

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

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General Certificate of Secondary Education
June 2004



**SCIENCE DOUBLE AWARD (MODULAR)
FOUNDATION TIER
Paper 2**

3468/2F

F

Monday 14 June 2004 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.

For Examiner's Use			
Number	Mark	Number	Mark
1		15	
2		16	
3		17	
4		18	
5		19	
6		20	
7		21	
8			
9			
10			
11			
12			
13			
14			
Total (Column 1)	→		
Total (Column 2)	→		
TOTAL			
Examiner's Initials			

Time allowed: 1 hour 30 minutes

Instructions

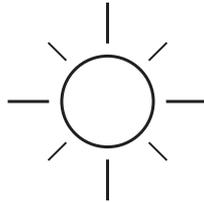
- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

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 Energy for living organisms comes from the Sun.



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

animals	carbohydrates	carbon dioxide	oxygen	plants	water
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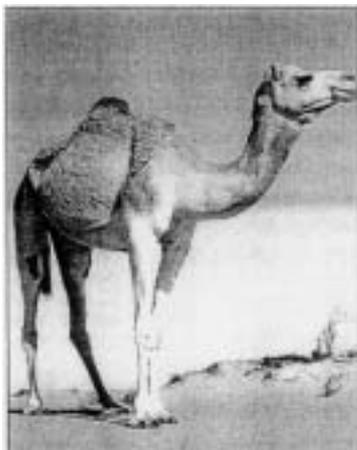
Light energy is captured by green

They use this energy to make

To do this, they also use

(3 marks)

2 Camels can live in hot deserts.



Read the following information.

- A camel has big, flat feet.
- A camel’s hump is where fat is stored.
- The fat from a camel’s hump can be broken down to form carbon dioxide and water.
- A camel has no layer of fat under the skin.
- A camel can go at least two weeks without water.
- A camel can drink large amounts of water in one go.
- A camel has long eyelashes and long hair around the openings to its ears.

(a) Give **one** way that the camel is well adapted to living where there is sand.

.....
(1 mark)

(b) Suggest why the camel does **not** need a layer of fat under its skin.

.....
(1 mark)

(c) Give **two** reasons why the camel can go at least two weeks without drinking any water.

1

.....

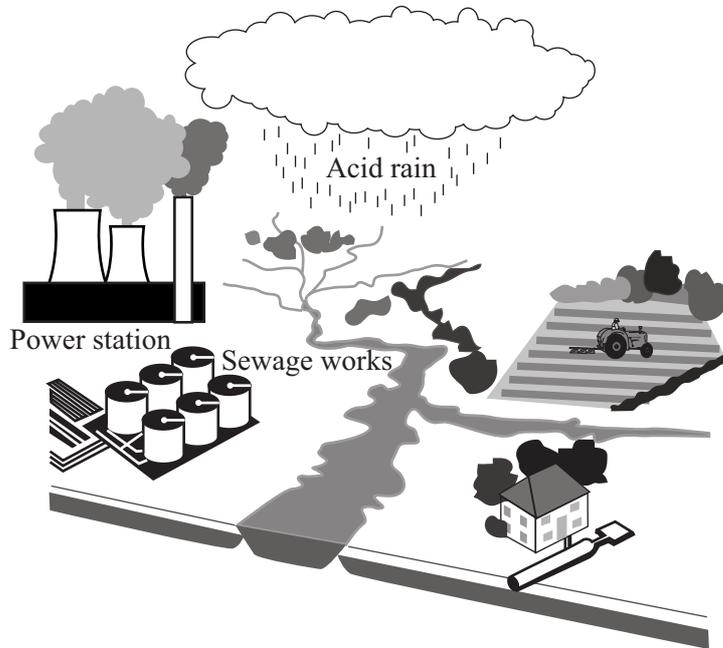
2

.....
(2 marks)

Turn over ►

3 Rivers can be polluted in different ways, for example:

- the use of toxic chemicals on some farmland;
- the effects of acid rain;
- sewage.



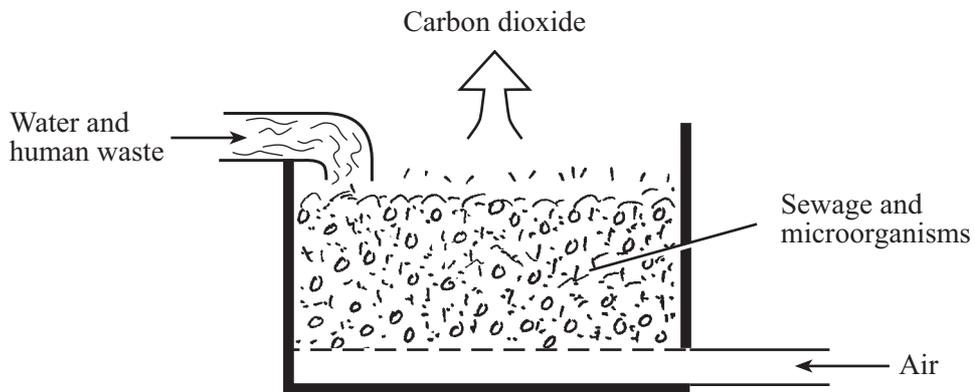
(a) Name **one** type of toxic chemical used on farmland.

