

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

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General Certificate of Secondary Education
June 2003



SCIENCE: DOUBLE AWARD (MODULAR) 3468/2F
FOUNDATION TIER
Paper 2

Monday 9 June 2003 9.00 am to 10.30 am

F

In addition to this paper you will require:

- the Data Sheet (enclosed);
- a ruler.

You may use a calculator.

For Examiner's Use			
Number	Mark	Number	Mark
1		14	
2		15	
3		16	
4		17	
5		18	
6		19	
7		20	
8			
9			
10			
11			
12			
13			
Total (Column 1)	→		
Total (Column 2)	→		
TOTAL			
Examiner's Initials			

Time allowed: 1 hour 30 minutes

Instructions

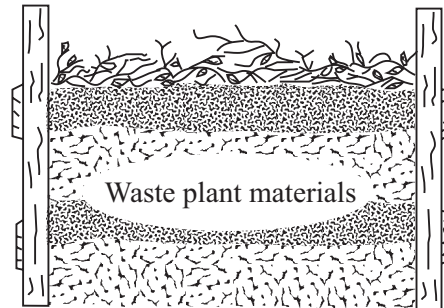
- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

Information

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

ENVIRONMENT

- 1 Compost heaps are used to recycle waste plant materials.



Complete the sentences by choosing the correct words from the box.

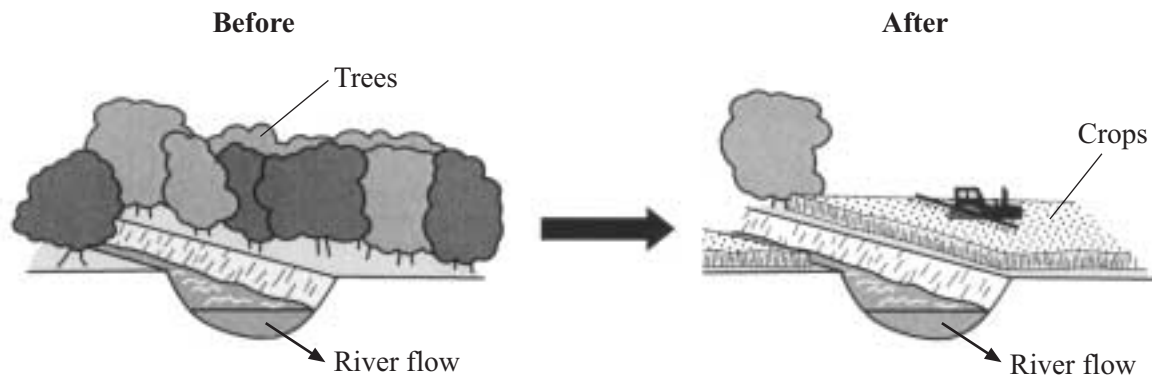
cool	decay	dry	grow
	moist	respire	warm

The waste plant materials because they are broken down by microorganisms.

The waste plant materials are broken down faster when the conditions are and

This process releases substances that can be used by other plants to
(4 marks)

- 2 In many countries, trees are removed so that more land can be used to grow crops.



- (a) When trees are removed it becomes more difficult for some plants and animals to survive. Give **one** reason why.

.....

(1 mark)

- (b) Farmers often spread chemicals on their fields before growing crops. When the crops are growing, the farmers sometimes spray them with toxic chemicals. These chemicals may be washed from the fields and can pollute the rivers.

Name **two** types of these chemicals that might pollute rivers.

1

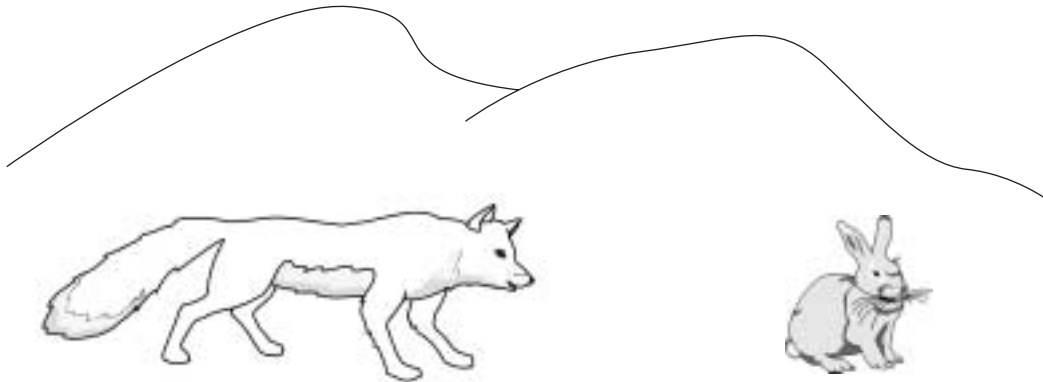
2

(2 marks)

TURN OVER FOR THE NEXT QUESTION

Turn over ▶

3 The Arctic fox is a predator that feeds mainly on small mammals. The Arctic fox is adapted to live in the cold conditions of the snow-covered Arctic.



The Arctic fox has thick, white fur.

Give **two** ways in which the fur helps the Arctic fox to survive.

1

.....

