Surname		Other Names	
Centre Number			Candidate Number	
Candidate Signature			

Leave blank

General Certificate of Secondary Education
June 2005

AQA
ASSESSMENT and QUALIFICATIONS ALLIANCE

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

F

Thursday 16 June 2005 9.00 am to 10.30 am

In addition to this paper you will require:
- the Data Sheet (enclosed);
- a ruler.

You may use a calculator.

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.

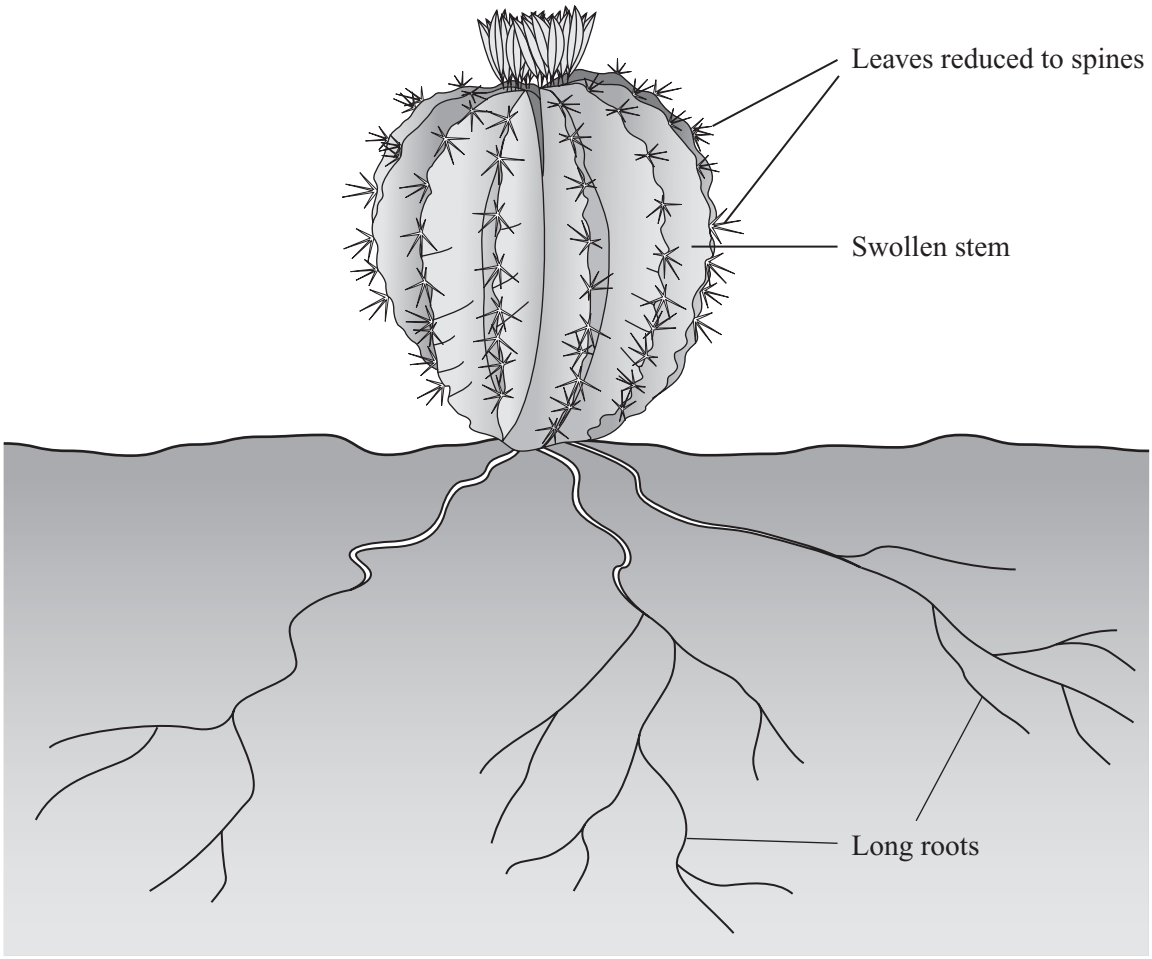
Information
- The maximum mark for this paper is 90.
- Mark allocations are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

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

LEAVE MARGIN BLANK

ENVIRONMENT

1 The drawing shows a plant that is adapted to life in a hot, dry desert.



(a) Which labelled part of the plant helps it to get the water it needs?

.....

.....

(1 mark)

(b) The stem of the plant is covered by wax.
How does this help the plant to survive?

.....

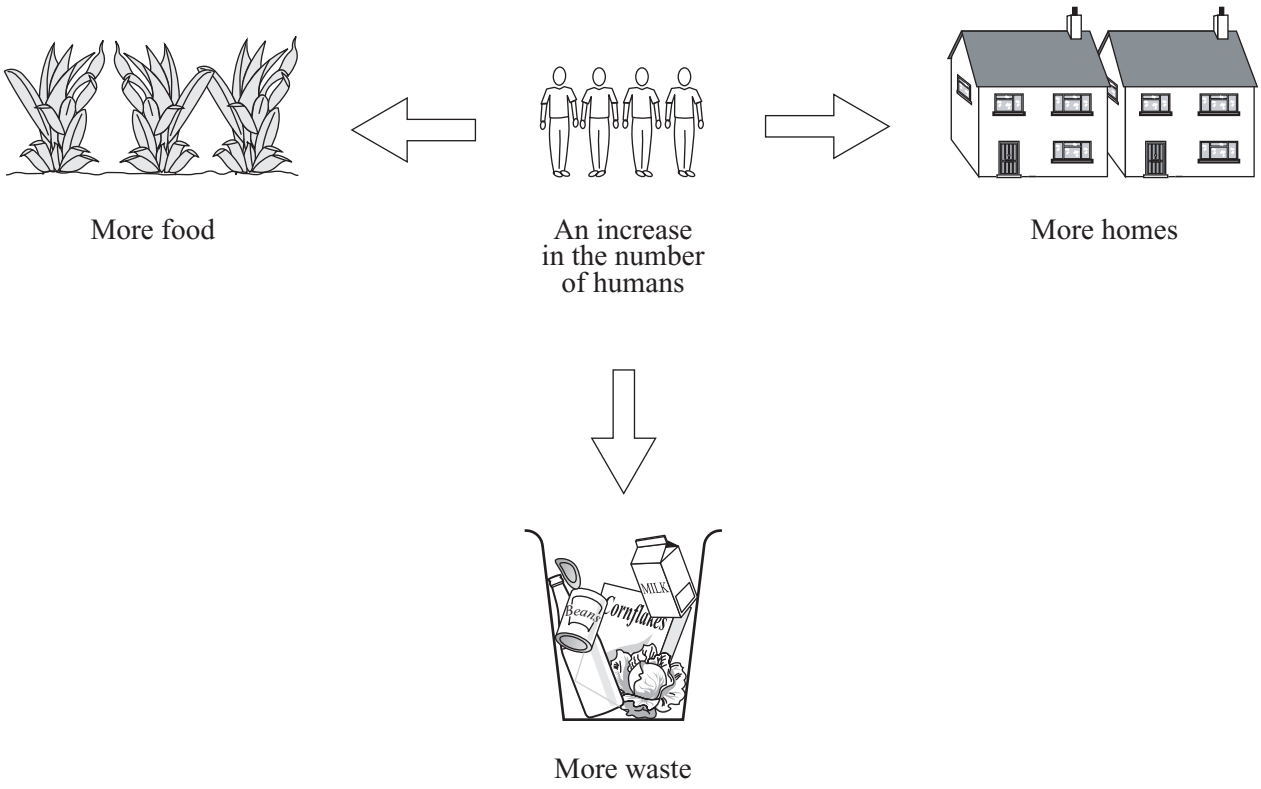
.....

