

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

For Examiner's Use
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General Certificate of Secondary Education  
June 2009



**APPLIED SCIENCE (DOUBLE AWARD)**  
**Unit 2 Science for the Needs of Society**  
**Higher Tier**

**APSC/2H**  
**H**

Thursday 4 June 2009 9.00 am to 10.30 am

<p><b>For this paper you must have:</b></p> <ul style="list-style-type: none"> <li>• a ruler</li> <li>• a calculator.</li> </ul>
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For Examiner's Use			
Question	Mark	Question	Mark
1		4	
2		5	
3		6	
		7	
		8	
		9	
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

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.

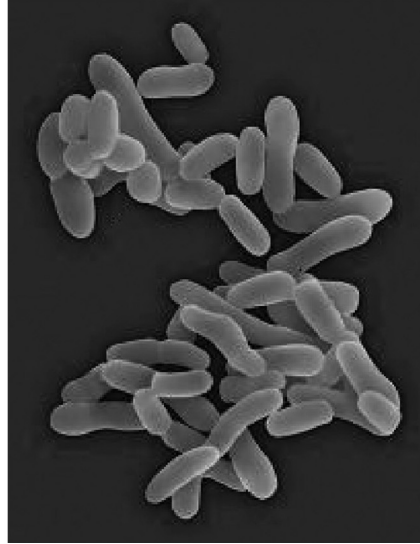


J U N O 9 A P S C 2 H O 1

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

- 1 Read the article 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.”

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

- 1 (a) (i) Why is the doctor’s explanation correct?

.....  
 .....

(1 mark)

- 1 (a) (ii) Microorganisms spread in different ways.

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

1 .....

.....

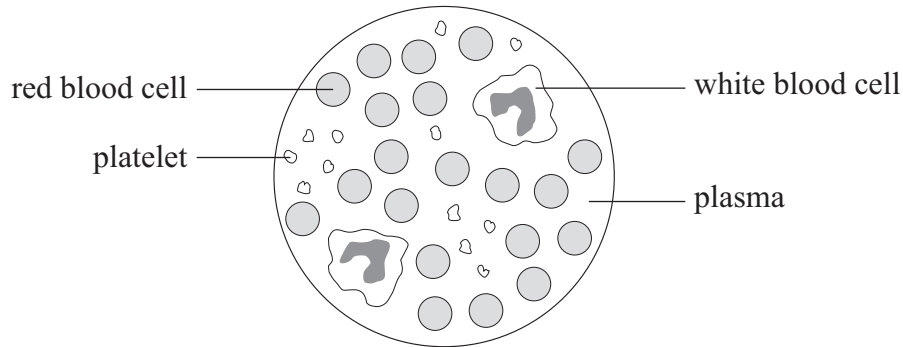
2 .....

.....

(2 marks)



- 1 (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:

- 1 (b) (i) red blood cells;

.....  
(1 mark)

- 1 (b) (ii) platelets?

.....  
(1 mark)

- 1 (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)

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

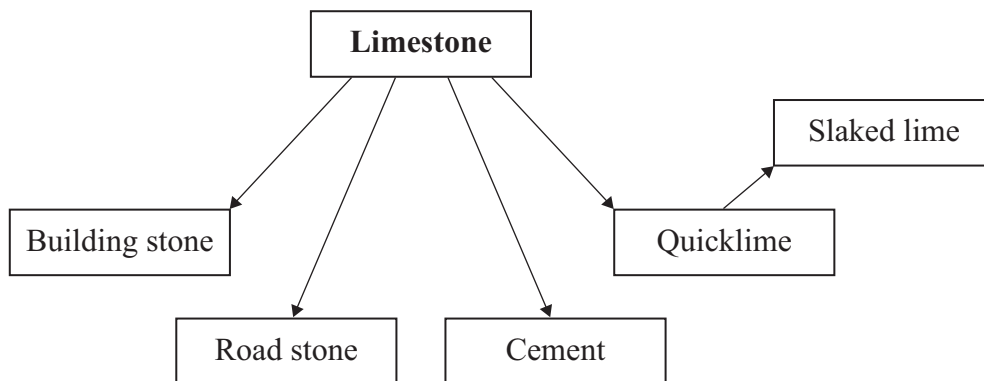
What kind of medicine is usually given to treat bacterial infections?