.....
(1 mark)

(b) Power stations can cause acid rain to form.
Explain how.

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

- 4 In a sewage works, human waste is broken down by microorganisms. Air is blown through this sewage.



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.

Carbon dioxide is formed from the mixture of sewage, microorganisms and air. Explain how.

.....

.....

.....

.....

.....

.....

(3 marks)

3

TURN OVER FOR THE NEXT QUESTION

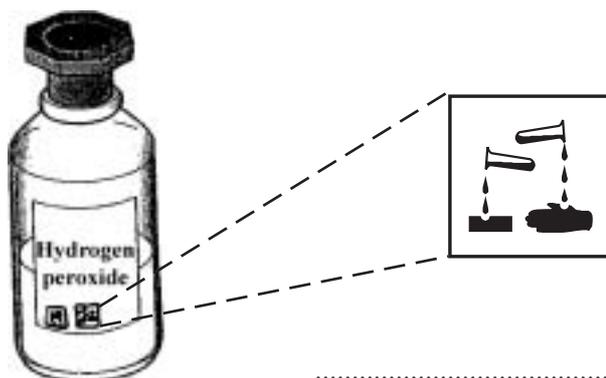
Turn over ▶

PATTERNS OF CHEMICAL CHANGE

5 Hydrogen peroxide (H₂O₂) contains the same elements as water (H₂O).

(a) Name the hazard symbol shown by using the correct word from the box.

corrosive flammable oxidising toxic



(1 mark)

(b) Hydrogen peroxide decomposes in the presence of a catalyst.



(i) Complete the word equation for this chemical reaction.

hydrogen peroxide → water +

(1 mark)

(ii) What does a catalyst do to a chemical reaction?

.....

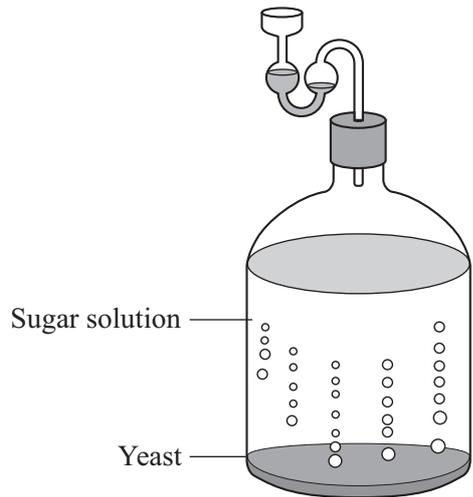
.....

(1 mark)

6 Enzymes can be used to make some chemical reactions happen quite quickly.

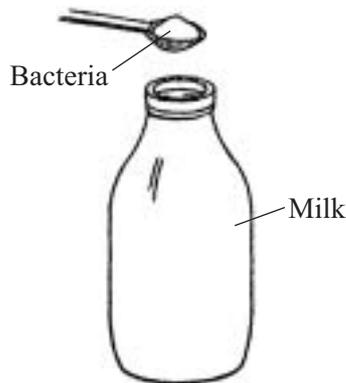
Complete each sentence using the correct words from the box.
You should use each word once only.

alcohol	lactic acid	wine	yoghurt
---------	-------------	------	---------



Yeast cells convert sugar solution into and carbon dioxide.

This reaction is used to make



Bacteria convert sugar in milk into

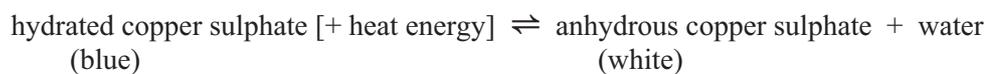
This reaction is used to make

(3 marks)

3

Turn over ►

- 7 Hydrated copper sulphate is a blue solid. When it is heated, white solid anhydrous copper sulphate is made. This is a reversible reaction.



- (a) To make the forward reaction work, the hydrated copper sulphate must be heated all the time.

What type of reaction is this?

.....
.....

(1 mark)

- (b) Anhydrous copper sulphate can be used in a test for water. What **two** things will happen when water is added to anhydrous copper sulphate?

1

.....

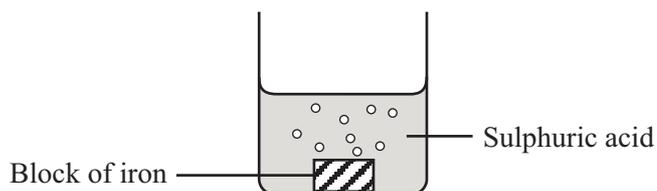
2

.....

(2 marks)

3

- 8 'Iron tablets' usually contain iron sulphate (FeSO_4). This salt can be made by reacting iron with sulphuric acid.



- (a) To react, particles from the sulphuric acid must collide with particles of iron. What could you do to the block of iron to make the reaction faster?

.....