(1 mark)

2

LEAVE MARGIN BLANK

2 The population of humans is rising. The diagram shows ways in which this affects the environment.



Humans reduce the amount of land available for other animals and plants. Use information from the diagram to state **three** ways in which this happens.

1 .....

.....

2 .....

.....

3 .....

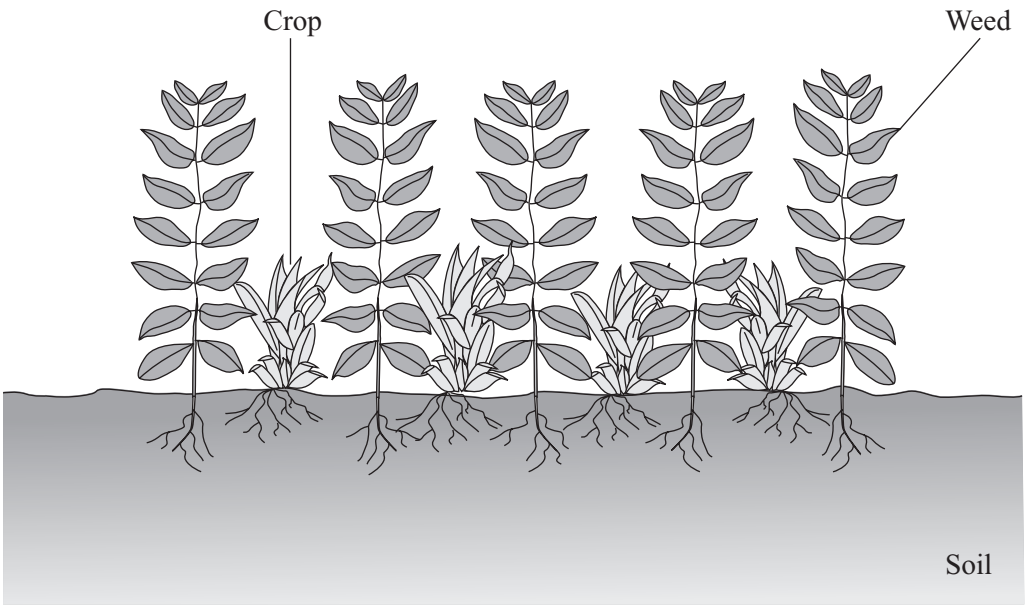
.....

(3 marks)

3

LEAVE MARGIN BLANK

3 Farmers need to get rid of weeds because they can stop crops growing well.



(a) Write down **three** things that crops and weeds compete for.

1 .....

2 .....

3 .....

(3 marks)

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

Chemicals that are used to kill weeds are called

fertilisers
herbicides
pesticides

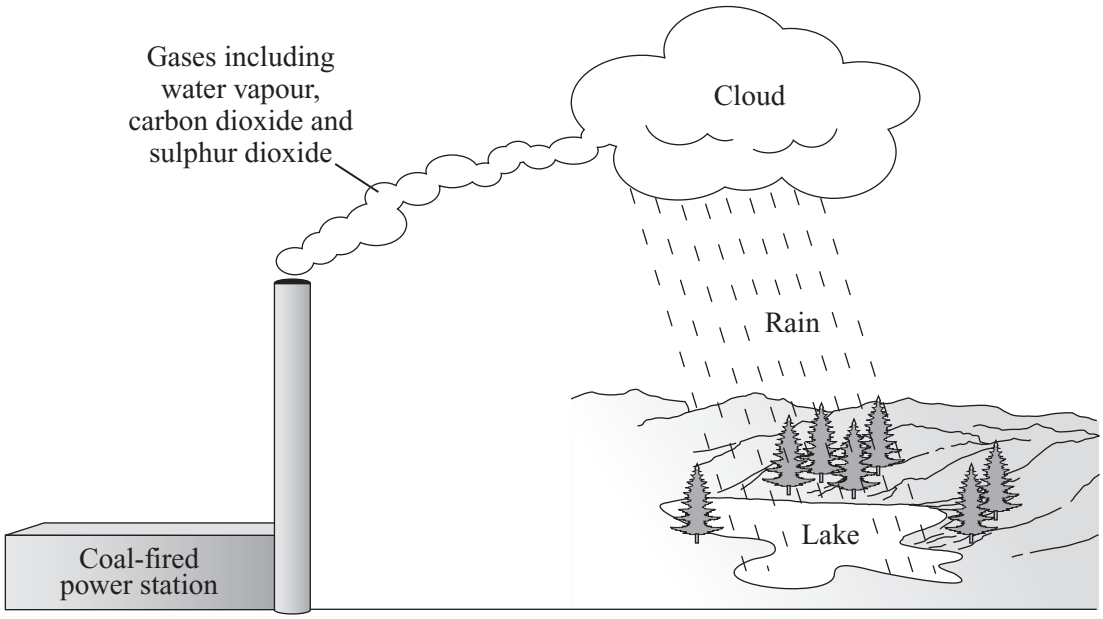
.

