Carbon dioxide + water → glucose + oxygen

4 (c) (i) Name the product that is a food.

.....

(1 mark)

4 (c) (ii) Name the reactant that is obtained through the leaves.

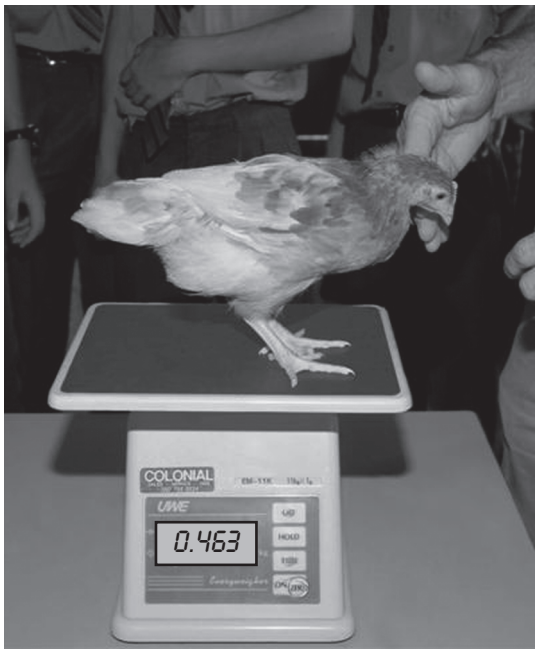
.....

(1 mark)

Question 4 continues on the next page

4 (d) The photos show one chicken that has been bred for meat production and one that has not.

Chicken A



Chicken B

4 (d) (i) Give **one** feature from the photos that tells you that **chicken B** has been bred to produce more meat.

.....

(1 mark)

4 (d) (ii) Give **one other** product that can be obtained from chickens.

.....

(1 mark)

11

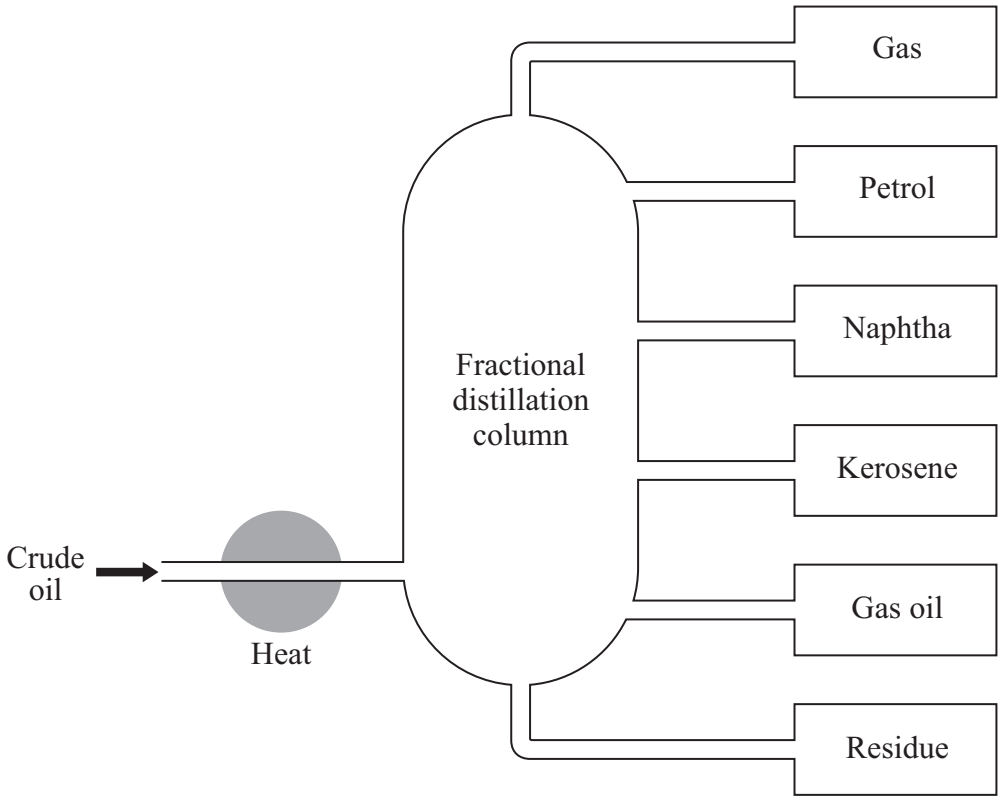
Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

5 Fuel scientists blend compounds obtained from crude oil to make fuel for cars.

Fractional distillation is used to separate crude oil into useful fractions.