(1 mark)

- (b) Calculate the percentage of iron in iron sulphate (FeSO_4).

(Relative atomic masses: Fe = 56, O = 16, S = 32)

.....

Percentage of iron in iron sulphate =%
 (3 marks)

4

TURN OVER FOR THE NEXT QUESTION

Turn over ►

FORCES

9 The Earth we live on is a planet.

Draw a straight line from each of the words to its description.
The first line has been done for you.

Words

Earth

Milky Way

Moon

Sun

Universe

Descriptions

A galaxy

Many galaxies

A planet

A satellite

A star

(3 marks)

- 10 When you transfer *energy* to a shopping trolley, the amount of *work done* depends on the *force* used and the *distance moved*.



Complete the table by using the correct units from the box.

joule (J)	metre (m)	newton (N)
------------------	------------------	-------------------

The first one has been done for you.

Quantity	Unit
energy (transferred)	joule
force	
distance (moved)	
work done	

(2 marks)

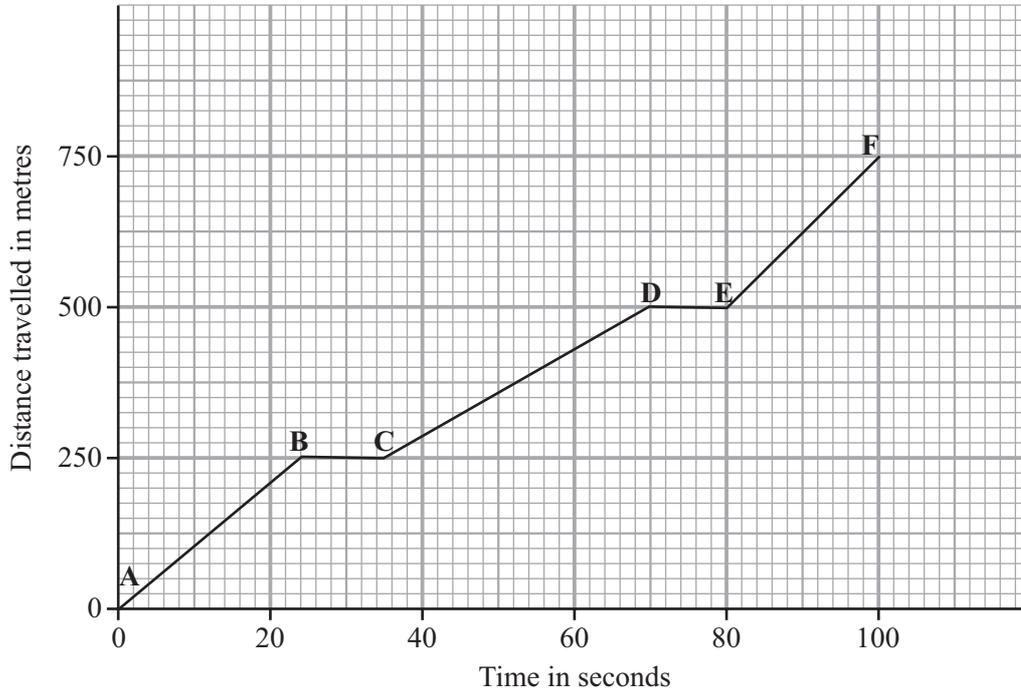
2

TURN OVER FOR THE NEXT QUESTION

Turn over ►

11 This question is about a car travelling through a town.

(a) The graph shows how far the car travelled and how long it took.



(i) Between which points was the car travelling fastest? Tick (✓) your answer.

Points	Tick (✓)
A – B	
B – C	
C – D	
D – E	
E – F	

(1 mark)

(ii) Between which points was the car stationary?

.....

.....

(1 mark)

(b) Complete the sentences by writing the correct words in the spaces.

When a car has to stop, the **overall** stopping distance is greater if:

- the car is poorly maintained;
- there are adverse weather conditions;
- the car is travelling ;
- the driver's reactions are

Also, the greater the speed of the car, then the greater the braking needed to stop in a certain time.

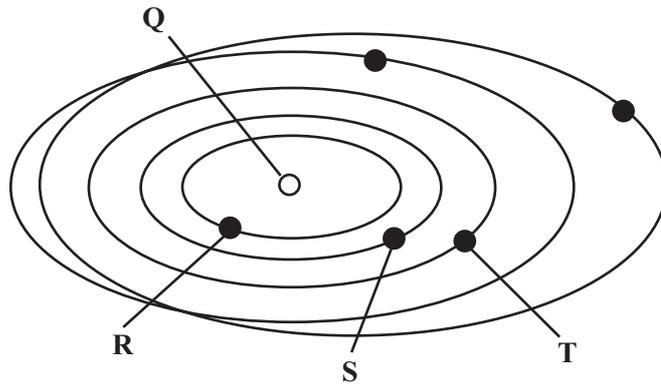
(3 marks)

5

TURN OVER FOR THE NEXT QUESTION

Turn over ►

12 Look at the diagram of part of our solar system.



(a) Which object, **Q**, **R**, **S** or **T**, is the largest in our solar system?