(1 mark)

4

LEAVE MARGIN BLANK

4 Coal is used in many power stations.



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.

Use information from the diagram to describe, in as much detail as you can, how using coal in power stations can damage the environment.

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

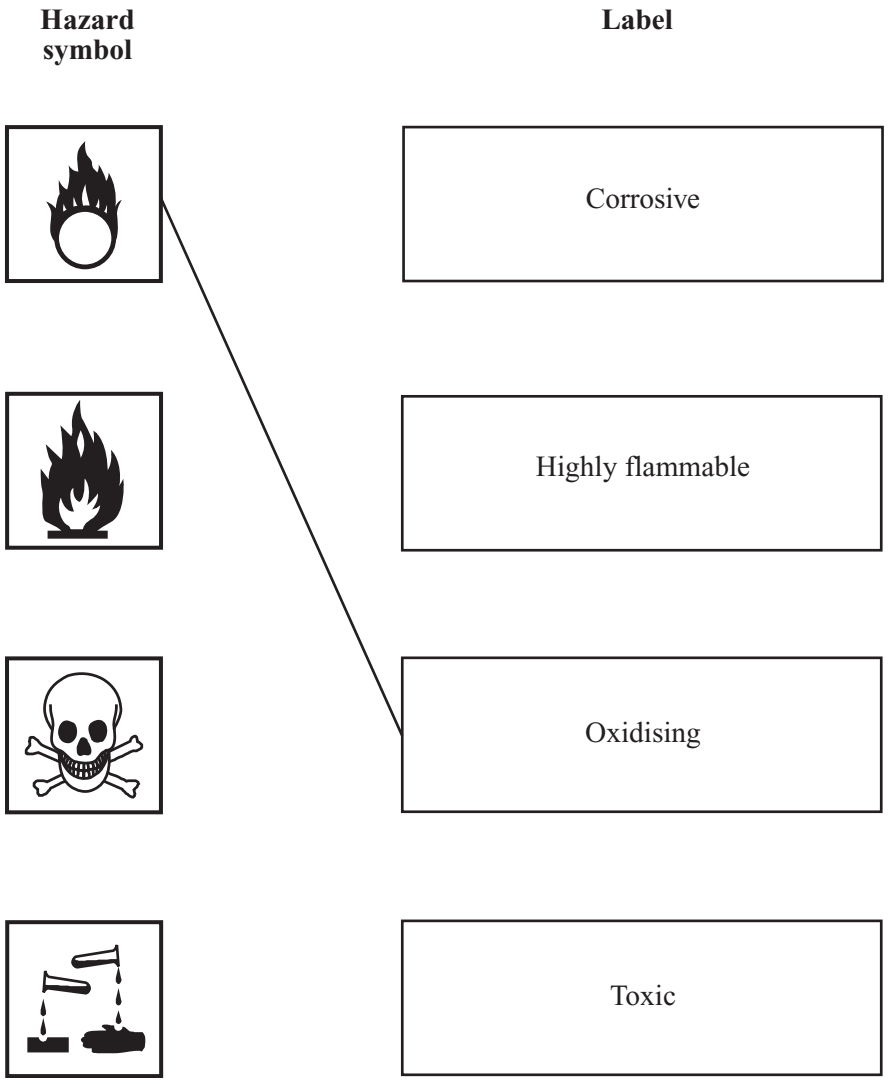
4

LEAVE MARGIN BLANK

PATTERNS OF CHEMICAL CHANGE

5 (a) Many bottles containing chemicals have hazard symbols on them.

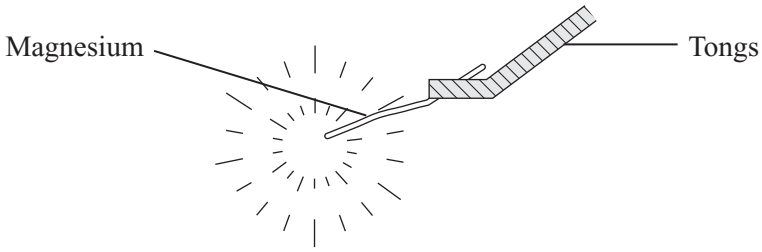
Draw a straight line from each of the hazard symbols to its correct label.
The first one has been done for you.



(2 marks)

LEAVE MARGIN BLANK

(b) Magnesium burns brightly in air.



(i) Write the correct word to complete the sentence.

This is an exothermic reaction because when magnesium burns, it transfers

..... to the surroundings. *(1 mark)*

(ii) The balanced symbol equation shows what happens when magnesium burns in air.

$$2Mg + O_2 \rightarrow 2MgO$$

Complete the word equation for this reaction.
(You may find the Data Sheet is helpful.)

magnesium + ... → .....

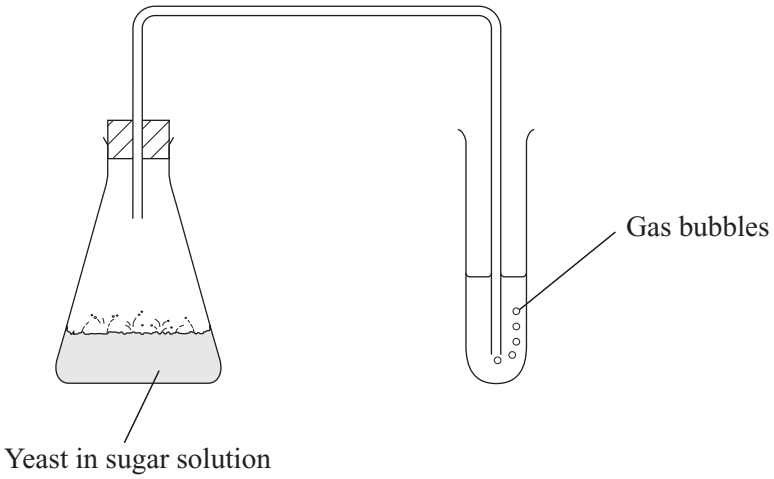
(2 marks)

5

TURN OVER FOR THE NEXT QUESTION

LEAVE MARGIN BLANK

6 (a) The diagram shows a fermentation reaction.



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

acid	**alcohol**	**carbon dioxide**	**copper sulphate**	**enzymes**
		limewater	**oxygen**	**sugar**

Yeast cells break down .....into

..... and ..... gas.