The fractional distillation of crude oil is carried out on a large scale at an oil refinery.



The fractions collect at different levels on the column.

The table gives information about the fractions.

Name of fraction	**Boiling point range in ^{o}C**	**Number of carbon atoms in the molecules**	**Percentage composition**
Gas	Less than 25	1–4	2
Petrol	25–75	5–8	
Naphtha	75–190	6–10	19
Kerosene	190–250	10–16	23
Gas Oil	250–350	14–20	30
Residue	Greater than 350	Greater than 20	11

5 (a) Complete the sentences about fractional distillation using words from the box.

decreases	**gases**	**increases**	**large**	**liquids**	**small**

As fractions move up the column, the temperature .....

and they condense into..... .

The fractions that collect at the top of the column have .....

molecules.

(3 marks)

5 (b) Petrol is an important fuel for road transport.

Use data from the table to calculate the percentage of petrol in crude oil.

..... %

(2 marks)

5 (c) Petrol is made up of molecules containing carbon atoms and hydrogen atoms.

5 (c) (i) What name is given to compounds containing **only** the elements carbon and hydrogen?

.....

(1 mark)

5 (c) (ii) Write the formula for a compound that has 7 carbon atoms and 16 hydrogen atoms in each molecule.

.....

(1 mark)

Question 5 continues on the next page

5 (d) Give a use for **one other named** fraction obtained from crude oil.

Name of fraction .....

Use for fraction .....

(1 mark)

5 (e) Scientists are developing fuels that cause less damage to the environment when they are burned. One of these new fuels is hydrogen.

Hydrogen can replace petrol as an alternative fuel for road transport.

The equation for the combustion of hydrogen is given below.

$$2H_2 + O_2 \rightarrow 2H_2O$$

5 (e) (i) Name the compound that is produced when hydrogen burns.

.....

(1 mark)

5 (e) (ii) Why does petrol cause more pollution than hydrogen when it is burned?

.....

.....

(1 mark)

10

6 Waves carry energy from one place to another and are used in communication devices.

An important group of waves is called the electromagnetic spectrum.

6 (a) Here is a list of all the electromagnetic waves in increasing order of frequency.

Radio

.....

Infra red

Visible

Ultraviolet

.....

Gamma

6 (a) (i) Complete the list by writing in the missing waves.

(2 marks)

6 (a) (ii) Which electromagnetic wave has the most energy?

.....

(1 mark)

6 (a) (iii) Which electromagnetic wave is the least dangerous?

.....

(1 mark)

6 (a) (iv) Which electromagnetic wave is used for sun beds?

.....

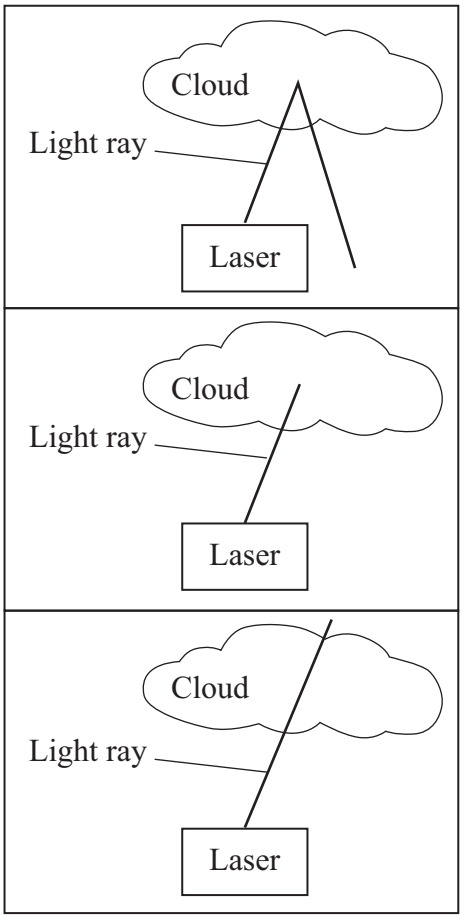
(1 mark)

