Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

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General Certificate of Secondary Education
June 2004

ASSESSMENT and QUALIFICATIONS ALLIANCE

SCIENCE DOUBLE AWARD (CO-ORDINATED) 3462/1F
FOUNDATION TIER
Paper 1

F

Monday 7 June 2004 1.30 pm to 3.00 pm

In addition to this paper you will require:
a ruler.
You may use a calculator.

Time allowed: 1 hour 30 minutes

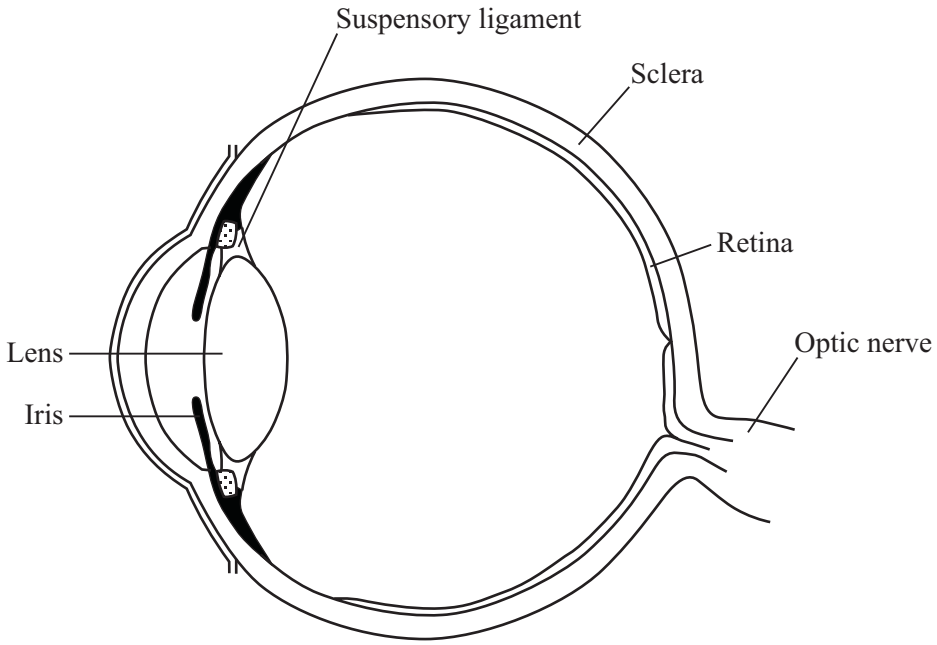
Instructions
- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

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		10	
2		11	
3		12	
4		13	
5		14	
6		15	
7			
8			
9			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

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

1 The diagram shows the structure of the eye.



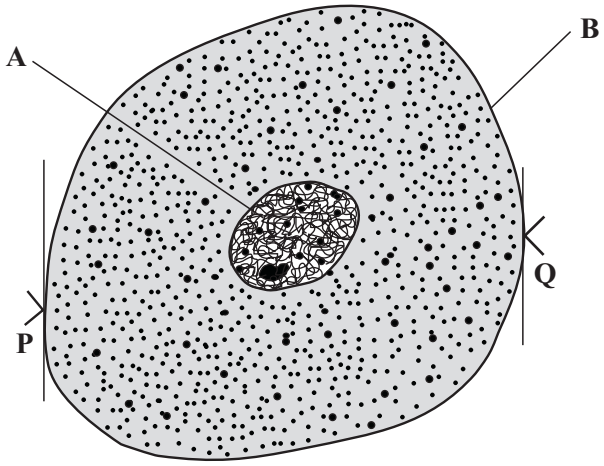
Complete the table by writing in the correct parts of the eye. Choose your answers from the labels on the diagram.

Function	Part of the eye
Contains receptor cells for light	
Carries impulses to the brain	
Controls the amount of light reaching the back of the eye	
Forms a tough outer covering for the eye	
Attaches the lens to the ciliary muscles	

(5 marks)

5

2 The diagram shows an animal cell.



(a) (i) Name structures **A** and **B** by choosing the correct words from the box.

cell membrane	**cell wall**	**cytoplasm**	**nucleus**	**vacuole**

Structure **A** .....

Structure **B** .....

(2 marks)

(ii) Which structure named in the box controls the passage of substances in and out of the cell?

.....

(1 mark)

(b) Distance **P** to **Q** on the diagram is the diameter of the cell. This distance was measured on three cells using a microscope. The results were as follows:

cell 1: 63 micrometres
cell 2: 78 micrometres
cell 3: 69 micrometres

Calculate the average diameter of these cells. Show clearly how you work out your final answer.