This gas turns ..... milky. *(4 marks)*

LEAVE MARGIN BLANK

(b) When ammonium chloride is heated, it forms ammonia and hydrogen chloride.

ammonium chloride $\rightleftharpoons$ ammonia + hydrogen chloride

What does the sign $\rightleftharpoons$ mean?

.....

.....

(1 mark)

(c) Ammonium chloride, NH_4Cl, is made up of nitrogen, hydrogen and chlorine atoms.

(i) Complete the table to show the number of atoms of each element present in NH_4Cl.

Element	**Number of atoms in NH_4Cl**
nitrogen	1
hydrogen	
chlorine	

(1 mark)

(ii) Calculate the relative formula mass of ammonium chloride, NH_4Cl.

(Relative atomic masses: H = 1, N = 14, Cl = 35.5)

.....

.....

.....

.....

Relative formula mass = ...

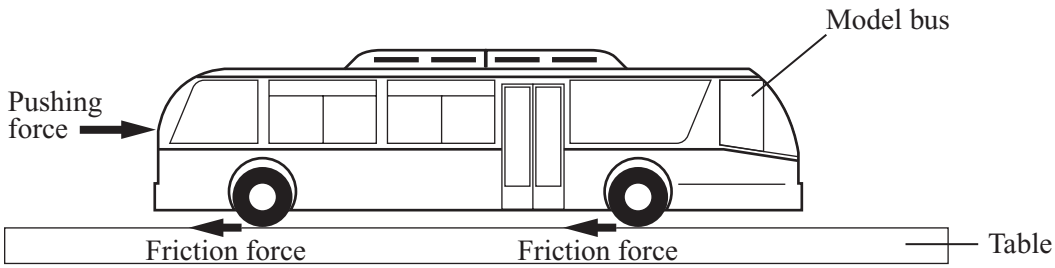
(2 marks)

8

LEAVE MARGIN BLANK

FORCES

7 (a) The model bus is being pushed on a table.



(i) At first the pushing force does **not** make the model bus move. Explain why.

.....

.....

(1 mark)

(ii) Write down **two** things that happen as the pushing force increases.

1 .....

.....

2 .....

.....

(2 marks)

(iii) Complete the formula by choosing the correct words from the box.

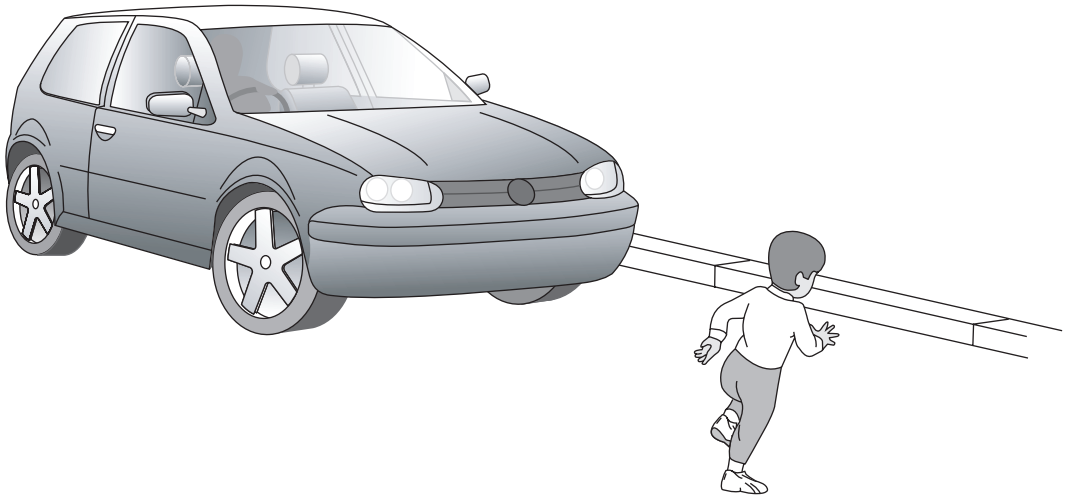
acceleration	**distance moved**	**force applied**
speed	**time taken**	

Work done on the model bus = ... × .....

(2 marks)

LEAVE MARGIN BLANK

(b) In this situation, the car driver needs to stop the car in the shortest possible distance.



(i) Complete the table by putting ticks (✓) to show which factors would make the stopping distance greater. The first one has been done for you.

Factor	Tick (✓) makes stopping distance greater
brakes are old and worn	✓
car is travelling fast	
driver has been drinking alcohol	
four new tyres are fitted	
hot, dry, sunny weather	
ice on the road	

(3 marks)

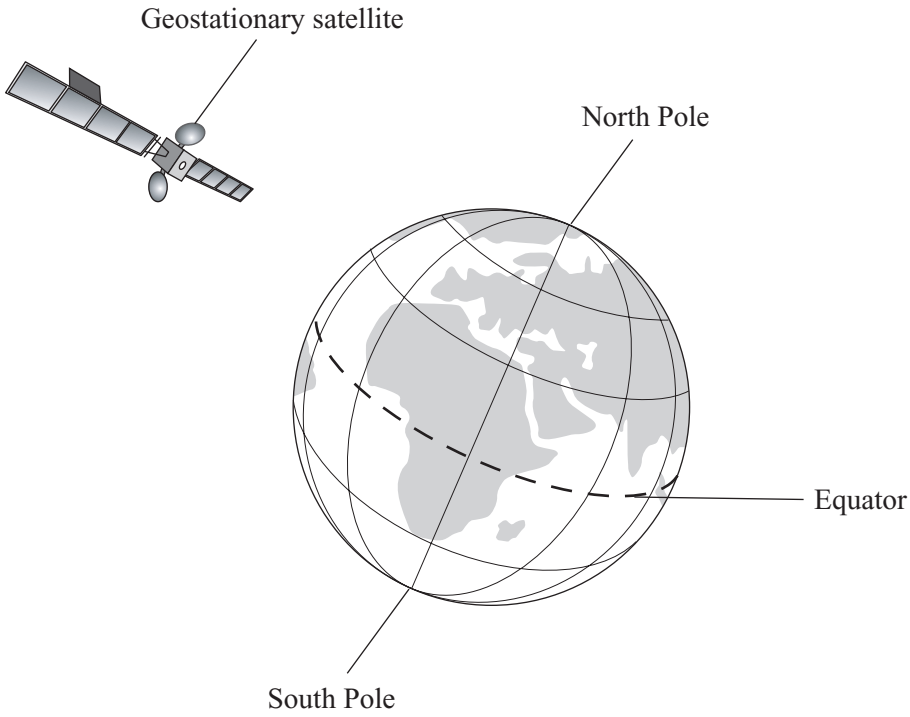
(ii) Complete the sentence by writing the correct words in the spaces.