Question 6 continues on the next page

6 (b) Lasers use visible light. The diagrams show how visible light can be reflected, transmitted or absorbed by clouds.

Write the correct word from the box next to each diagram.

Absorbed	**Transmitted**	**Reflected**



.....

.....

.....

(2 marks)

6 (c) Radiotherapists treat people for cancer using gamma radiation.

6 (c) (i) Why are gamma waves used to treat cancer?

.....

.....

(1 mark)

6 (c) (ii) How do radiotherapists protect themselves from the radiation?

.....

.....

(1 mark)

6 (d) Some people are frightened to receive radiotherapy.

6 (d) (i) Why might people be frightened of radiotherapy?

.....

.....

(1 mark)

6 (d) (ii) Suggest what a radiotherapist could do to make people less frightened.

.....

.....

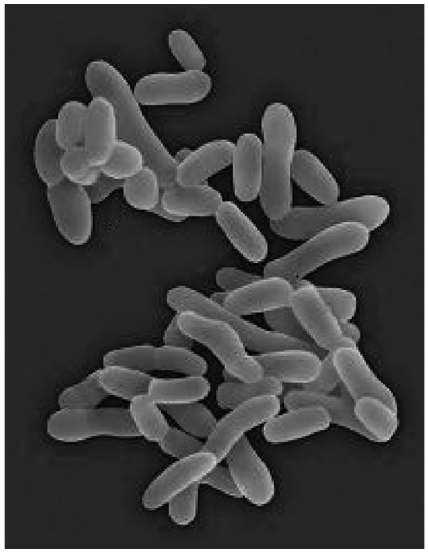
(1 mark)

11

Turn over for the next question

7 Read the article below about tuberculosis (TB) and answer the questions that follow.

SCHOOLGIRL DIES OF TB INFECTION



A 15-YEAR-OLD girl died in hospital after catching tuberculosis (TB). TB is an infection of the lung.

One parent said: "TB is spread by germs and they could have been anywhere in the school, on computer keyboards, in toilet sinks."

But the doctor said: "To be at risk of contracting the disease, you would need to have been close enough to inhale the germ from a sneeze or a cough."

7 (a) The parent and the doctor have different ideas about how TB is spread.

7 (a) (i) Why is the doctor's explanation correct?

.....

.....

(1 mark)

7 (a) (ii) Microorganisms spread in different ways.

Suggest **two** things that could be done to prevent the infection from spreading.

1 .....

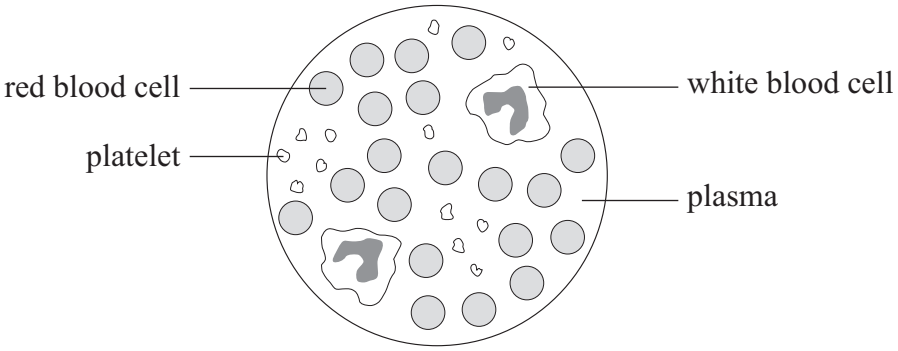
.....

