

Candidate Name	Centre Number	Candidate Number
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GCSE

243/02

**SCIENCE BIOLOGY
HIGHER TIER
BIOLOGY 3**

P.M. WEDNESDAY, 21 May 2008

45 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	8	
2.	4	
3.	3	
4.	5	
5.	5	
6.	11	
7.	5	
8.	9	
Total	50	

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator.

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

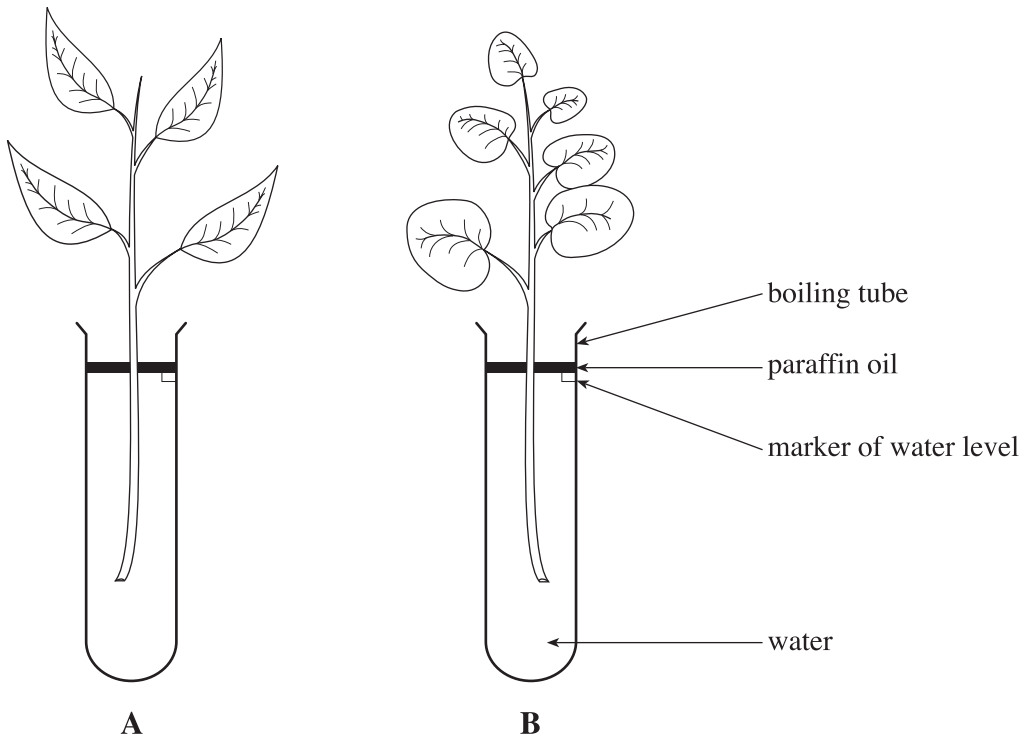
Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

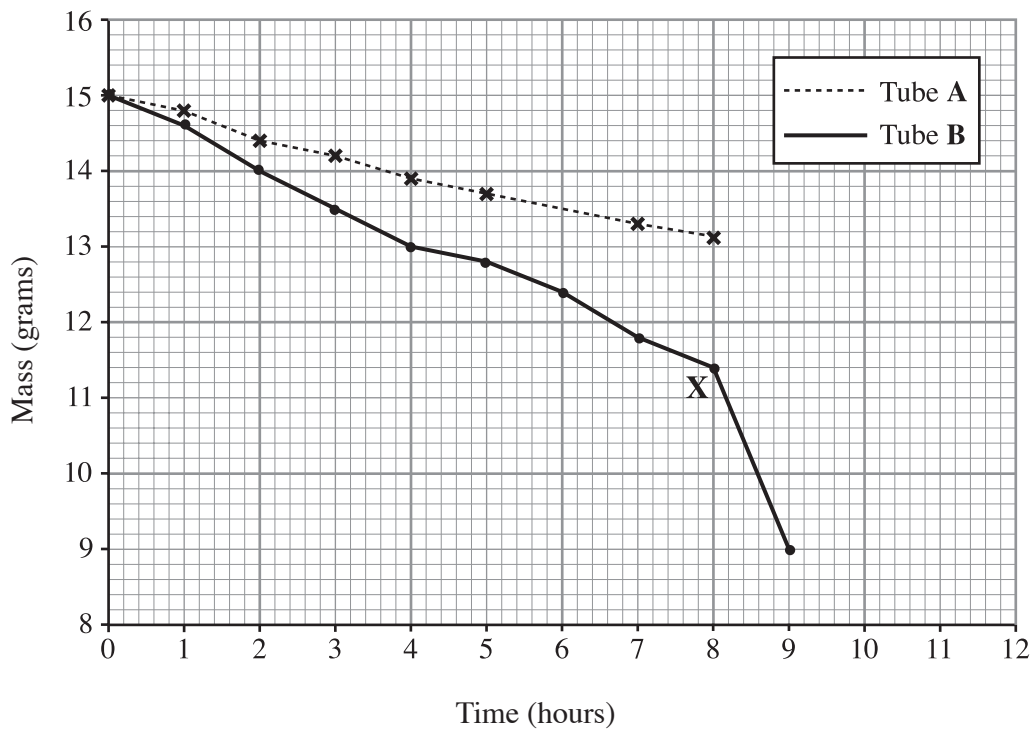
The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

1. Two different plant shoots were placed in water in boiling tubes. Both were weighed and the mass recorded.



The weighing was repeated at hourly intervals and the results are shown in the graph below.