.....
(1 mark)

(b) Write in the correct words to complete these sentences about planet **R**.

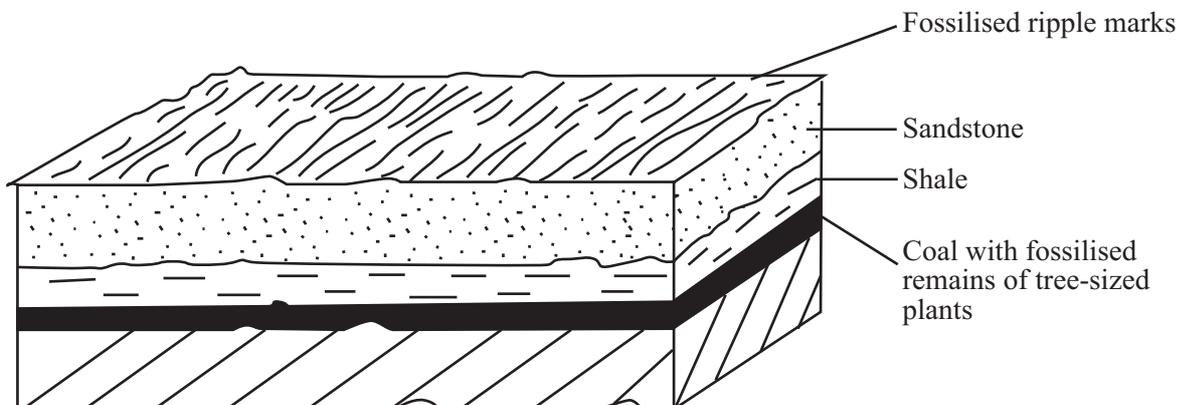
Planet **R** stays in orbit around **Q** because of the force of gravity and its high
..... .

Q's force of gravity on planet **R** is than that on planet **T**.

(2 marks)

QUESTIONS RELATING TO PREVIOUSLY TESTED MODULES

13 In the diagram, coal has formed under layers of rocks that were deposited over millions of years.



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

These layers of rocks are all

igneous metamorphic sedimentary

 rocks. (1 mark)

(b) Why is the sandstone probably the youngest rock?

.....

(1 mark)

(c) What could have caused ripple marks in the sandstone?

.....

(1 mark)

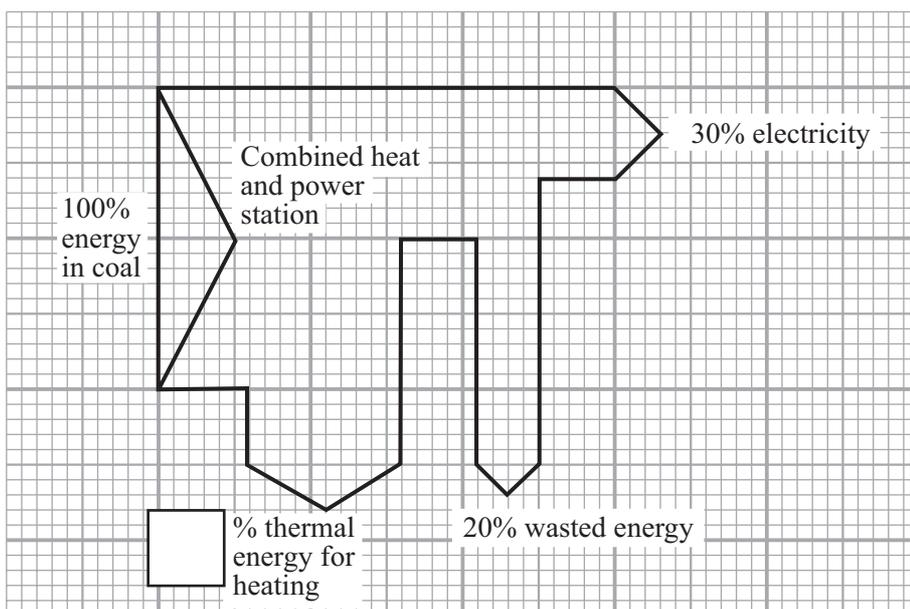
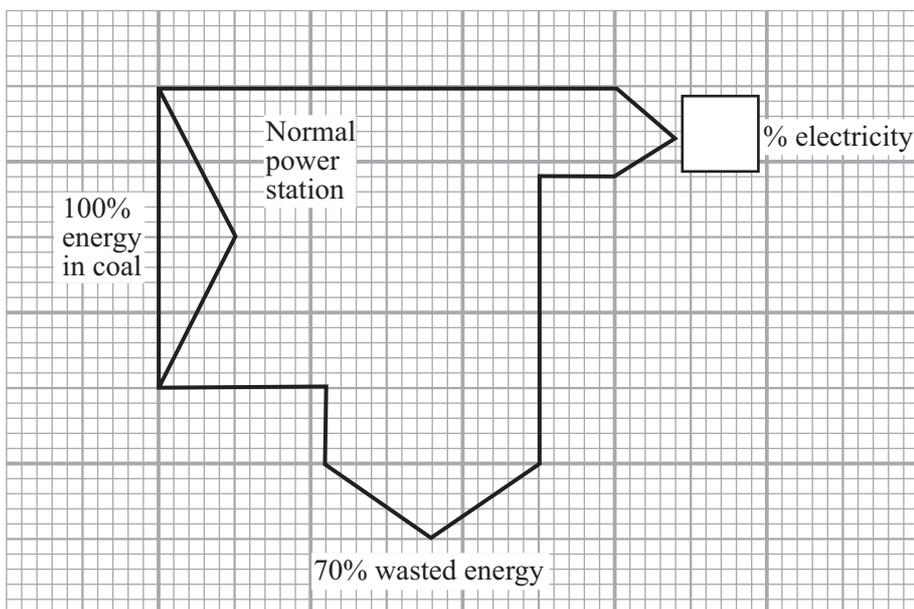
(d) Coal contains carbon, hydrogen and small amounts of sulphur. Name **two** gases that are released into the atmosphere when coal burns.