2 .....

.....

(2 marks)

7 (b) The diagram shows some of the main components of blood. Some of these are used to defend our body against infection by microorganisms.



What is the function of each of the following components of blood:

7 (b) (i) red blood cells;

.....

(1 mark)

7 (b) (ii) platelets?

.....

(1 mark)

7 (c) In the UK, schoolchildren are normally given a vaccination to prevent them from catching TB.

Complete the sentences describing how a vaccination prevents people from catching TB.

The TB vaccination contains ..... versions of the bacteria that cause TB.

If the same bacteria enter the blood in the future, ...blood cells

recognise the microorganism and make ..... to destroy it.

(3 marks)

7 (d) TB is caused by a type of bacteria.

What kind of medicine is usually given to treat bacterial infections?

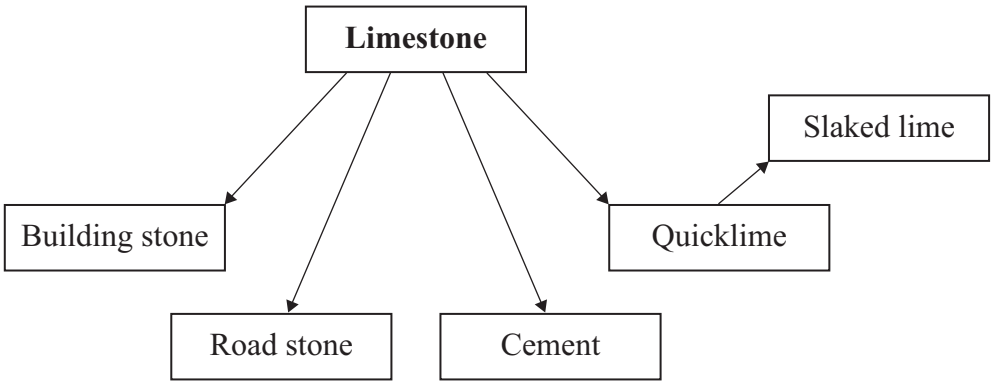
.....

(1 mark)

9

8 The demand for limestone is increasing. Managers at a limestone quarry plan to increase production to meet the demand.

The flow chart shows the uses of the limestone obtained from the quarry.



8 (a) The quarry is in an area of natural beauty.

8 (a) (i) Give **one** advantage of increasing the production of limestone from the quarry.

.....

.....

(1 mark)

8 (a) (ii) Describe **one** action that the managers could take to reduce the environmental impact of the quarry.

.....

.....

(1 mark)

8 (b) There is more demand for road stone than for building stone.

Describe how stone that can be used for building houses is converted into stone that can be used for making roads.

.....

.....

(1 mark)

8 (c) A large quantity of slaked lime is sold to farmers for neutralising acid in soil.

Slaked lime is made from quicklime (calcium oxide) in a chemical reaction carried out at the quarry.

8 (c) (i) Give the chemical name for slaked lime.

.....

(1 mark)

8 (c) (ii) Complete the equation for the reaction.

$$CaO + \text{.....} \rightarrow Ca(OH)_2$$

(1 mark)

8 (d) Cement is made at the quarry and sold to the building industry to make concrete.

8 (d) (i) Describe how cement is made from limestone.

.....

.....

(1 mark)

8 (d) (ii) Describe how cement is used to make concrete.

.....

.....

.....

.....

(2 marks)

8 (d) (iii) The managers would like to sell limestone for other uses.

Give **one other** large-scale use for limestone.

.....