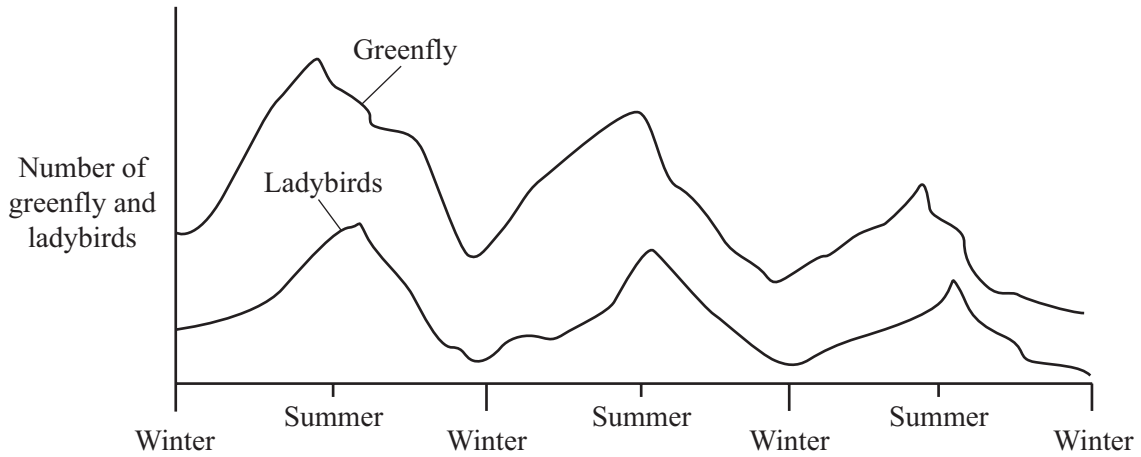
2

.....

(2 marks)

2

- 4 Greenfly feed on rose bushes. Ladybirds (predators) feed on these greenfly. The graph shows how the population of greenfly and ladybirds in a garden change over a period of three years.



- (a) *To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.*

Describe what happened to the population of greenfly over the three years.

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(3 marks)

- (b) Give **one** factor that limits the number of ladybirds.

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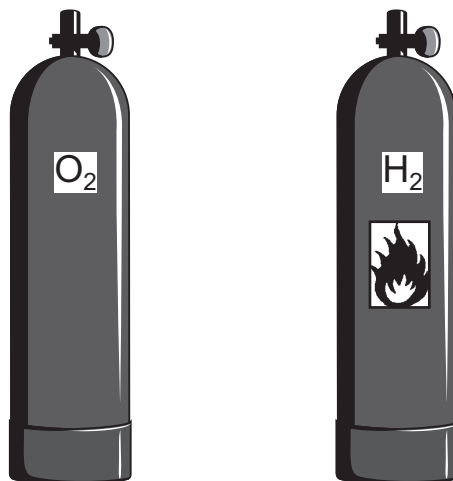
.....

(1 mark)

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4

PATTERNS OF CHEMICAL CHANGE

- 5 The gas cylinders contain two different gases.



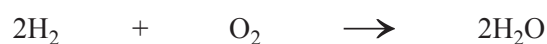
- (a) What does the hazard symbol on the hydrogen cylinder mean?

.....

(1 mark)

- (b) You may find the Data Sheet helpful to complete the word equation.

These two gases react as shown in the balanced symbol equation.



Complete the word equation for this reaction.

hydrogen + \rightarrow

(2 marks)

- (c) Complete this sentence by crossing out the **two** words in the box that are wrong.

This chemical reaction is much faster if a

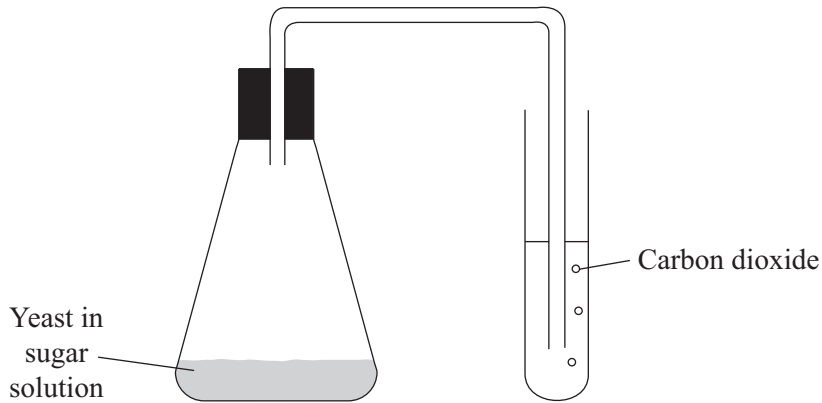
catalyst
molecule
solution

is used.

(1 mark)

4

6 We can use yeast to change sugar into alcohol and carbon dioxide. This process is called fermentation.



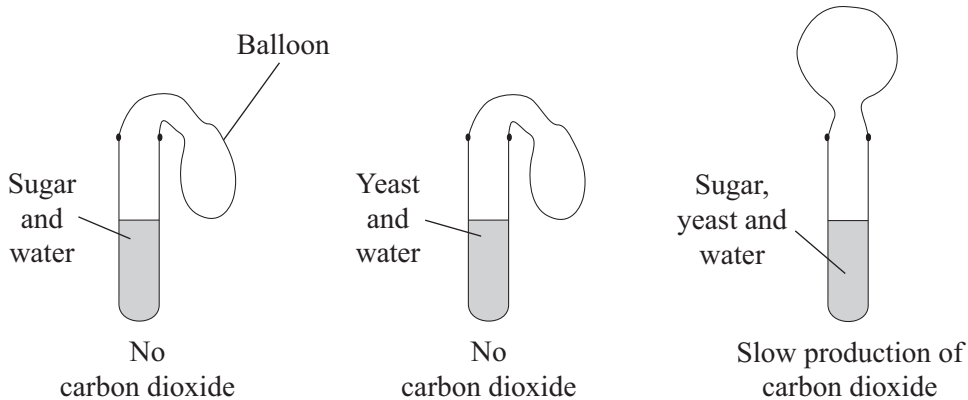
(a) Complete the sentences by choosing the correct words from the box.

bread	cheese	wine	yoghurt
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Alcohol produced in this way is used in making

Carbon dioxide produced by fermentation can be used to make rise. (2 marks)

(b) Three test tubes were set up, as shown below. The temperature was kept at 15°C.



(i) Give **one** advantage of using enzymes in chemical reactions.

.....