1

2

(2 marks)

- 14 Power stations are usually not very efficient. A lot of energy is wasted as thermal energy. The diagrams show the percentage of energy transferred by two coal-burning power stations.



- (a) Write the **two** missing figures in the boxes on the diagrams.

(2 marks)

- (b) Which power station is the most efficient **overall**, the normal power station or the combined heat and power station?
Give reasons for your answer.

.....

.....

.....

.....

(2 marks)

- (c) Some heat energy released from burning coal on an open fire is emitted by radiation. Tick (✓) the main type of electromagnetic radiation emitted by hot coal.

Type of electromagnetic radiation	Tick (✓)
gamma	
infra red	
ultraviolet	
X-ray	

(1 mark)

- (d) Radiation can be reflected or absorbed when it strikes a surface.
What type of surface is a poor reflector but a good absorber of radiation?

.....

.....

(1 mark)

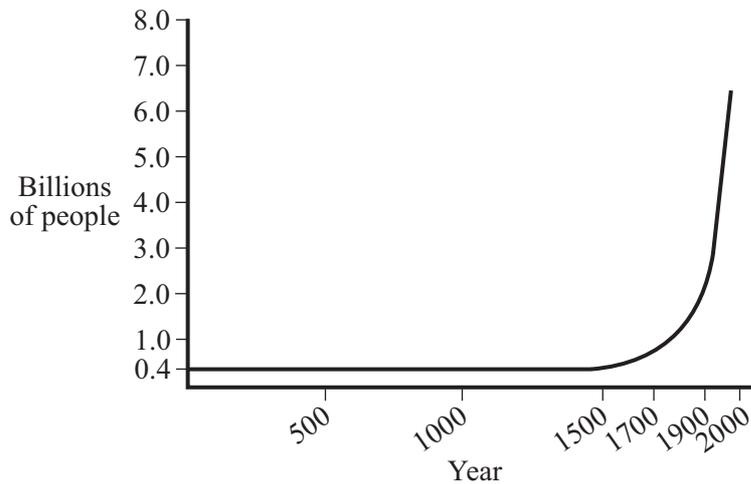
6

TURN OVER FOR THE NEXT QUESTION

Turn over ►

ENVIRONMENT

- 15** Improving the quality of life for everyone without damaging the planet for the future is known as sustainable development.
One problem is the rapid growth in the Earth’s population of humans during the last 500 years. This is shown by the graph.



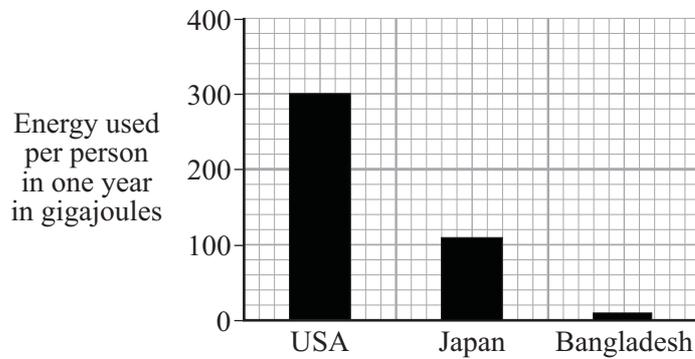
- (a) When the Earth’s population was much smaller, the effects of human activities on forests were usually small and local.
In the past 500 years there has been large-scale deforestation in some areas. Give **two** reasons for this.

1

2

(2 marks)

- (b) Look at the bar chart. It shows the average amount of energy used by each person in one year in the USA, Japan and Bangladesh.



(i) Suggest **one** reason why so much more energy is used per person in the USA than in Bangladesh.

.....
.....

(1 mark)

(ii) Using a lot of resources for energy harms the Earth. Explain why.

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

(2 marks)

(c) As we are using more resources, waste management is becoming more important. In the UK much of the solid waste is still being dumped in landfill sites. In 1996, the UK government introduced a landfill tax because landfill sites were being used up. However, the year after the landfill tax was introduced it was estimated that 18 million tonnes of landfill waste was not reported. The government was trying to encourage other forms of waste management, such as:

- reduce waste
- reuse waste
- recycle waste

(i) Explain the main problem caused by the landfill tax.