.....  
(1 mark)



- 2 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.



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

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

.....  
 .....  
 (1 mark)

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

.....  
 .....  
 (1 mark)

- 2 (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)



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

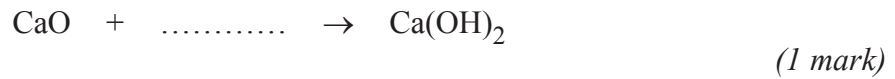
Slaked lime is made from quicklime (calcium oxide) in a chemical reaction carried out at the quarry.



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

.....  
(1 mark)

- 2 (c) (ii) Complete the equation for the reaction.



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

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

.....  
.....  
(1 mark)

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

.....  
.....  
.....  
.....  
(2 marks)

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

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

.....  
(1 mark)

9

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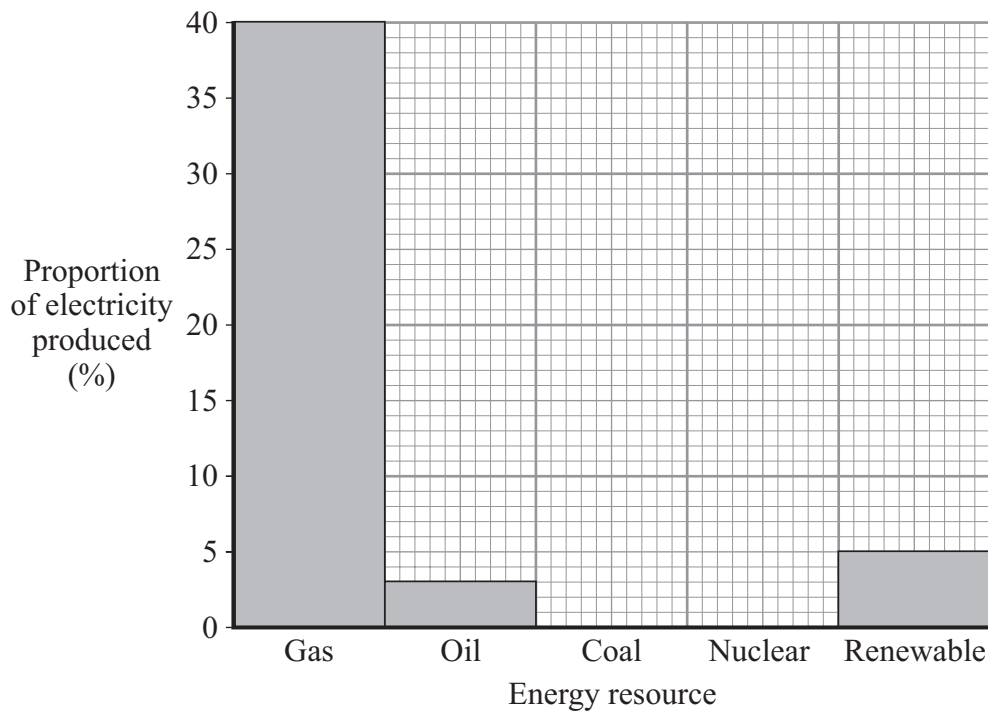


3 Countries have agreed to decrease their use of non-renewable fuels. One reason for this is because of the amount of pollution produced when these fuels burn.

3 (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

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



(2 marks)

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

.....

(1 mark)



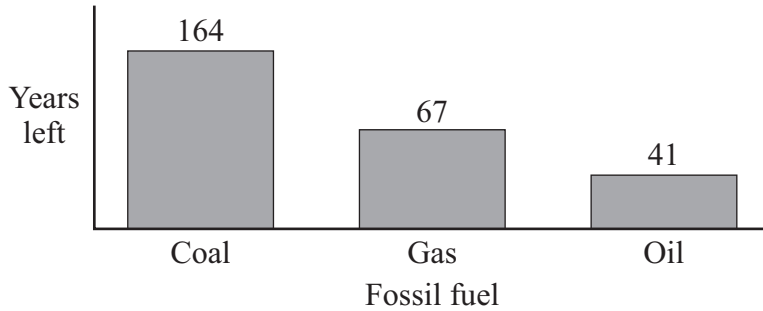
3 (a) (iii) Name **two** renewable energy resources.