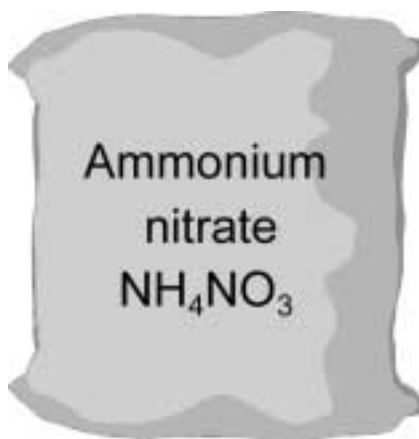
 (1 mark)

(ii) Give **one** disadvantage of using enzymes in chemical reactions.

.....

 (1 mark)

- 7 Nitrates, such as ammonium nitrate, are added to soil to help plant growth.



- (a) When rain falls nitrates dissolve and can end up in drinking water. Nitrates in drinking water can stop respiration in babies. This only happens if there is a lot of nitrate in the drinking water.

Plants use nitrates for growth. Humans need plants. Should large amounts of nitrates be added to soil?

Give **two** reasons for your answer.

Answer

Reason 1

.....

Reason 2

.....

(2 marks)

- (b) The amount of nitrogen in a nitrate compound is important.

- (i) How many nitrogen atoms are there in the formula of ammonium nitrate, NH_4NO_3 ?

.....

(1 mark)

- (ii) Calculate the percentage of nitrogen in ammonium nitrate, NH_4NO_3 .

(Relative atomic masses: H = 1; N = 14; O = 16)

.....

.....

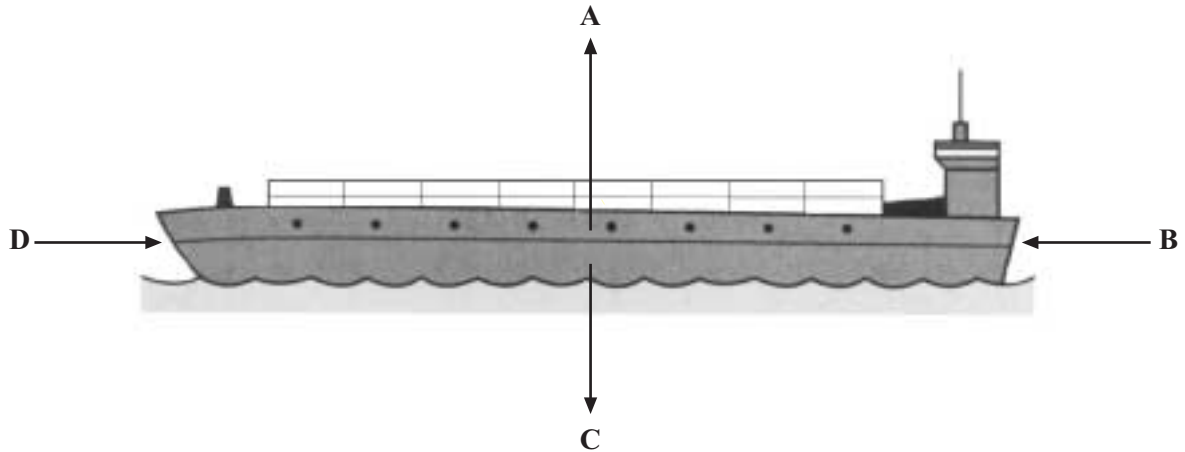
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Percentage of nitrogen in ammonium nitrate = %

(3 marks)

FORCES

- 8 Four of the forces that act on this container ship are shown in the diagram as **A**, **B**, **C** and **D**.



Complete each sentence by choosing the correct letters, **A**, **B**, **C** or **D**.

The first one has been done for you.

At the start, the ship is not moving because forces **B** and **D** are balanced.

The ship begins to move forward when forces and are unbalanced.

When the ship is moving at a steady speed, forces and are balanced.

The ship stops at a port. All of the containers are taken off and this changes force
(3 marks)

3

TURN OVER FOR THE NEXT QUESTION

Turn over ►

9 **Figure 1** shows the thinking distances, braking distances and total stopping distances of a car at three different speeds.

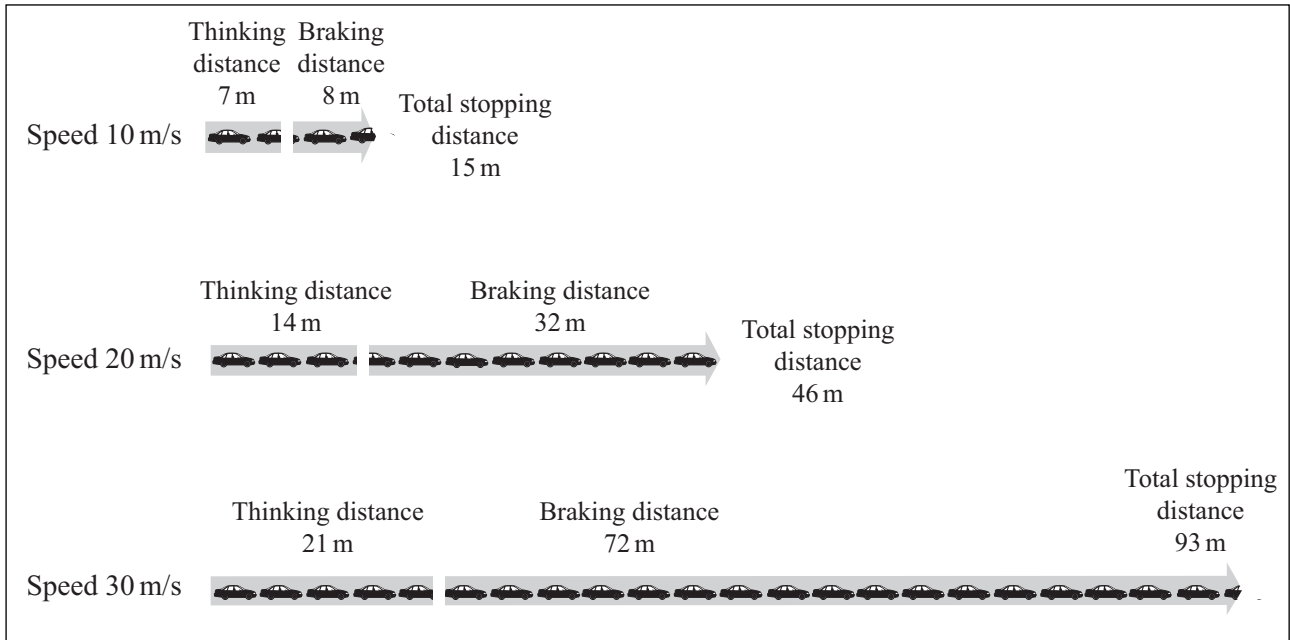


Figure 1

(a) Look at the total stopping distances at each speed.