The car will skid if the braking force is too big compared with the friction between the car's ..... and the ..... . *(1 mark)*

9

LEAVE MARGIN BLANK

8 There are many geostationary satellites orbiting the Earth.



(a) Complete the sentences by crossing out the **two** lines that are wrong in each box.

Geostationary satellites orbit high above the | equator / North Pole / South Pole |.

They move at exactly the same rate as the Earth | moves / orbits / spins |.

They are used mainly for | observing the Moon / scanning the Earth / sending messages |.

(3 marks)

(b) What will happen if more than 400 geostationary satellites are put into orbit?

.....

.....

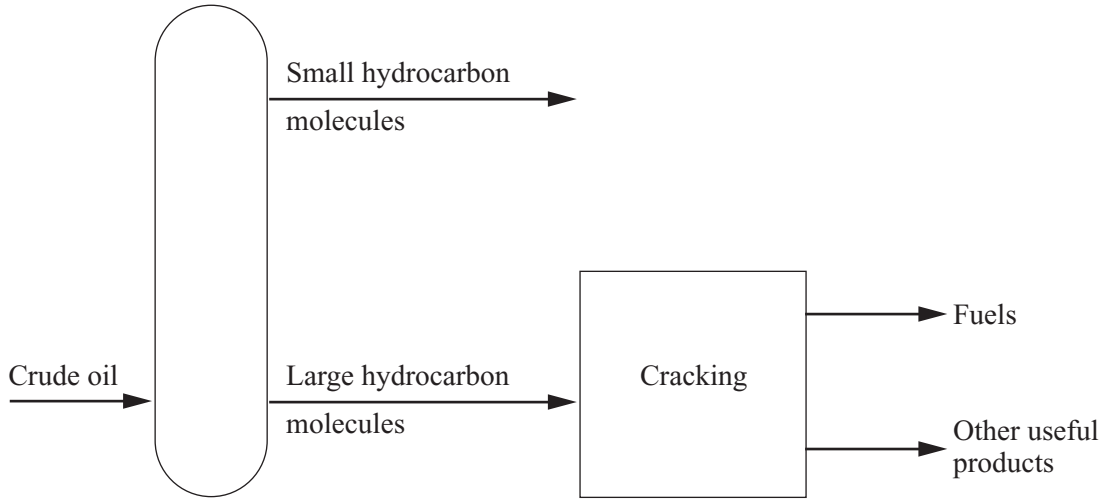
(1 mark)

4

LEAVE MARGIN BLANK

QUESTIONS RELATING TO PREVIOUSLY TESTED MODULES

9 Crude oil is a mixture of hydrocarbons. These hydrocarbons can be separated and some of them can be used to make other useful products.



(a) Complete the sentence.

Hydrocarbons are made up of ..... atoms and ..... atoms.

(2 marks)

(b) How are the small and large hydrocarbon molecules in crude oil separated?

.....

.....

.....

.....

(2 marks)

(c) The diagram shows that one useful product of cracking is fuels.
Name **one** of the other useful products.

.....

(1 mark)

5

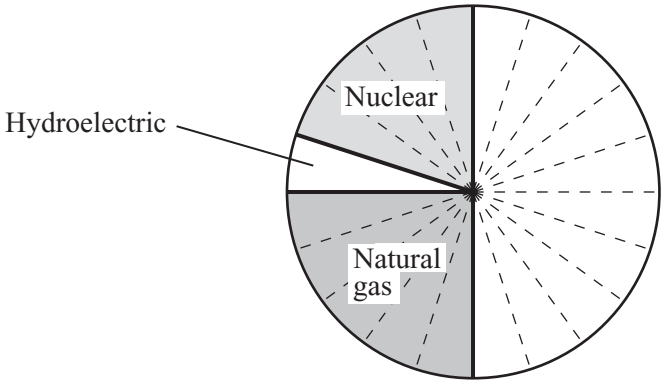
LEAVE MARGIN BLANK

10 The table shows the main sources of energy used to generate electricity.

Energy source	Percentage (%)
coal	35
hydroelectric	5
natural gas	25
nuclear	
oil	15

(a) Complete the table by writing in the percentage for nuclear power. *(1 mark)*

(b) Use the information from the table to complete and label the pie chart below.



(2 marks)

(c) Why can hydroelectric generators be used to meet sudden increases in the demand for electricity?

.....

(1 mark)

(d) Gases are released when fossil fuels burn.

(i) Which **one** of these gases increases the greenhouse effect?

.....

(1 mark)

(ii) Which **one** of these gases produces acid rain?

.....

(1 mark)

6

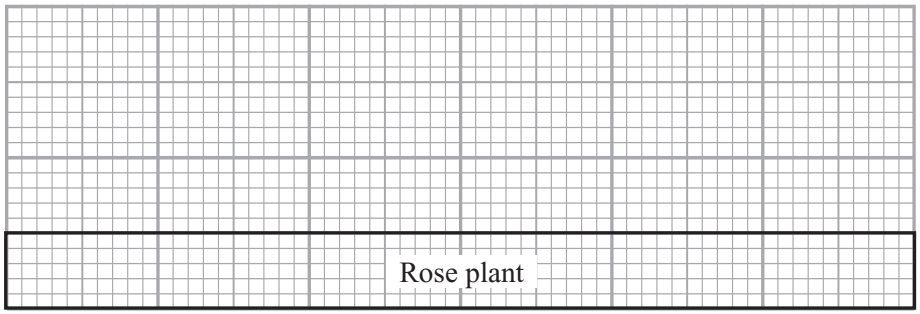
LEAVE MARGIN BLANK

ENVIRONMENT

11 Energy is stored in the materials that make up organisms. These materials are called biomass.

Organisms in food chain	Rose plant →	Greenfly →	Ladybird →	Blackbird
Biomass in g/m^2	600	50	10	1

(a) Complete the pyramid of biomass for this food chain. The rose plant has been done for you. You should draw the rest of the pyramid to the same scale. (5 small squares = 50 g/m^2.)



(3 marks)

(b) What proportion of the energy in a rose plant is transferred to greenfly?

.....

.....