(1 mark)

9

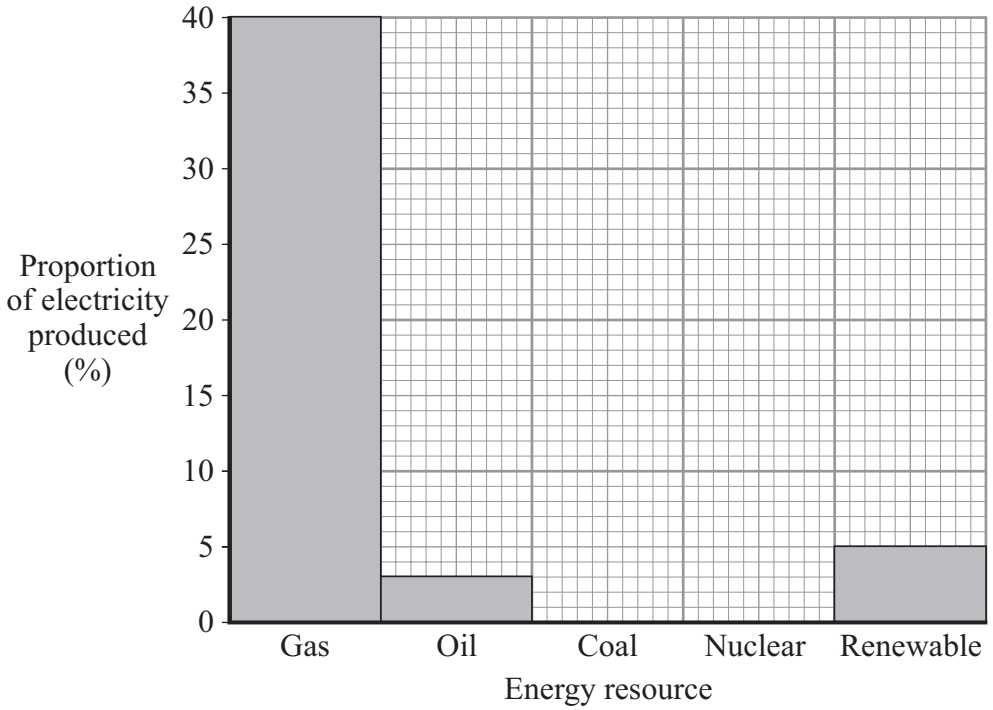
Turn over ▶

9 Countries have agreed to decrease their use of non-renewable fuels. One reason for this is because of the amount of pollution produced when these fuels burn.

9 (a) The table shows the methods used to generate electricity in the United Kingdom.

Energy resource	Proportion of electricity produced (%)
Gas	40.0
Oil	3.0
Coal	33.0
Nuclear	19.0
Renewable	5.0

9 (a) (i) Use the data in the table to complete the bar chart below for coal and nuclear fuel.



(2 marks)

9 (a) (ii) Name **one** non-renewable fuel.

.....

(1 mark)

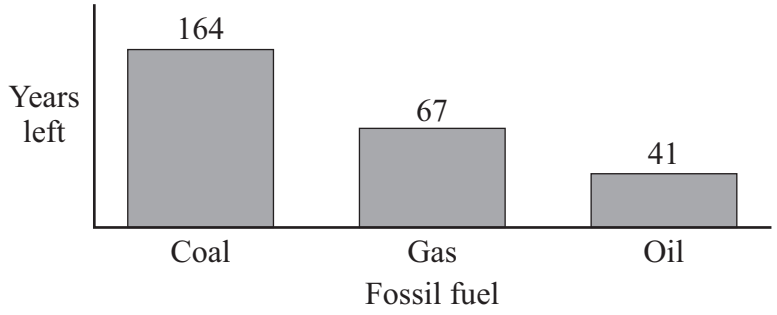
9 (a) (iii) Name **two** renewable energy resources.

1 .....

2 .....

(2 marks)

9 (b) The bar chart below shows how long the UK fossil fuel reserves are expected to last.



In what year will we run out of coal? .....

(1 mark)

9 (c) Two pollutants produced as a result of electricity generation are carbon dioxide and nitrogen oxides.

9 (c) (i) Suggest the chemical formula for nitrogen dioxide?

.....

(1 mark)

9 (c) (ii) Suggest how levels of these polluting gases could be reduced in the future.

.....

.....

.....

.....

.....

(2 marks)

9

END OF QUESTIONS

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