Complete the sentence by choosing the correct words from the box.

distance	force	mass	time
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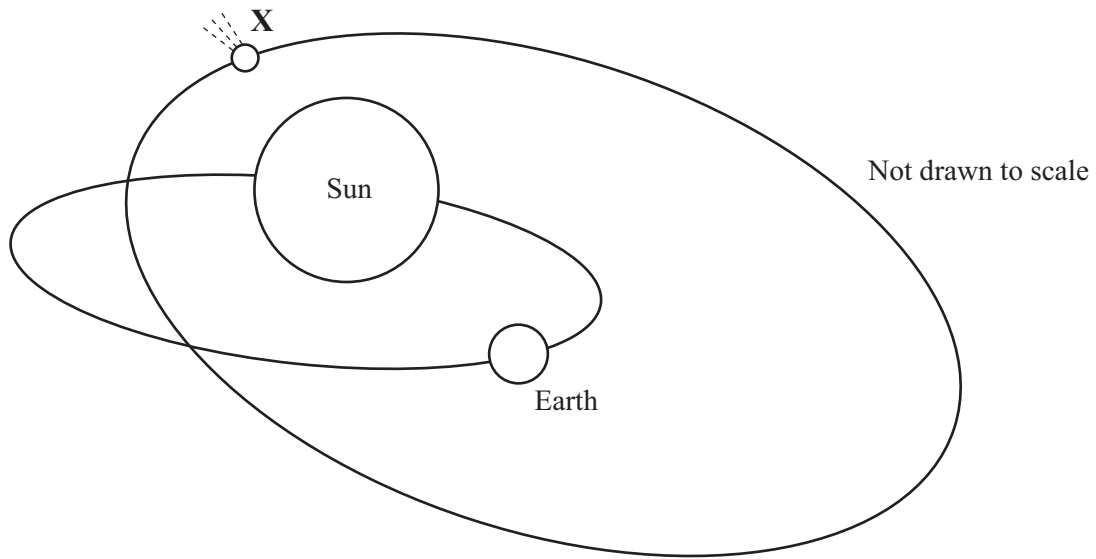
The total stopping distance depends on the distance the car travels during the driver’s reaction and under the braking
(2 marks)

(b) Give **three** other factors that could cause the total stopping distance of a car to be greater. Do **not** give the factors in **Figure 1**.

- 1
- 2
- 3

(3 marks)

- 10 The diagram shows part of the solar system.



Complete these sentences by crossing out the **two** words that are wrong in each box.

- (a) The object labelled X most probably is a
- | |
|--------|
| comet |
| moon |
| planet |

(1 mark)

- (b) The orbit of the Earth around the Sun is
- | |
|------------|
| circular |
| elliptical |
| spherical |

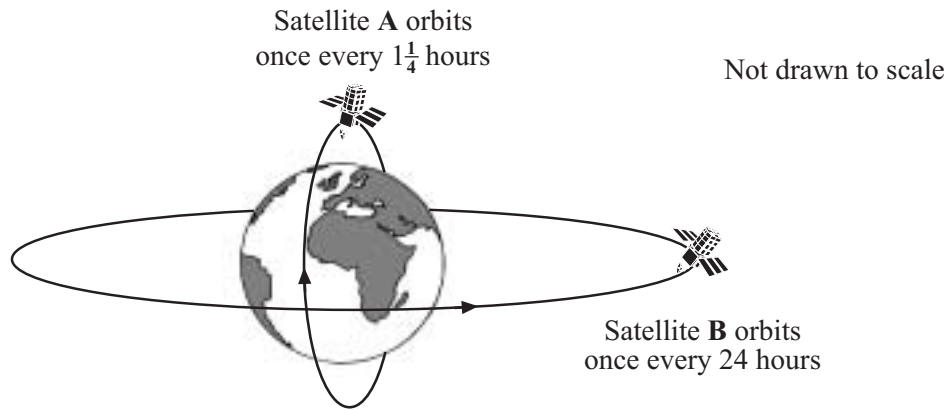
(1 mark)

2

TURN OVER FOR THE NEXT QUESTION

Turn over ▶

11 The orbit of a satellite around the Earth depends on the job that the satellite does.



The Earth spins once every 24 hours.

(a) Complete the sentence by choosing the correct word from the box.

equatorial	polar	tropical
-------------------	--------------	-----------------

Satellite A is used to monitor weather because it has a low orbit.
(1 mark)

(b) Satellite B orbits once every 24 hours. Satellite B can be used for communications.
Give **two** reasons why.

1

.....