.....

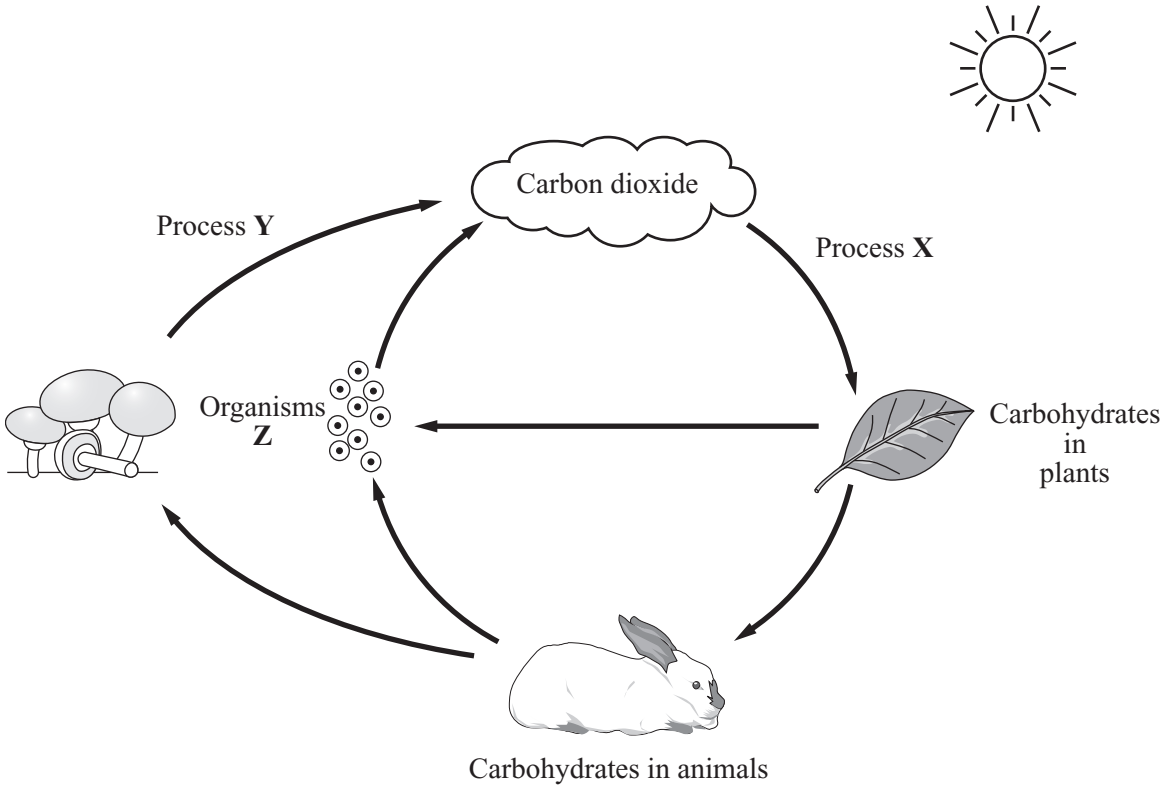
Proportion = ...

(2 marks)

5

LEAVE MARGIN BLANK

12 In a stable community, the processes which remove materials are balanced by processes which return materials. These materials are constantly cycled within the community.



(a) Name:

(i) process **X** .....

(1 mark)

(ii) process **Y** .....

(1 mark)

(iii) the group of organisms **Z** which bring about decay.

.....

(1 mark)

LEAVE MARGIN BLANK

(b) Many of the plants that we eat as fruits and vegetables in the UK are imported. The transport used to import foods accounts for about 2.5 % of the UK's carbon dioxide emissions. During winter, it is necessary to import foods because most of the UK's fresh vegetables have to be grown in greenhouses. Energy is needed to heat and light these greenhouses.

Give **one** argument for and **one** against growing all of our vegetables in the UK. These arguments should consider the environmental effect of carbon dioxide emissions.

Argument for:

.....

.....

.....

.....

Argument against:

.....

.....

.....

.....

(3 marks)