.....

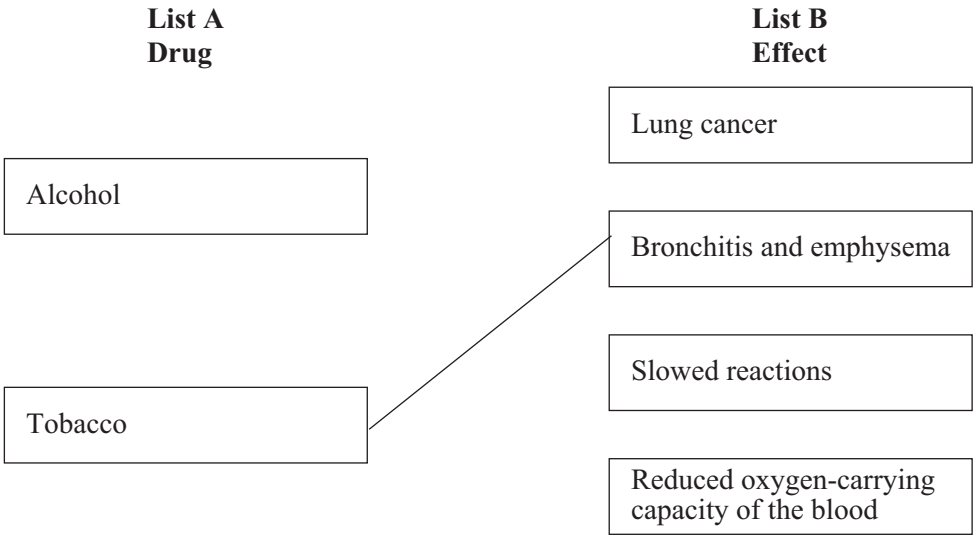
.....

Average diameter = ... micrometres

(2 marks)

5

3 (a) List **A** gives the names of two drugs, alcohol and tobacco. List **B** gives four effects of these drugs. Draw straight lines to link the drugs with the effects that they cause. (An example line has already been drawn for you.)



(3 marks)

(b) The smoking of tobacco is addictive. Name the addictive substance found in tobacco.

.....

(1 mark)

(c) The table shows the death rates among 40 – 60 year old cigarette smokers compared with non-smokers in the same age group.

Age at which smoking started in years	Death rate compared with non-smokers
Non-smokers	1.0
Under 15	2.3
15 – 19	2.2
20 – 24	1.6
25+	1.4

Using information in the table, what is the effect of smoking from an early age on the death rate among 40 – 60 year olds?

.....

.....

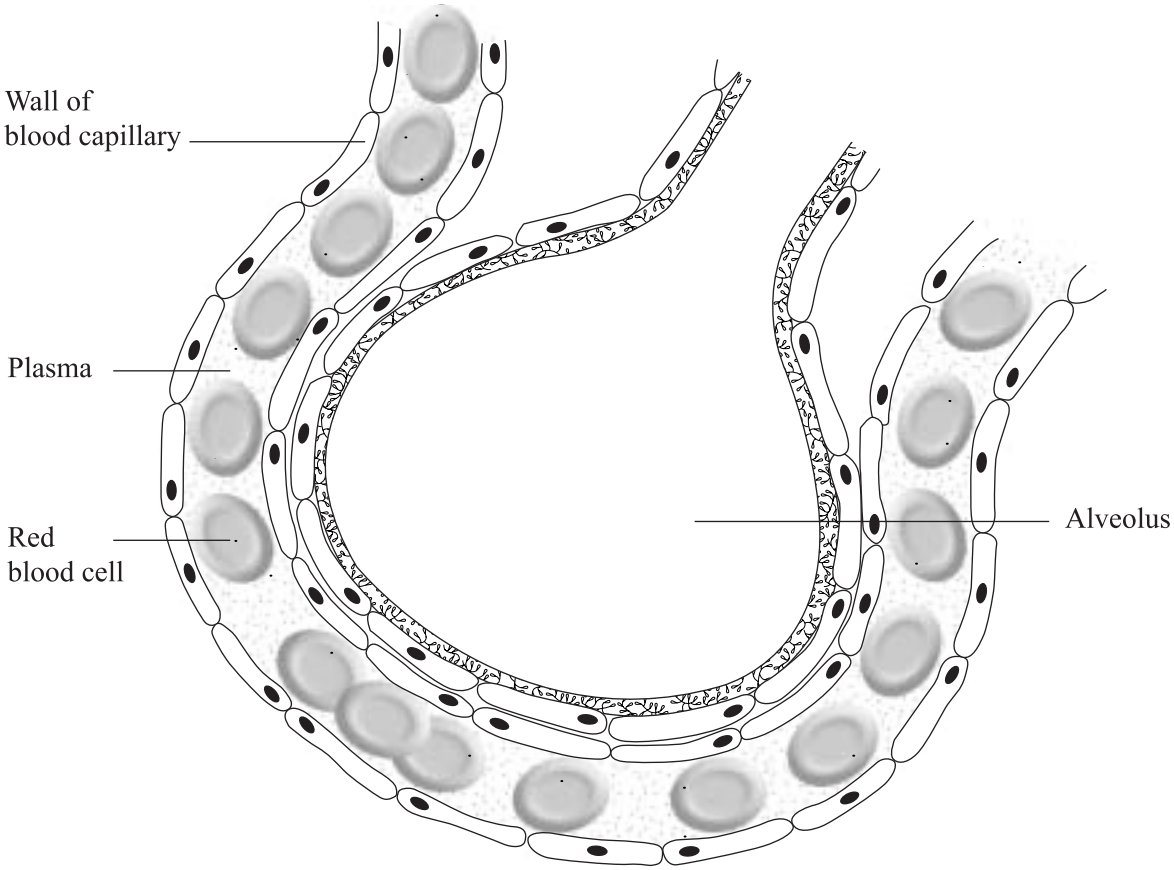
(1 mark)