1 .....

2 .....

(2 marks)

3 (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)

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

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

.....  
(1 mark)

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

.....  
.....  
.....  
.....  
.....

(2 marks)



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) Herbicides are chemicals used in intensive farming.

What are herbicides used for?

.....  
.....

(1 mark)

4 (b) Organic farmers use alternatives to chemical herbicides in farming.

4 (b) (i) Give **one** alternative to using chemical herbicides on an organic farm.

.....  
.....

(1 mark)

4 (b) (ii) Give **one** reason why this alternative might make organic vegetables more expensive than those grown intensively.

.....  
.....

(1 mark)





- 4 (c) Selective breeding is a technique used by farmers to produce chickens for meat production.

The chicken in the photograph has been selectively bred for its meat.



Describe the process of selective breeding.

.....

.....

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.....

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.....

(3 marks)

Turn over ►



4 (d) Describe and explain **two** methods that intensive farmers could use to make chicken farming as efficient as possible.

Method 1 .....

Explanation .....

.....

Method 2 .....

Explanation .....

.....

*(4 marks)*

<b>10</b>



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5 Metals are useful materials obtained from the Earth.

5 (a) Gold and lead are examples of metals that are extracted from rocks.

(a) (i) Explain why gold is easier to extract than lead.

.....

.....

.....

.....

(2 marks)

5 (a) (ii) Describe how lead is extracted from its ore.

.....

.....

.....

.....

.....

(2 marks)

5 (b) Copper, gold and lead are elements.

Information about the atoms of these elements is given in the table.

Elements	Number of		
	protons	neutrons	electrons
Copper	29	34	29
Gold	79	118	79
Lead	82	125	82

5 (b) (i) Give the atomic number of copper.

.....

(1 mark)



5 (b) (ii) Give the number of particles in the nucleus of an atom of gold.

.....  
(1 mark)

5 (b) (iii) Write the symbol for lead.

.....  
(1 mark)

5 (c) How a metal is used depends upon its properties.

5 (c) (i) Give **one** use for copper and explain how this use depends on its properties.

Use .....

Explanation .....

.....  
(2 marks)

5 (c) (ii) Steel is an alloy containing iron and carbon.

Give an example of **one other** alloy and describe a use for this alloy.

Name of alloy .....

Use of alloy .....

.....  
(2 marks)

5 (d) Extracting metals causes damage to the environment.

Materials scientists develop ways to extract and use metals without causing too much damage to the environment.

Describe **one** way in which materials scientists can help to prevent damage to the environment.

.....

.....  
(1 mark)



6 Many electrical devices use a fuse for safety.

6 (a) Describe how a fuse works.

.....

.....

.....

.....

.....

.....

.....

(3 marks)

6 (b) A label from a microwave oven is shown below.

<p style="text-align: center;"><b>Microwave Oven</b></p> <p>Supply: 230 V a.c. 50 Hz</p> <p>Power 900 W</p> <p style="text-align: center;"><b>This equipment must be earthed</b></p>
--

6 (b) (i) Calculate the current through the microwave oven.

Current ..... Amps  
(3 marks)



6 (b) (ii) What size fuse should be used?

Draw a ring around the correct answer.

2A

3A

5A

13A

(1 mark)

6 (c) Many houses have fuse boxes with a row of circuit breakers.

Give **two** reasons why circuit breakers have replaced fuses in modern homes.

1 .....

.....

2 .....

.....

(2 marks)