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

(2 marks)

(ii) Describe **one** example of how each of the different forms of waste management can be put into practice.

Reduce waste.....

.....

Reuse waste.....

.....

Recycle waste.....

.....

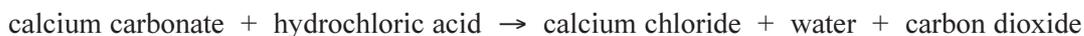
(3 marks)

10

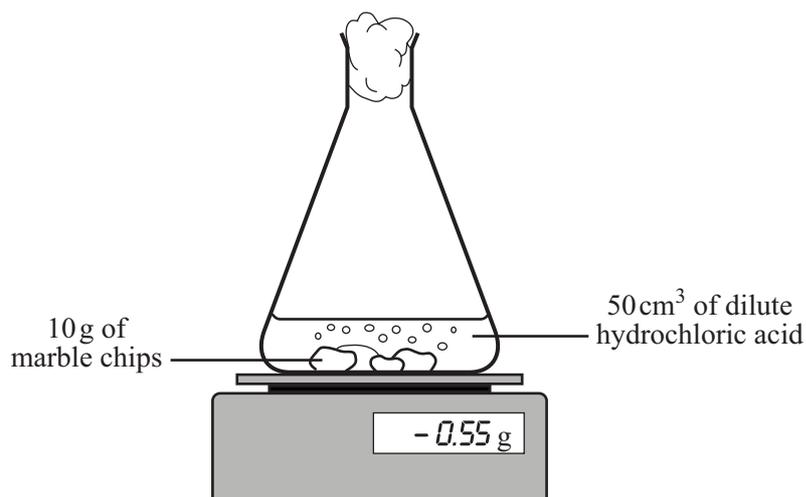
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PATTERNS OF CHEMICAL CHANGE

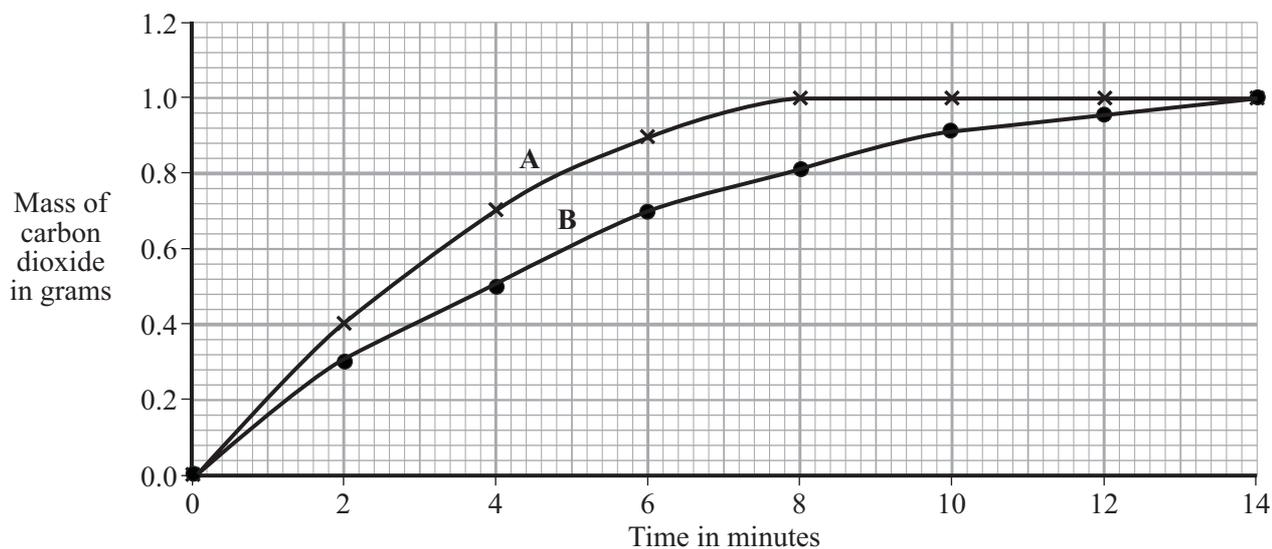
16 Marble is a rock that contains mainly calcium carbonate. This reacts with hydrochloric acid.



The rate of this reaction was followed by measuring the mass of carbon dioxide formed.



Two 10 g samples of marble, **A** and **B**, were each reacted with 50 cm³ of dilute hydrochloric acid, at different temperatures. The mass of carbon dioxide formed in each reaction was recorded and plotted to produce the graph below.



Each reaction stopped when no more carbon dioxide was formed.
In both experiments some marble was left unreacted when the reaction stopped.

- (a) Explain how you can tell which sample, **A** or **B**, reacted faster with the dilute hydrochloric acid.

.....

.....

.....

.....