5

4 (a) Complete this sentence. You should put only **one** word in each space.

To make air move into the lungs, the ribcage moves ..... and the diaphragm moves ..... . *(2 marks)*

(b) The diagram shows an alveolus and a blood capillary in the lung.



(i) During gaseous exchange, oxygen and carbon dioxide are exchanged across the wall of the alveolus. **On the diagram**, carefully draw **two** arrows to show the paths taken by oxygen and by carbon dioxide during this process. **Label each arrow**. *(3 marks)*

(ii) Name the process by which oxygen moves across the wall of the alveolus.

.....

(1 mark)

(iii) Each lung contains about 350 million alveoli. How does this help gaseous exchange?

.....

.....

(1 mark)

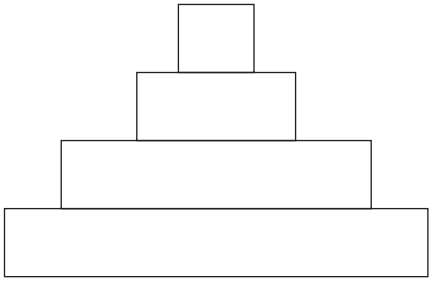
7

Turn over ▶

5 This is a simple food chain.

Lettuce plant ⟶ Slug ⟶ Frog ⟶ Heron

The diagram shows a pyramid of biomass for this food chain.



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(a) Write the names of the organisms in the food chain on the correct lines next to the pyramid of biomass. *(1 mark)*

(b) (i) The slug obtains its energy from the lettuce plant. What is the source of energy for the lettuce plant?

.....

(1 mark)

(ii) What is the function of chlorophyll in a lettuce plant?

.....

(1 mark)

(iii) The slugs ate some lettuce plants which contained 1620 kJ of energy. Only 10 per cent of this energy is used by the slugs for growth. Use the formula to calculate how much energy can be used by the slugs for growth. Show clearly how you work out your final answer.

$$\text{Amount of energy} = \frac{(\text{Percentage of energy used by slugs}) \times (\text{Amount of energy in lettuce})}{100}$$

.....

.....

.....

Amount of energy = ... kJ

(2 marks)

5

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

dark	**enzymes**	**gravity**	**hormones**	**inhibits**
less	**light**	**moisture**	**more**	**stimulates**

Plants are sensitive to light, moisture and gravity. Plant shoots grow towards ..... and against ..... . The roots grow towards gravity and ..... .

To coordinate growth, the plants use special chemicals called ..... . For example, when the shoot responds to light from one side only, more of one of these chemicals is found on the ..... side of the shoot and this causes ..... growth on that side. *(6 marks)*

6

TURN OVER FOR THE NEXT QUESTION

7 Each week, an athlete trains on 5 days (training days) but does not train on the other 2 days (rest days).

The table shows how water losses from the athlete's body are different on a rest day from those on a training day.