9

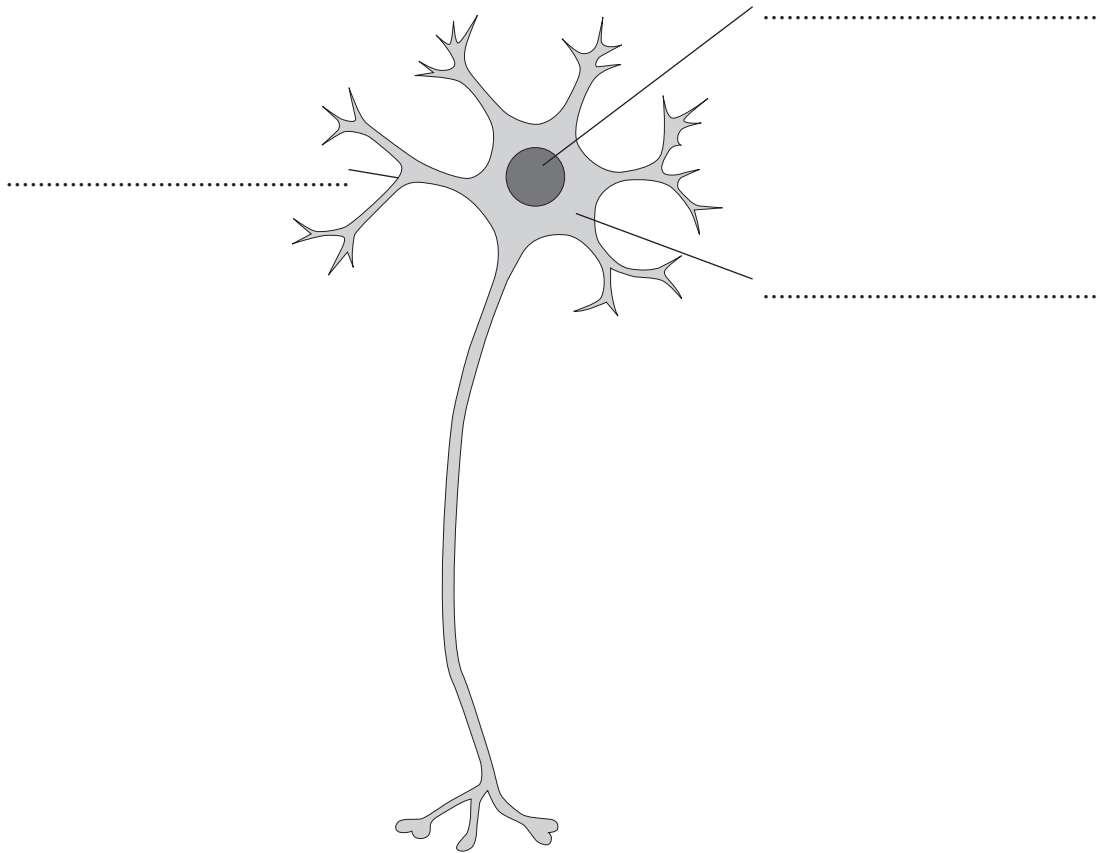
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**Turn over ►**



7 Huntington’s disease is a genetically inherited disorder. It damages the nerve cells in the brain.

7 (a) Complete the labels for the nerve cell in the diagram.



(3 marks)

7 (b) The structure of a nerve cell is different from that of other cells. This helps it to carry out its function.

7 (b) (i) What is the function of a nerve cell?

.....  
(1 mark)

7 (b) (ii) Describe **one** feature of the nerve cell that helps it to carry out its function.

.....  
(1 mark)

7 (b) (iii) Explain how the feature that you have described helps the nerve cell to carry out its function.

.....  
.....  
(1 mark)





7 (c) Children resemble their parents because of the genetic information that is passed on in sex cells.

7 (c) (i) Name the part of the cell in which the genes are found.

.....  
(1 mark)

7 (c) (ii) What are different versions of the same gene called?

.....  
(1 mark)

7 (d) Genetic specialists can advise parents who are worried that they may pass on a genetic disease to their children.

A couple who are trying for a baby have recently found out that the father has inherited Huntington's disease and the mother has not inherited Huntington's disease. Use a genetic diagram to show why their children have a 50% chance of inheriting the disease. Include clear labels on your diagram.

Use H as the dominant gene. This gene causes the disease.

Use h as the recessive gene.