(2 marks)

- (b) The faster rate of reaction was caused by using a higher temperature.
Explain, in terms of particles, why a higher temperature causes a faster rate of reaction.

.....

.....

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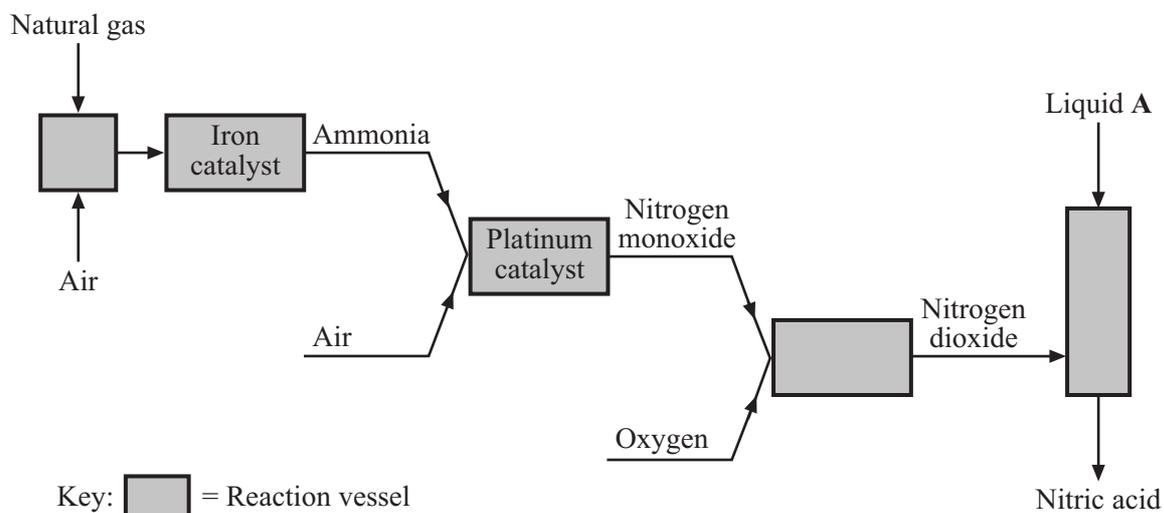
(3 marks)

5

TURN OVER FOR THE NEXT QUESTION

Turn over ►

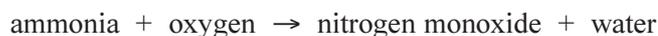
- 17 The flow diagram shows some stages in the manufacture of the fertiliser ammonium nitrate (NH_4NO_3).



- (a) The elements needed to make ammonia (NH_3) are obtained from natural gas and air. Which element is obtained from the air?

.....
(1 mark)

- (b) The word equation for the formation of nitrogen monoxide is:



The platinum catalyst needs to be heated only at the start of the reaction. Suggest why.

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

- (c) Name the liquid **A** that reacts with nitrogen dioxide (NO_2) to produce nitric acid (HNO_3).

.....
(1 mark)

- (d) Describe how ammonium nitrate (NH_4NO_3) can be made from **two** of the products shown in the flow diagram.

.....

.....

.....

.....

(2 marks)

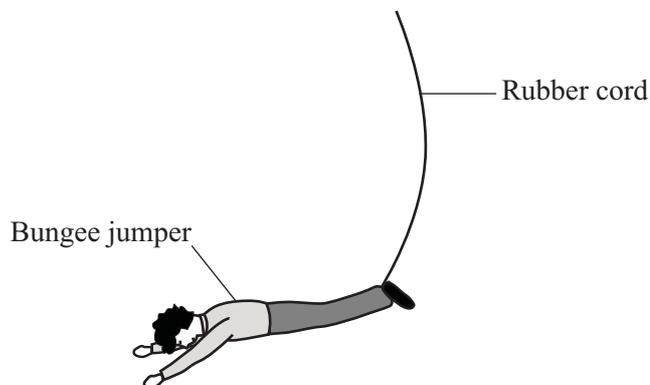
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TURN OVER FOR THE NEXT QUESTION