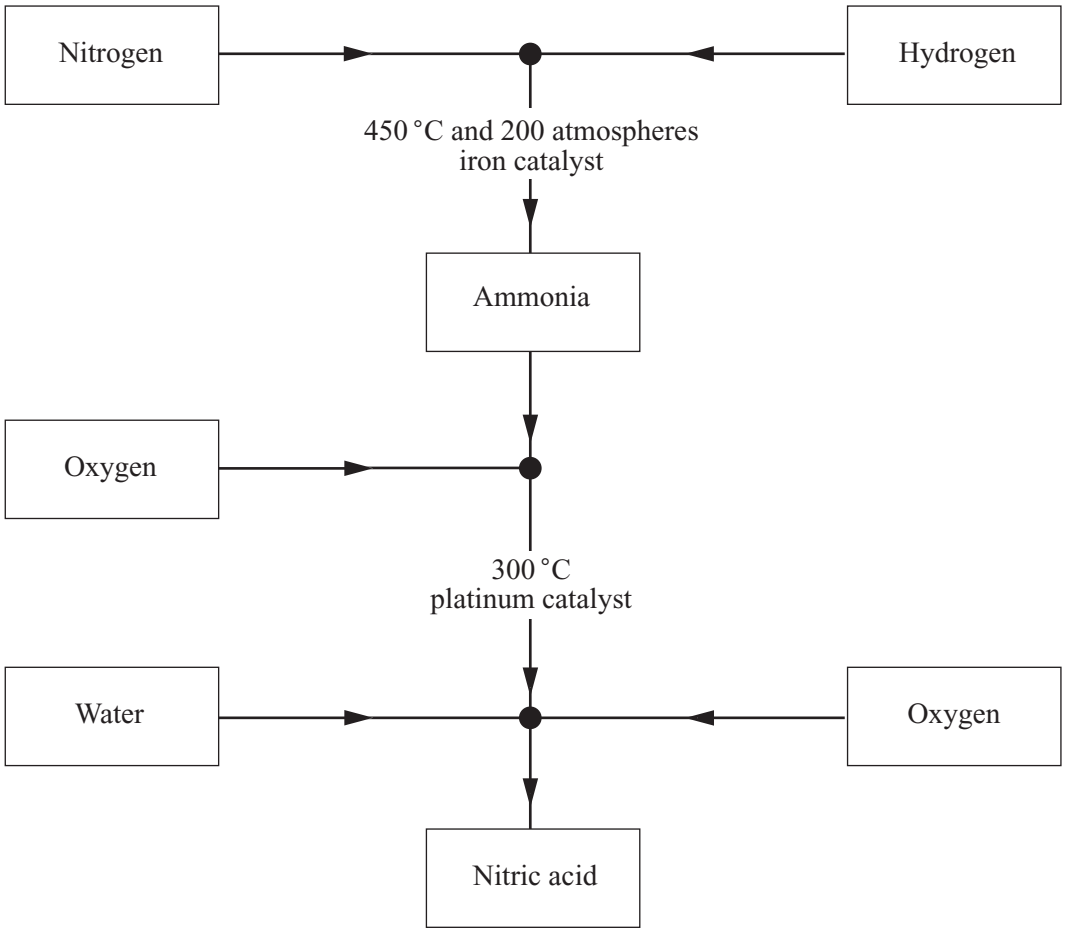
6

TURN OVER FOR THE NEXT QUESTION

LEAVE MARGIN BLANK

PATTERNS OF CHEMICAL CHANGE

13 The flow diagram shows how to make ammonia and nitric acid from the nitrogen in the air.



(a) A fertiliser is made by neutralising ammonia with nitric acid. What is the name of this fertiliser?

.....

(1 mark)

(b) In the flow diagram, why are two different catalysts used?

.....

.....

(1 mark)

(c) What happens to catalysts at the end of a reaction?

.....

.....

(1 mark)

LEAVE MARGIN BLANK

(d) Explain why catalysts are used in many industrial chemical reactions.

.....

.....

.....

(2 marks)

(e) Explain, in terms of collisions between molecules, why a high pressure is used in the reaction between nitrogen and hydrogen.

.....

.....

.....

.....

(2 marks)

7

TURN OVER FOR THE NEXT QUESTION

LEAVE MARGIN BLANK

14 Nitrate fertilisers are important in agriculture. They help to increase crop yields and so make food cheaper to buy. Some of the nitrate fertilisers run off into rivers and get into drinking water. The problem is that the nitrates can react with iron in our blood. This reduces the blood's ability to carry oxygen. If the amount of nitrate in drinking water is too high, it can cause 'blue baby syndrome', in which babies look blue due to lack of oxygen.

The table shows the amount of nitrate fertilisers used and the crop yield.

Nitrate fertilisers in kilograms per hectare of land	0	150	250
Crop yield in tonnes per hectare of land	5	8	7

Use the information above to suggest what should be done, by farmers and government, to prevent 'blue baby syndrome'. Explain the reasons for your suggestions.

.....

.....

.....

.....

.....

.....

.....

.....

(3 marks)

3

LEAVE MARGIN BLANK

FORCES

15 Read the passage below.

HAS THERE EVER BEEN LIFE ON MARS?

Scientists have studied Mars to find out whether or not there has ever been life on the planet.

- About 100 years ago, Percy Lowell used his telescope to look at Mars. He claimed that he could see signs of a network of canals.
- In 1996, scientists found a meteorite in Antarctica which was thought to have come from Mars. These scientists claimed that the meteorite contained fossilised bacteria.
- Recently, spacecraft have sent pictures of Mars back to Earth. The landscape of Mars shows signs of erosion by flowing water.
- Robot machines landed on Mars. They took small samples of soil and placed them in two sealed containers. They sterilised one sample of soil. Water and nutrients were added to both samples to see if the gases inside changed over a period of time. The results for the two samples were identical.
- The table shows how the composition of the Earth's atmosphere compares with that of Mars.

Gases in atmosphere	Earth (billions of years ago)	Earth (present)	Mars (present)
carbon dioxide (%)	98	0.03	95
nitrogen (%)	1.9	79	2.7
oxygen (%)	0.01	21	0.13

Use the information above to decide whether or not there is evidence to show that there has been life on Mars. Explain, as fully as you can, the reasons for your decision.

.....

.....

.....

.....

.....

.....

.....

.....

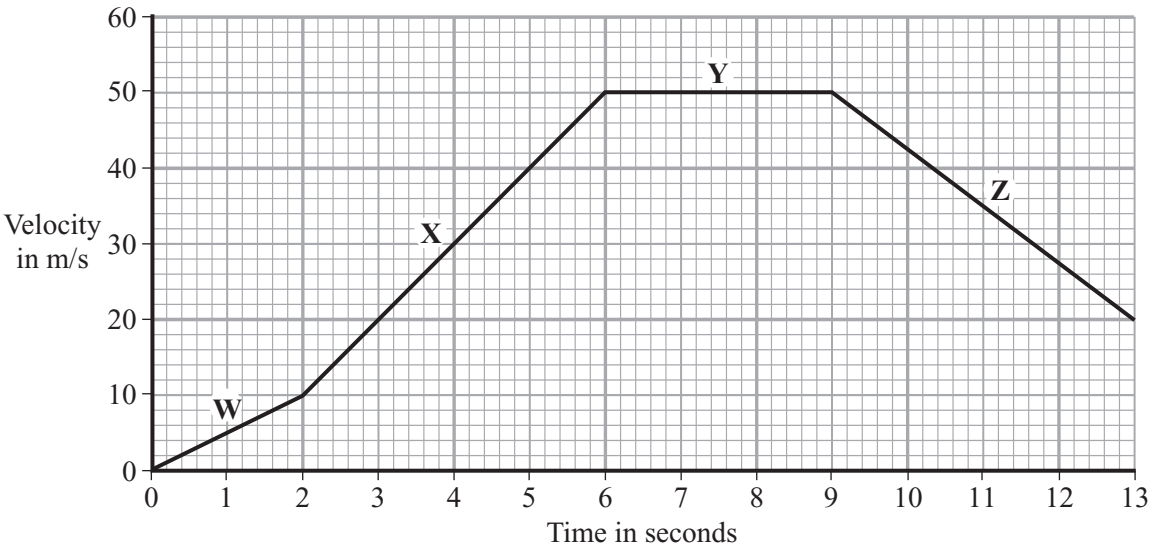
.....

(4 marks)

4

LEAVE MARGIN BLANK

16 The graph shows changes in the velocity of a racing car.



(a) Describe the motion of the racing car during:

(i) the period labelled **W**; .....

.....

(1 mark)

(ii) the period labelled **Y**. .....

.....