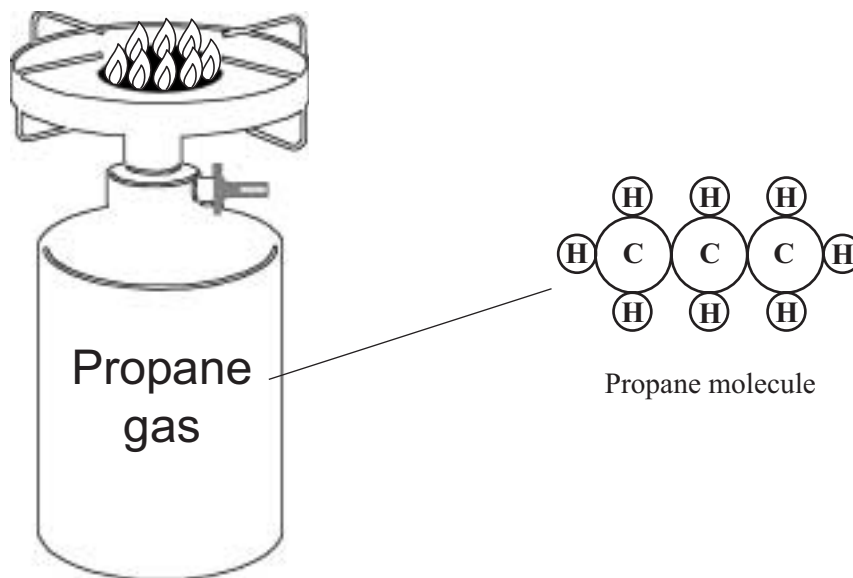
2

.....

(2 marks)

QUESTIONS RELATING TO PREVIOUSLY TESTED MODULES

- 12 Propane has a small, hydrocarbon molecule, so it is used as a fuel.



- (a) Complete the sentences by choosing the correct words from the box.

carbohydrate	high	hydrogen
hydroxide	low	volatile

Propane is a hydrocarbon with a boiling point. Propane is a hydrocarbon because it is made of and carbon only.

(2 marks)

- (b) Describe, in as much detail as you can, what happens when propane burns.

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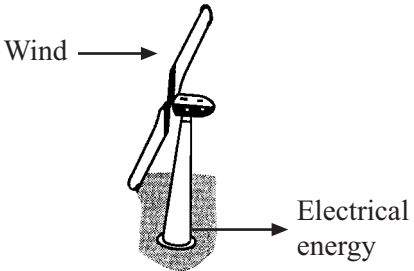
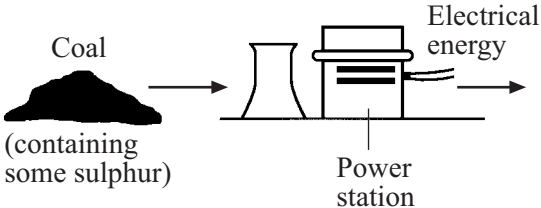
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(3 marks)

13 Electricity is a useful form of energy.

(a) Different energy sources can be used to generate electricity.

Wind is an energy source	Coal, a fossil fuel, is an energy source
	
<p>This wind turbine generates 1 MW. (1 MW = 1000 kW)</p>	<p>This coal-fired power station generates 1000 MW.</p>
<p>Electricity demand in the UK can be 48 000 MW.</p>	

Give **one** advantage and **one** disadvantage (other than cost) of using each energy source to generate electricity in the UK.

Advantage	Disadvantage
<p>Using wind</p> <p>.....</p> <p>.....</p> <p>.....</p>	<p>Using wind</p> <p>.....</p> <p>.....</p> <p>.....</p>
<p>Using coal</p> <p>.....</p> <p>.....</p> <p>.....</p>	<p>Using coal</p> <p>.....</p> <p>.....</p> <p>.....</p>

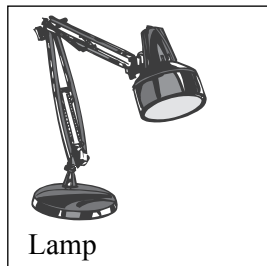
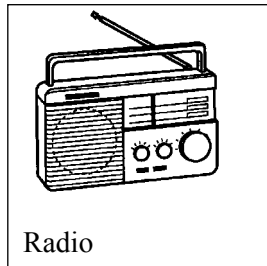
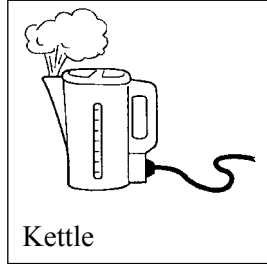
(4 marks)

- (b) List **A** shows three electrical devices.
List **B** gives the type of useful energy transferred.

Draw a straight line from each electrical device in List **A** to the useful energy it transfers in List **B**.

List **A**

Electrical device

List **B**

Useful energy transferred

heat

light

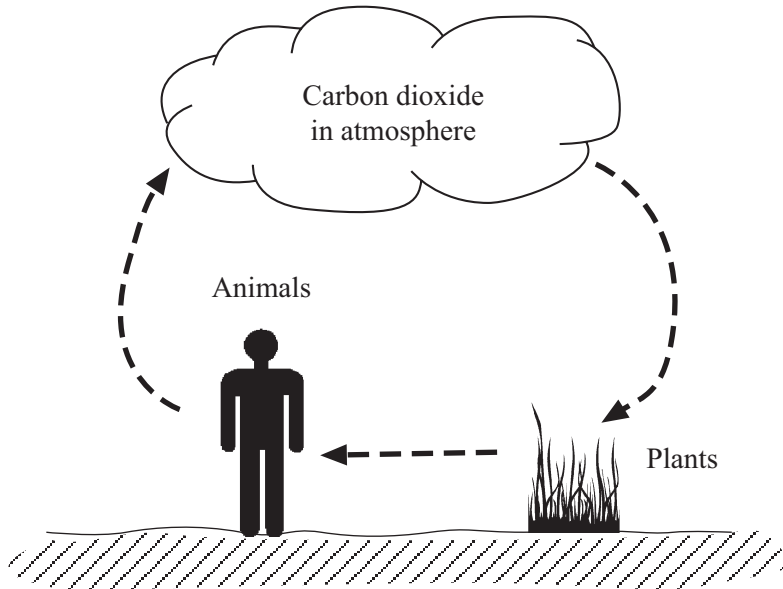
sound

(2 marks)



ENVIRONMENT

14 The diagram shows part of the carbon cycle.



Describe the processes shown in the diagram above.