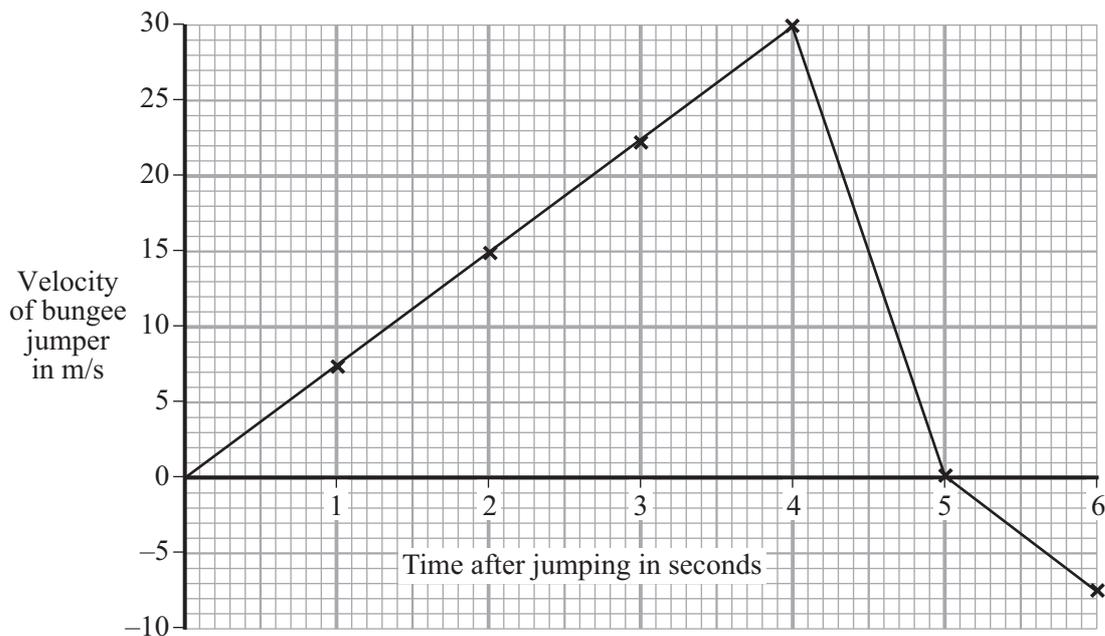
Turn over ►

FORCES

18 In bungee jumping, a fixed rubber cord is fastened to the jumper's ankles.



The graph shows how the bungee jumper's velocity changes during part of the jump.



(a) Calculate the acceleration of the bungee jumper between 2 and 4 seconds. Show your working.

.....

.....

.....

.....

Acceleration =m/s²
(3 marks)

(b) Describe, in as much detail as you can, what happens to the bungee jumper after 4 seconds.

.....

.....

.....

.....

.....

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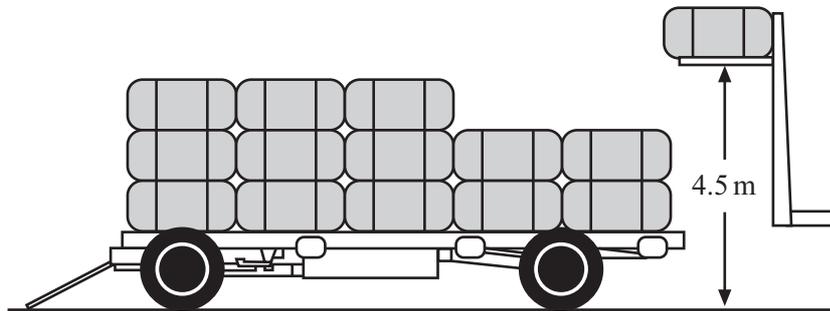
(3 marks)

6

TURN OVER FOR THE NEXT QUESTION

Turn over ►

- 19 A forklift truck was used to stack boxes on to a trailer.
It lifted a box weighing 1900 N through 4.5 m.



- (a) Calculate the work done on the box. Show your working.

.....

.....

.....

.....

Work done = J
(3 marks)

- (b) The efficiency of the forklift truck is about 80%.
Explain what happens to the wasted energy.

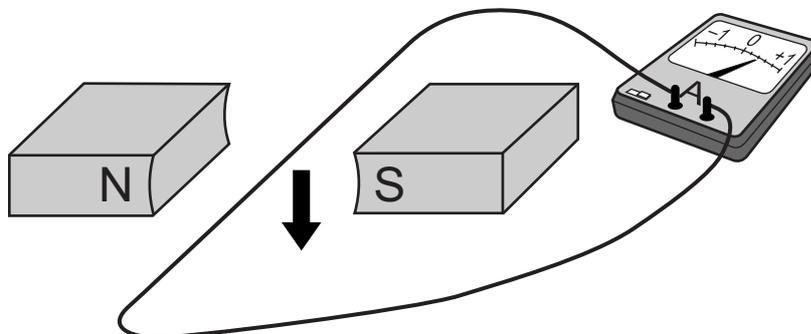
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.....

(1 mark)

21 Magnets have many uses.

- (a) When the wire in the diagram is moved downwards, so that it ‘cuts through’ the magnetic field, the ammeter pointer moves to the right.



- (i) What happens to the ammeter pointer when the wire is moved upwards through the magnetic field?

.....

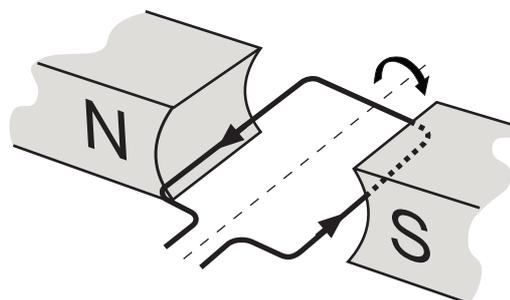
 (1 mark)

- (ii) Why does a current flow in the wire when it is moved through the magnetic field?

.....

 (1 mark)

- (b) Rotating a wire coil in a magnetic field generates electricity.



Give **two** ways of increasing the current generated.

1
 2
 (2 marks)

END OF QUESTIONS