(1 mark)

(b) Calculate the acceleration of the racing car during the period labelled **X**.
Show clearly how you work out your answer and give the unit.

.....

.....

.....

.....

.....

.....

.....

.....

Acceleration = ...

(4 marks)

6

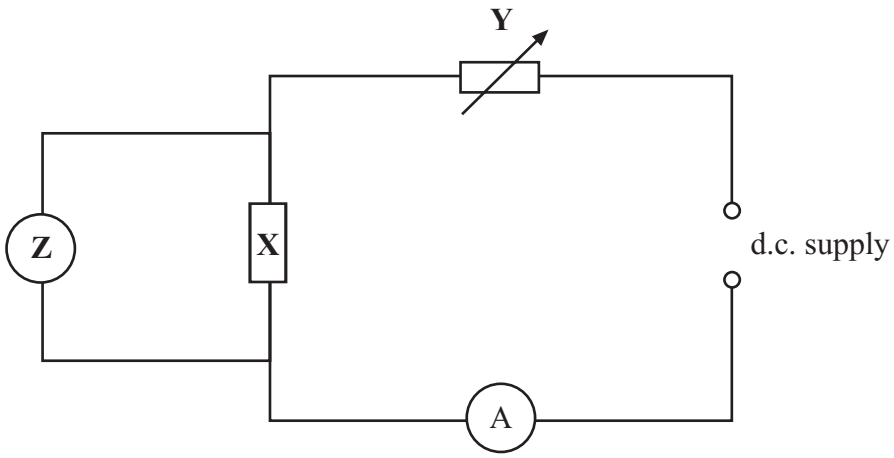
NO QUESTIONS APPEAR ON THIS PAGE

TURN OVER FOR THE NEXT QUESTION

LEAVE MARGIN BLANK

QUESTIONS RELATING TO PREVIOUSLY TESTED MODULES

17 The current through component **X** is measured when different voltages are applied across it.



(a) Name the component labelled **Y** in the circuit.

.....

(1 mark)

(b) What type of meter is **Z**?

.....

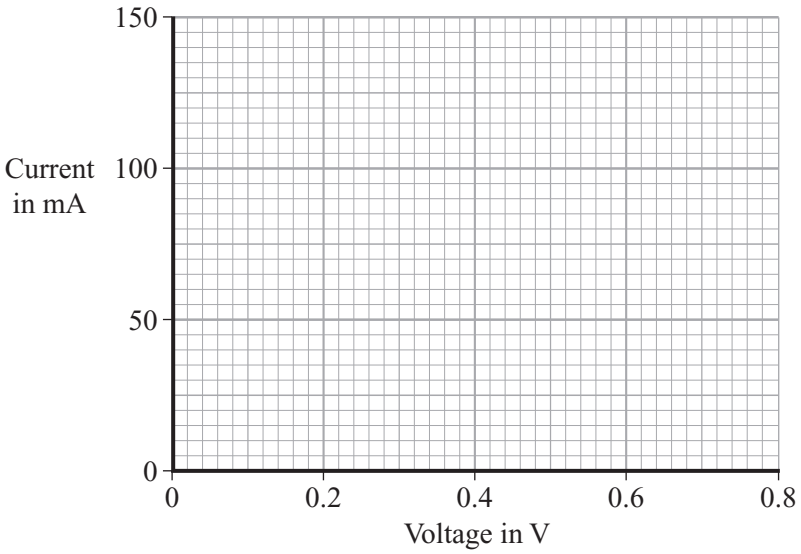
(1 mark)

LEAVE MARGIN BLANK

(c) The table shows the measurements obtained in this experiment.

Voltage in V	0	0.2	0.4	0.6	0.8
Current in mA	0	0	50	100	150

Draw a graph of the measurements.



(2 marks)

(d) Use the shape of the graph to name component **X**.

.....

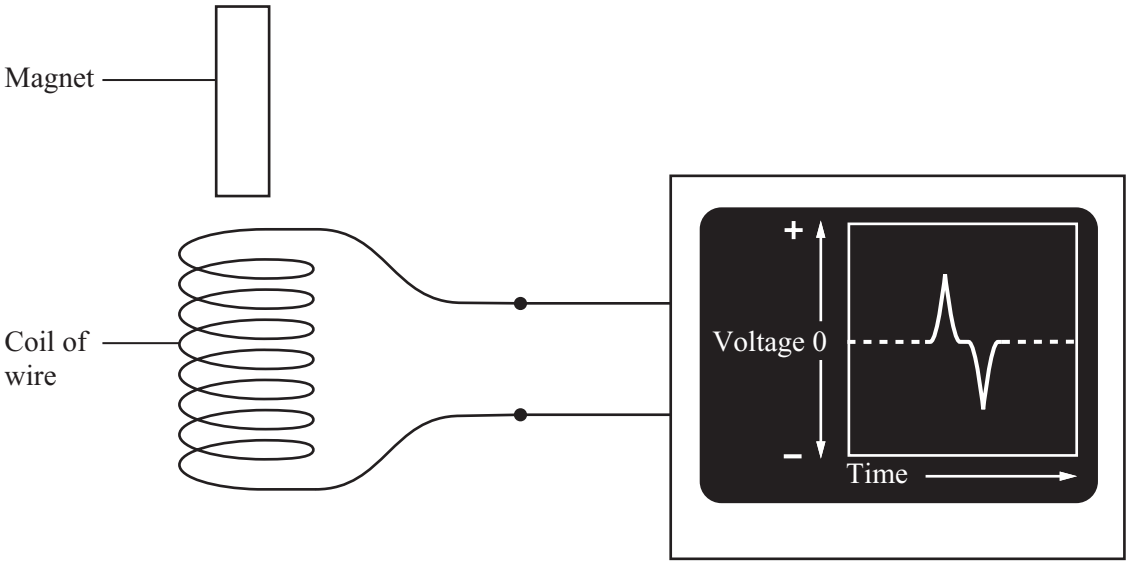
(1 mark)

5

TURN OVER FOR THE NEXT QUESTION

LEAVE MARGIN BLANK

18 The equipment shown was used to produce the trace on the computer screen.



Computer screen

Describe and explain what was done with the equipment to produce this trace.

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

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

4

END OF QUESTIONS

THERE ARE NO QUESTIONS PRINTED ON THIS PAGE

THERE ARE NO QUESTIONS PRINTED ON THIS PAGE

Copyright © 2005 AQA and its licensors. All rights reserved.