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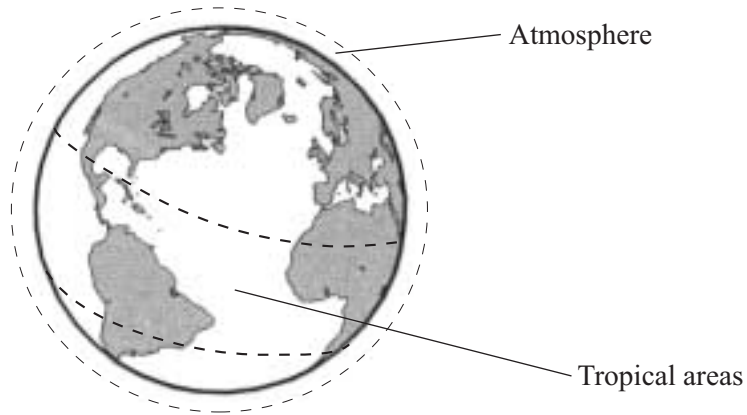
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(4 marks)

4

15 Recently the concentration of carbon dioxide in the Earth’s atmosphere has increased slightly. This may be linked to an increase in the ‘greenhouse effect’.



(a) The human population has grown rapidly. This has caused an increase in the amount of land used for agriculture, especially in tropical areas. This has helped to increase the carbon dioxide in the atmosphere.

Give **two** reasons for this.

- 1
-
- 2
-

(2 marks)

(b) The increased ‘greenhouse effect’ has caused an increase in the Earth’s average temperature.

Give **two** possible environmental effects of this increased average temperature.

- 1
-
- 2
-

(2 marks)

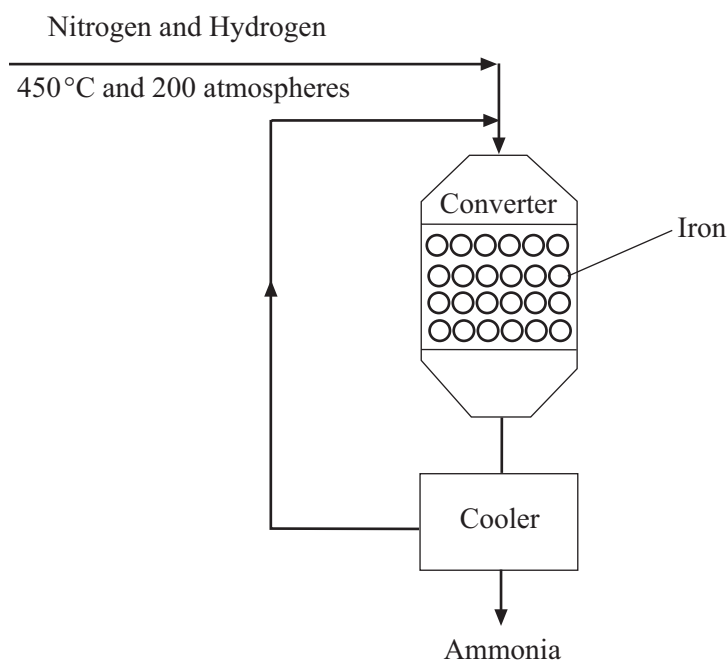
(c) Name another gas, produced by cattle and rice fields, that also helps cause the ‘greenhouse effect’.

.....

(1 mark)

PATTERNS OF CHEMICAL CHANGE

- 16 The diagram shows the final stages in the manufacture of ammonia.



- (a) Why is iron used in the converter?

.....

 (1 mark)

- (b) Write the word equation for the reaction in the converter.

..... + \rightleftharpoons
 (1 mark)

- (c) The yield of ammonia is only about 15%.

- (i) Why can the yield **not** be 100%?

.....

 (1 mark)

- (ii) Describe what happens to the mixture of gases after it leaves the converter.

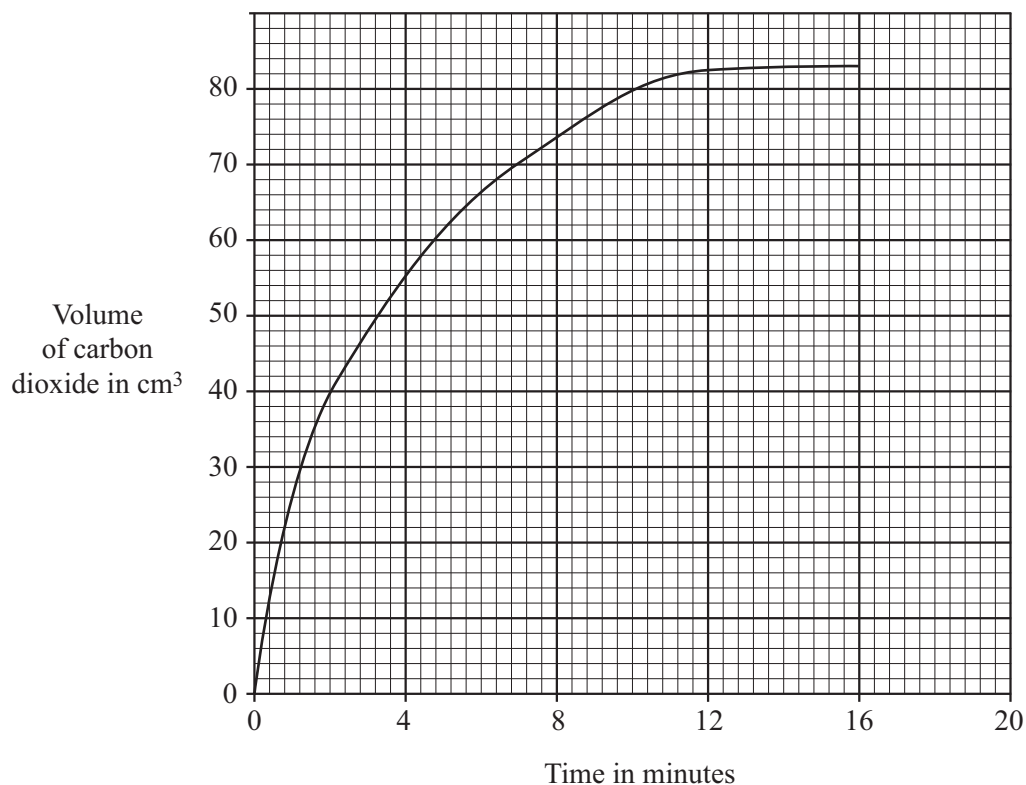
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 (2 marks)

- 17 Calcium carbonate reacts with nitric acid to produce carbon dioxide.