	Volume of water lost in cm^3	
Method	**Rest day**	**Training day**
Urine	1500	900
Sweating	625	2400
Breathing	450	1500
Faeces	125	120
Total	2700	

(a) Complete the table to show the total volume of water lost by the athlete on a training day.

(1 mark)

(b) Explain why the athlete sweats more on a training day.

.....

.....

.....

.....

(2 marks)

(c) On a training day, the athlete needs to take in more water.

Explain why the athlete needs to take in more water on a training day.

.....

.....

.....

.....

(2 marks)

5

8 A selective herbicide (a type of pesticide) can be used to kill weeds growing among crop plants.

The table shows the result of adding different amounts of a selective herbicide to a rice crop.

Herbicide added in kg per hectare	Amount of rice produced in tonnes per hectare	Percentage cover of weeds
0.0	50	85
1.7	70	32
3.4	76	24

(a) As more herbicide is applied, what happens to:

(i) the amount of rice produced;

.....

(1 mark)

(ii) the percentage cover of weeds?

.....

(1 mark)

(b) Suggest **two** reasons why rice does not grow well when there are a lot of weeds present.

1 .....

.....

2 .....

.....

(2 marks)

(c) Suggest **one** possible danger of spraying crops with pesticides.

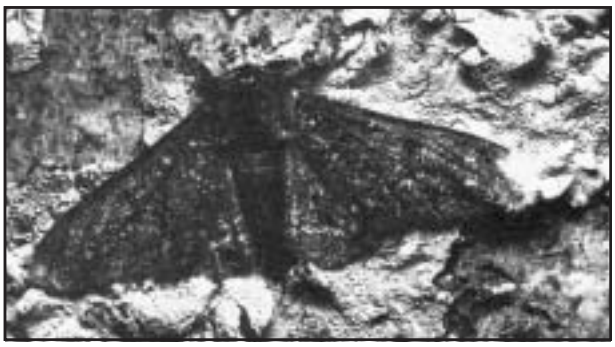
.....

.....

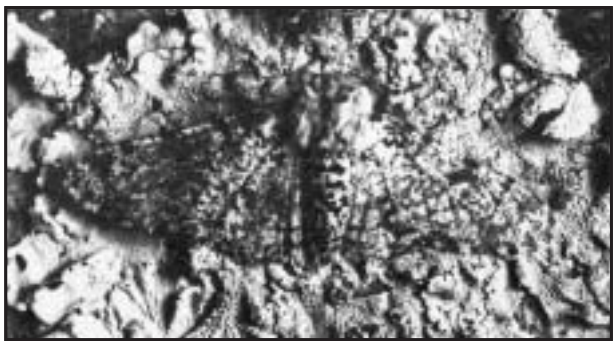
(1 mark)

5

9 The photographs show two varieties of moths, **X** and **Y**. The moths belong to the same species. The moths are resting on a tree trunk in open countryside.



Moth **X**



Moth **Y**

(a) Which variety of moth, **X** or **Y**, is more likely to be killed by insect-eating birds? Give a reason for your answer.

Variety of moth:.....

Reason: .....

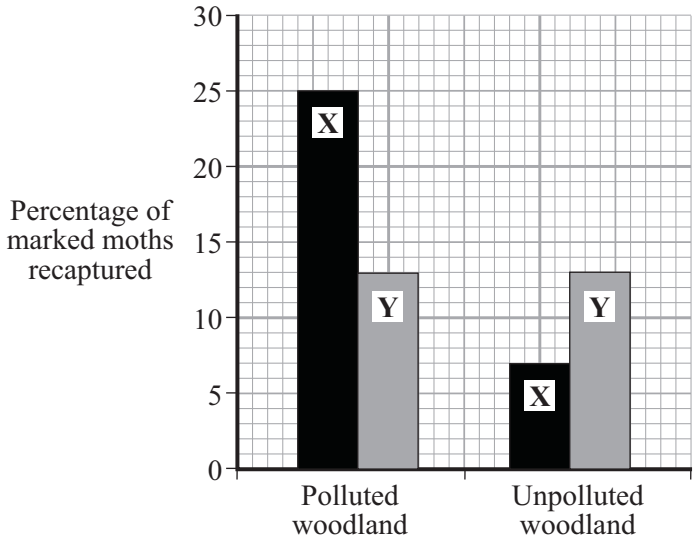
.....

(1 mark)

(b) In an experiment, large numbers of each variety of moth were caught in a trap.