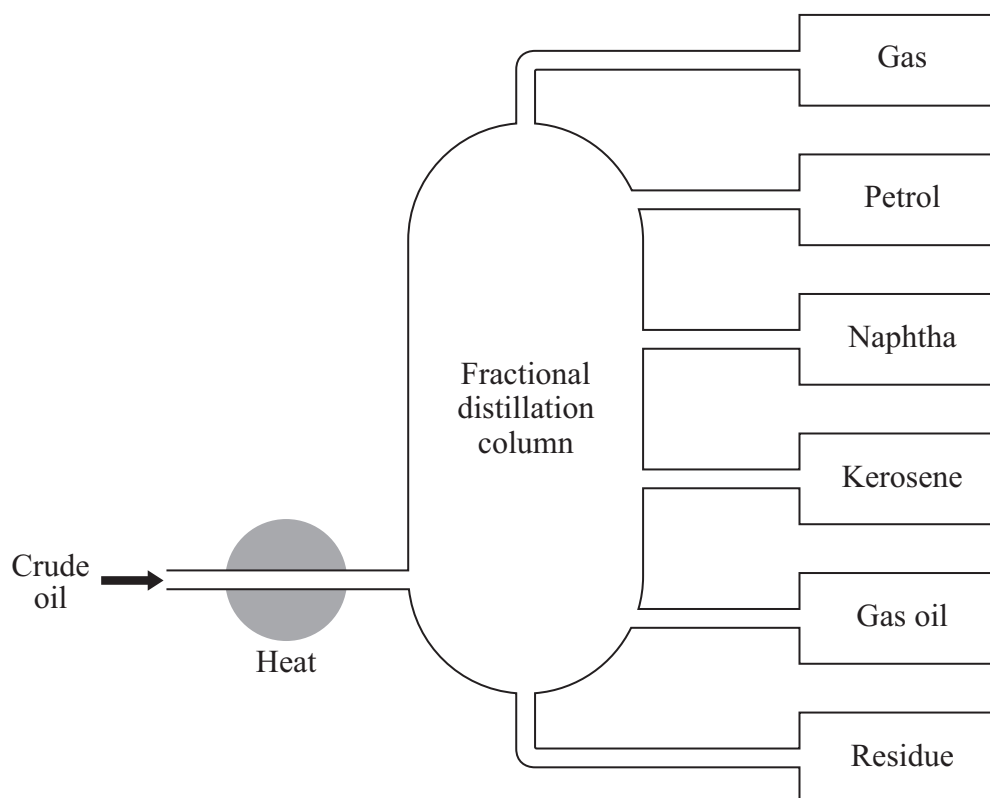
(3 marks)



8 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.

8 (a) Describe how fractional distillation is used to separate crude oil into useful fractions.

.....

.....

.....

.....

.....

.....

.....

(3 marks)



- 8 (b) Petrol contains a mixture of hydrocarbons.

Some hydrocarbons found in petrol are listed in the table.

Name	Formula
Pentane	$C_5H_{12}$
Hexane	$C_6H_{14}$
Heptane	$C_7H_{16}$

- 8 (b) (i) What is a hydrocarbon?

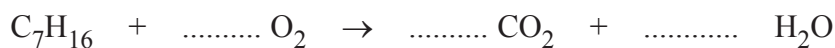
.....  
 .....  
 (1 mark)

- 8 (b) (ii) Octane is a hydrocarbon with 8 carbon atoms.

Write the chemical formula for octane.

.....  
 (1 mark)

- 8 (c) Heptane burns in air to form carbon dioxide and water.



Balance the equation by writing the correct numbers in the spaces provided.

(3 marks)

- 8 (d) Fuel scientists are developing alternatives to hydrocarbon fuels.

Give **one** advantage of using alternative fuels.

.....  
 .....  
 (1 mark)

9
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Turn over ►



9 Road safety is an increasing concern as more and more people are buying cars in the UK.

9 (a) The table shows the number of pedestrians killed by motorists in the UK in a 10-year period.

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Child	180	165	160	132	131	138	103	107	107	107	109
Adult	1163	1072	953	897	858	853	803	760	750	719	696

9 (a) (i) The data shows an overall decrease in the number of pedestrians killed.

Suggest **one** reason to explain the overall trend shown.

.....  
.....

(1 mark)

9 (a) (ii) The percentage decrease in the number of adult pedestrian deaths can be calculated using the following equation.

$$\frac{\text{Change in number of deaths}}{\text{Original number of deaths}} \times 100$$

The percentage decrease in adult pedestrian deaths between 2000 and 2001 was 4.1%.

Calculate the percentage decrease in adult pedestrian deaths between 2001 and 2002.

.....  
(2 marks)





- 9 (c) It is now illegal to use a mobile phone when driving.

Why do people think that using a mobile phone when driving should be against the law?

.....

.....

(1 mark)

<b>12</b>

**END OF QUESTIONS**



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