A 10 g lump of calcium carbonate was reacted with 20 cm³ of dilute nitric acid. When the reaction was finished, some of the calcium carbonate was left unreacted. The graph shows the volume of carbon dioxide made in each minute for sixteen minutes.



- (a) The volume of carbon dioxide made in each minute decreases until it remains steady at 83 cm³. Explain why.

.....

.....

.....

.....

(2 marks)

- (b) Draw a graph line, on the axes above, for an experiment where 20 cm³ of the same dilute nitric acid was reacted with 10 g of **powdered** calcium carbonate.

(2 marks)

- (c) Give **one** way of changing the rate of this reaction (other than using powdered calcium carbonate).

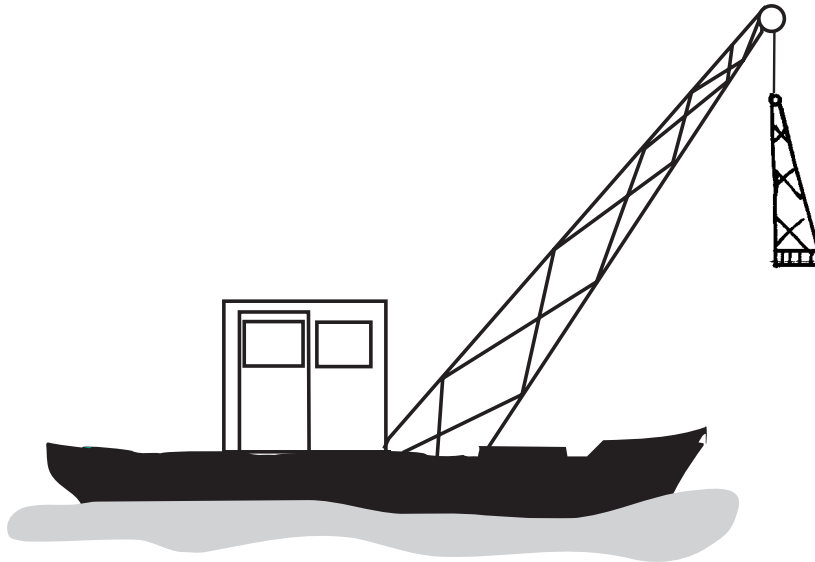
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(1 mark)

FORCES

18 A crane on a barge lifts a girder and then carries it along the river.



The girder has a weight of 1 000 000 N and is lifted to a height of 1500 cm.

(a) Complete the sentence.

The weight of the girder is caused by the Earth's gravitational field strength acting on its

..... (1 mark)

(b) Calculate the work done in lifting the girder.

Write the equation you are going to use.

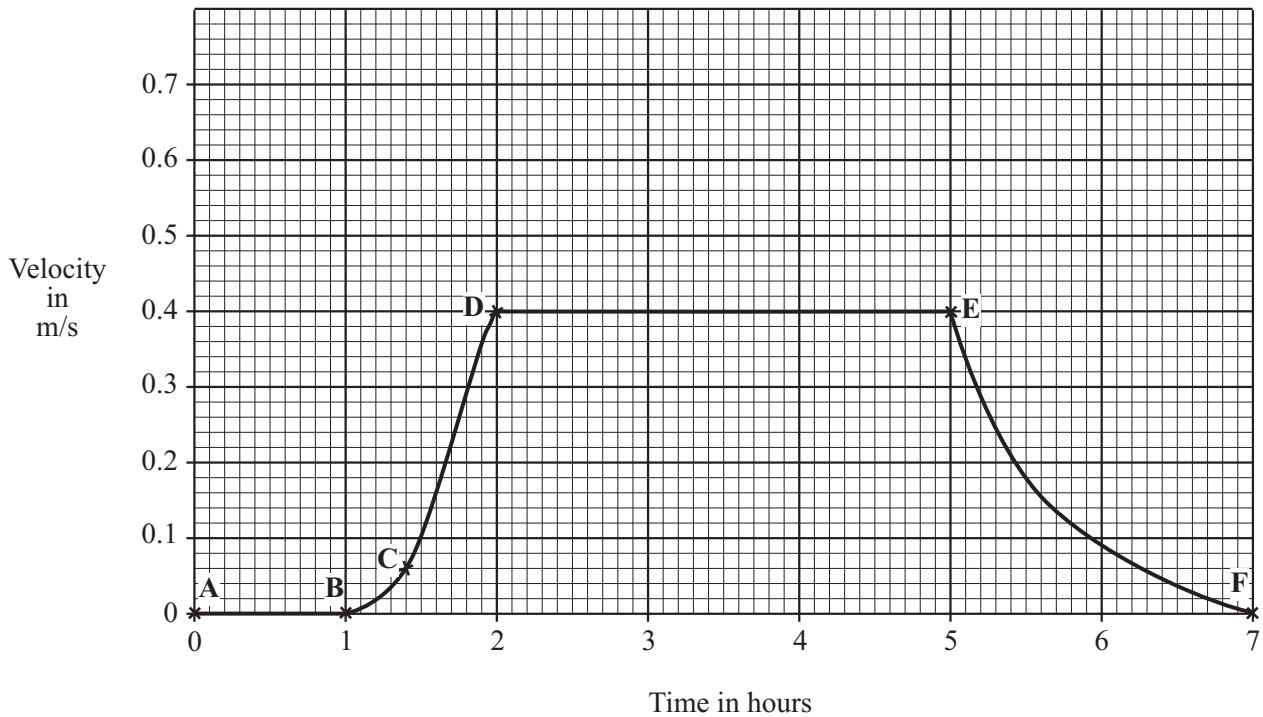
..... (1 mark)

Show clearly how you work out your answer and give the unit.