- They were marked with a spot of paint on the underside of one wing and then released.
- A few days later, moths were again trapped and the number of marked moths was counted.
- The experiment was carried out in a woodland polluted by smoke and soot, and also in an unpolluted woodland.

The results are shown in the bar graph.



(i) When the moths were being marked, suggest why the paint was put on the underside of the wing and not on the top.

.....

(1 mark)

(ii) What percentage of moths of type **X** was recaptured in:

the polluted woodland;.....

the unpolluted woodland?.....

(2 marks)

(iii) In each woodland, only a small number of marked moths of both varieties were recaptured. Suggest **one** reason for this.

.....

.....

(1 mark)

(c) (i) The colour of the moths is controlled by a gene. The dark form was first produced by a mutation in the gene.

What chemical, found in a gene, is changed by a mutation? Draw a ring around your answer.

carbohydrate **DNA** **fat** **protein**

(1 mark)

(ii) Some of the offspring from the original dark moth were also dark. What caused this?

.....

.....

(1 mark)

7

TURN OVER FOR THE NEXT QUESTION

10 (a) (i) What name is given to an enzyme which catalyses the breakdown of protein?

.....

(1 mark)

(ii) What product is formed when protein is broken down by the enzyme?

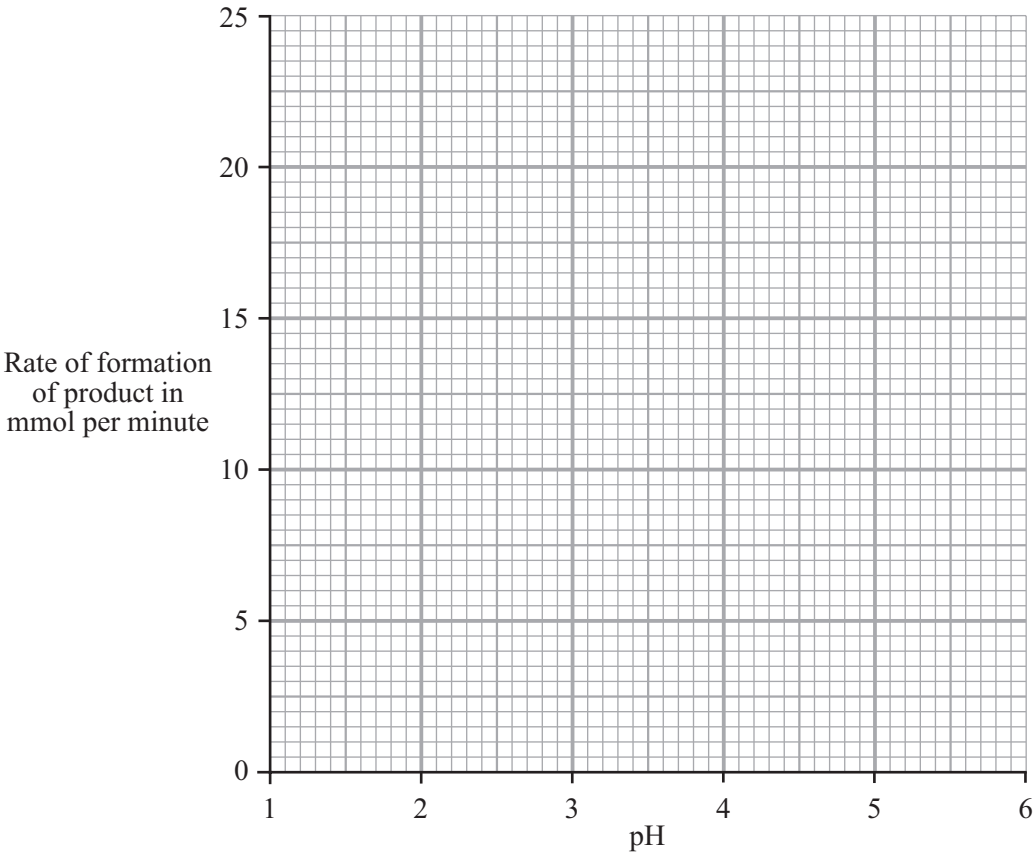
.....

(1 mark)

The table shows the effect of pH on the activity of an enzyme which catalyses the breakdown of protein.

pH	1.0	2.0	3.0	4.0	5.0
Rate of formation of product in mmol per minute	10.5	23.0	10.5	2.5	0.0

(b) Draw a graph of the data in the table.



(3 marks)

(c) The enzyme is produced by the human digestive system.