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Work done = (3 marks)

(c) The velocity–time graph represents the motion of the barge after the girder had been lifted.



To gain full marks in this question you should write your ideas in good English. Put them in a sensible order and use the correct scientific words.

Describe the motion of the barge over this period of seven hours. You must refer to the points A, B, C, D, E and F in your description.

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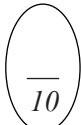
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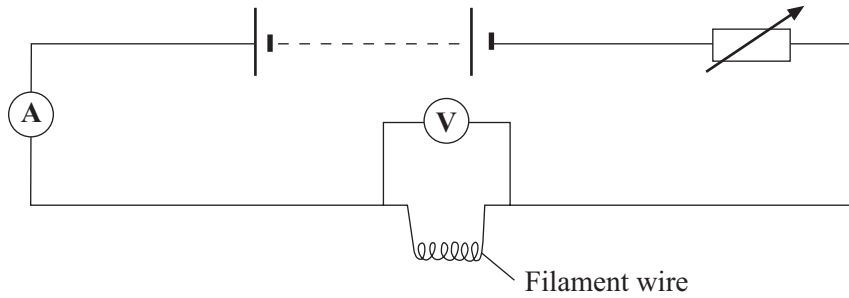
(5 marks)



Turn over ▶

QUESTIONS RELATING TO PREVIOUSLY TESTED MODULES

- 19 A bulb heats up when an electric current passes through the filament wire. The current was measured when different voltages were applied across the filament wire shown in the diagram below.



- (a) (i) Look at the circuit diagram. How was the voltage changed?

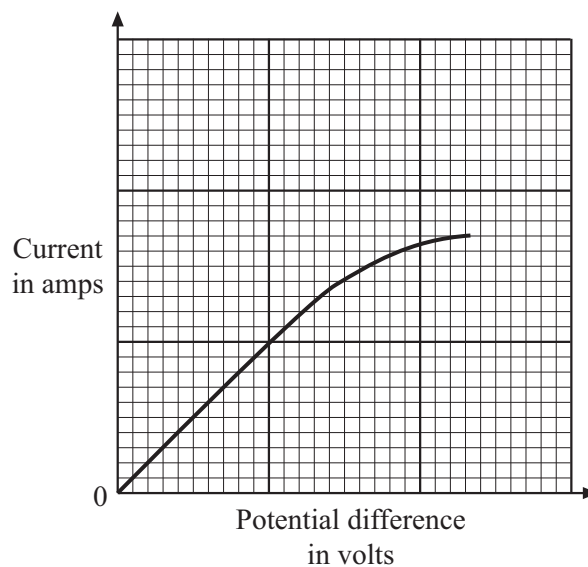
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(1 mark)

- (ii) Write an equation that shows the relationship between *current*, *potential difference* and *resistance*.

.....
(1 mark)

- (b) The graph shows how the current through the filament wire changed as the potential difference across it changed.



- (i) Describe the effect of increasing the potential difference on the current flowing through the filament wire.

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(2 marks)

- (ii) Explain this effect in terms of the resistance of the filament wire.

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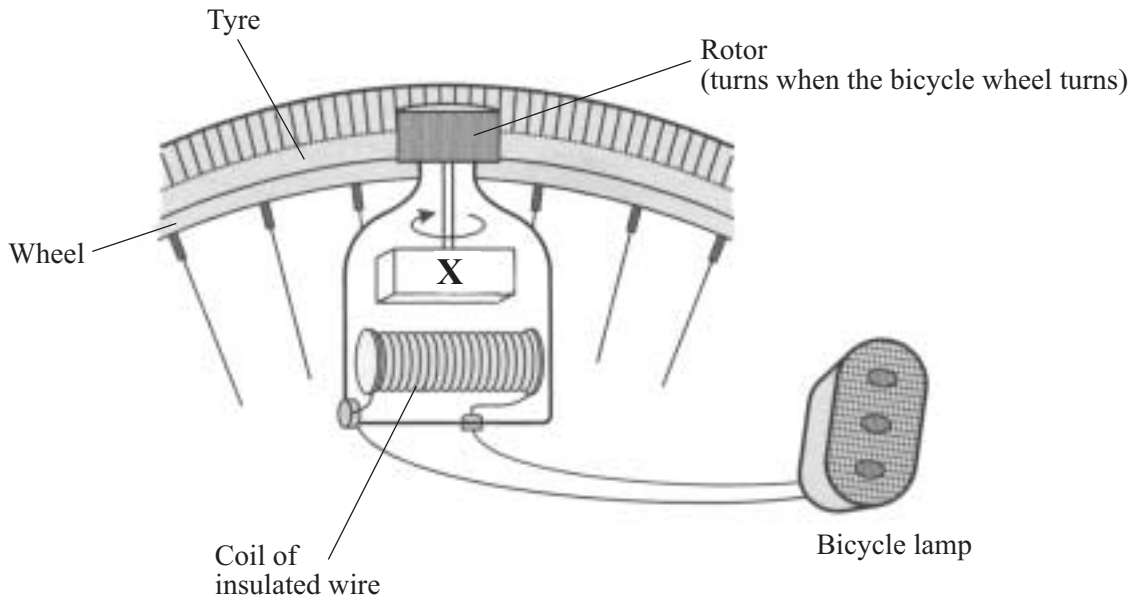
(2 marks)

6

TURN OVER FOR THE NEXT QUESTION

Turn over ▶

20 A bicycle can use a dynamo to generate electricity.



(a) Name part X.

.....
(1 mark)

(b) Give **three** ways of increasing the size of the induced voltage from a dynamo.

- 1
-
- 2
-
- 3
-

(3 marks)

END OF QUESTIONS