(i) At what pH does this enzyme work best? .....
(1 mark)

(ii) Suggest which part of the digestive system produces this enzyme.

.....
(1 mark)

(d) Why is it necessary to break down proteins in the digestive system?

.....

.....

.....

.....

.....

.....
(3 marks)

10

TURN OVER FOR THE NEXT QUESTION

11 Hormones are sometimes used to regulate human reproduction.

(a) (i) What is a hormone?

.....

.....

(1 mark)

(ii) How are hormones transported around the body?

.....

.....

(1 mark)

(b) Describe the benefits and possible problems that may result from the use of hormones to regulate human reproduction. You should refer to fertility drugs and contraceptives in your answer.

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.

.....

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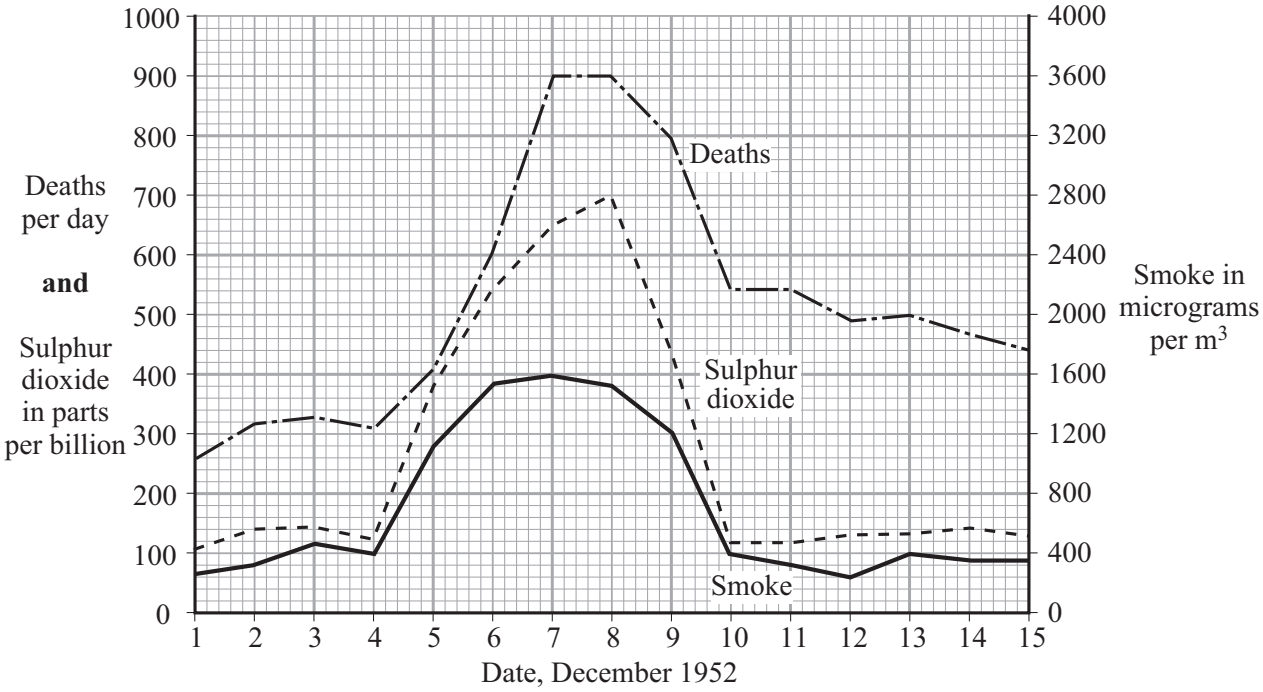
(4 marks)

6

12 In December 1952, there was a thick fog in London. The graph shows changes in the amounts of sulphur dioxide and smoke in the air and the number of people dying during this period.



(a) Describe **one** human activity which releases sulphur dioxide into the air.

.....

(1 mark)

(b) Human deaths during this period were caused mainly by lung diseases.

(i) Why were the lungs particularly affected?

.....

(1 mark)

(ii) Give evidence from the graph which suggests that sulphur dioxide might have caused these deaths.

.....

.....

(1 mark)

(iii) Does the graph prove that sulphur dioxide caused these deaths? Explain your answer.

.....

.....

(1 mark)

4

Turn over ▶

13 Hepatitis B is a liver disease caused by a virus. The virus is found in body fluids such as blood, saliva and urine. Diagram **1** shows the structure of the virus in cross section.

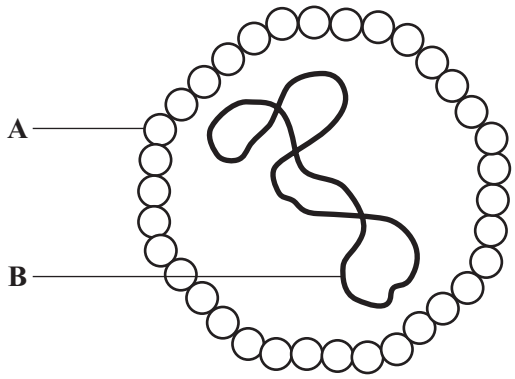


Diagram 1

(a) Name structures **A** and **B**.

A: .....

B: .....

(2 marks)

(b) The human body has several natural defences against viruses. Some of these prevent viruses from entering the body. Others act once the viruses have entered.

(i) Give **two** ways in which the body stops viruses from entering.

1 .....

2 .....

(2 marks)

(ii) Diagram **2** shows a white blood cell attacking a group of viruses.

Complete diagram **2** by drawing the 2nd stage.

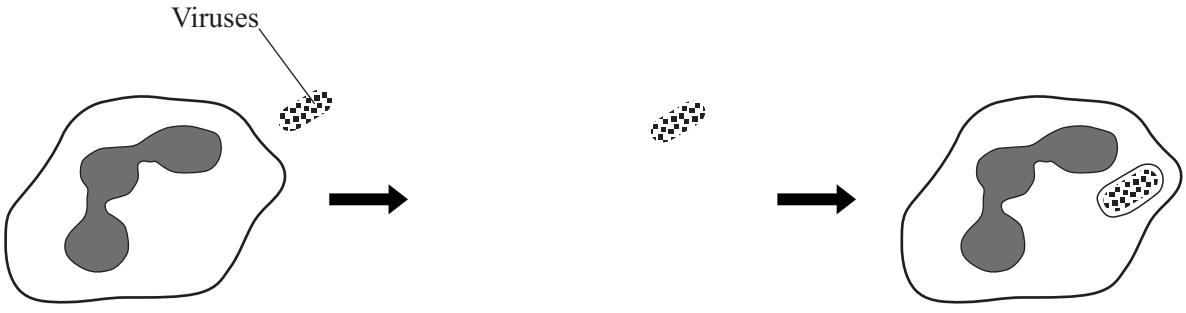


Diagram 2

(1 mark)

(iii) What type of chemical is released by some white blood cells to attack viruses?

.....

(1 mark)

(c) Hepatitis B is more likely to be spread among people who share needles when they inject drugs. Use information given at the beginning of this question to explain why this is so.

.....

.....

.....

.....

(2 marks)

8

TURN OVER FOR THE NEXT QUESTION

14 Four leaves were removed from the same plant. Petroleum jelly (a waterproofing agent) was spread onto some of the leaves, as follows:

Leaf **A**: on both surfaces
Leaf **B**: on the lower surface only
Leaf **C**: on the upper surface only
Leaf **D**: none applied

Each leaf was then placed in a separate beaker, as shown in diagram **1**.

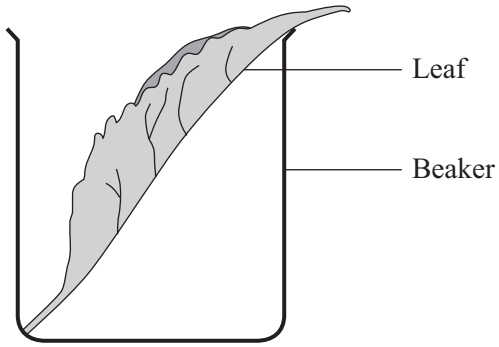
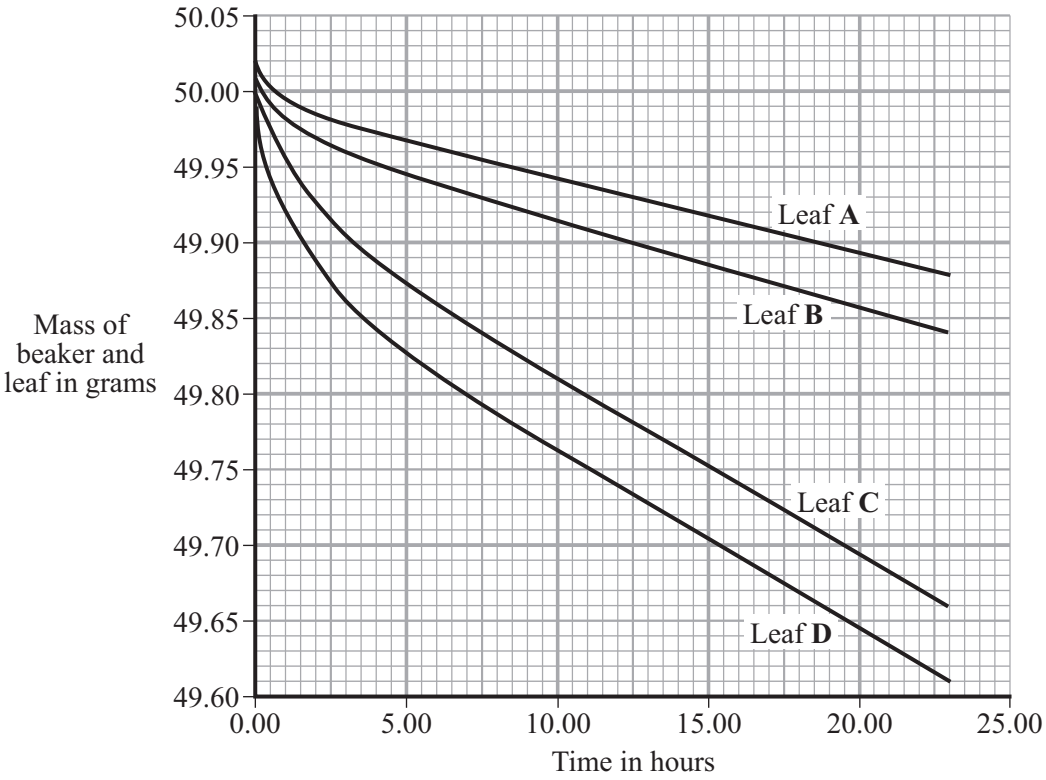


Diagram 1

Each beaker was weighed at intervals. The results are shown in the graph.



(a) Give evidence from the graph in answering the following questions.

(i) Which surface (upper or lower) loses water most rapidly? .....

Evidence .....

.....

(1 mark)

(ii) Is water lost from both surfaces of the leaf? .....

Evidence .....

.....

(1 mark)

(b) Diagram **2** shows the appearance of each surface of the leaf as seen through a microscope.

Upper Surface of Leaf **Lower Surface of Leaf**

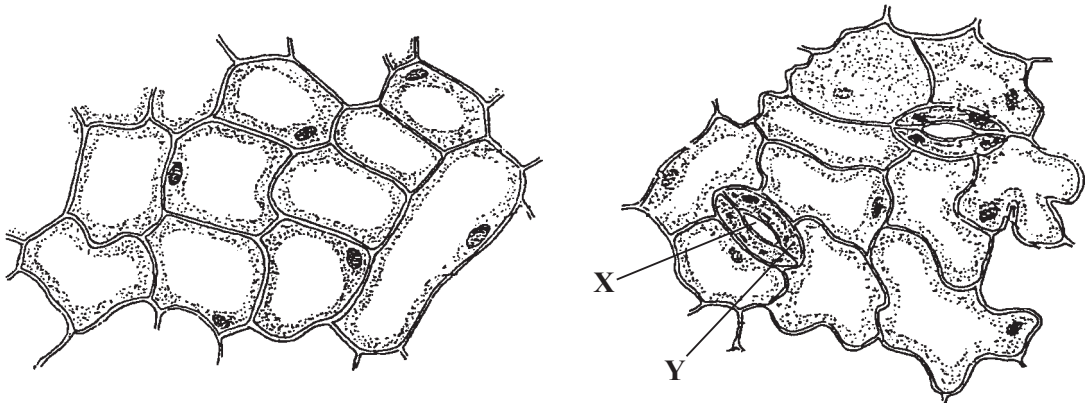


Diagram 2

(i) Name space **X** and cell **Y**.

X:.....

Y:.....

(2 marks)

(ii) Use information in diagram **2** to explain why the results are different for leaves **B** and **C**.

.....

.....

.....

.....

(2 marks)

6

Turn over ▶

15 Each autumn, many trees lose their leaves.

(a) Describe how carbon compounds in the leaves can be recycled so that they can be used again by the trees.

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.

.....

.....

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(4 marks)

(b) Give **two** environmental conditions which speed up the processes that you have described in part (a).

1 .....

2 .....

(2 marks)

6

END OF QUESTIONS