(a) (i) Calculate the loss in mass for both tubes **A** and **B** after **8 hours**. [2]
Tube **A**

..... g

Tube **B**

..... g

(ii) Explain **fully** the difference in loss of mass between tubes **A** and **B**. [3]

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(iii) State the purpose of the paraffin oil. [1]

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(iv) Which of the following treatments could be applied to shoot **B**, at point **X**, to produce the graph shown between 8 and 9 hours?
Underline the correct answer. [1]

Enclosed in a bell jar

Upper surface of leaves coated with vaseline

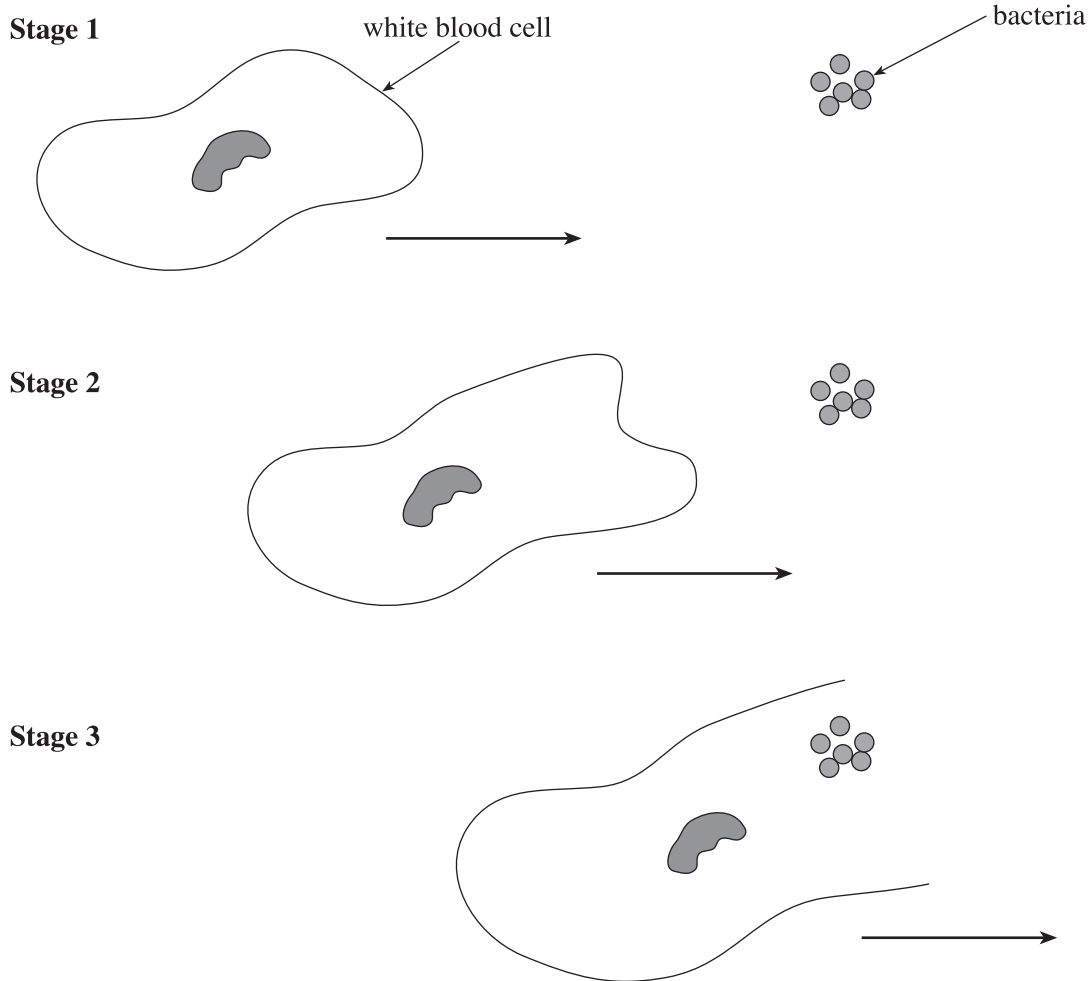
Half the leaves removed

Air directed at the leaves by a fan

(b) Name the structures in a leaf that control water loss. [1]

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2. (a) The diagram shows a white blood cell at a site in the body where disease causing bacteria have entered. Complete stage 3 of the diagram to show how the white blood cell protects the body from the bacteria. [2]



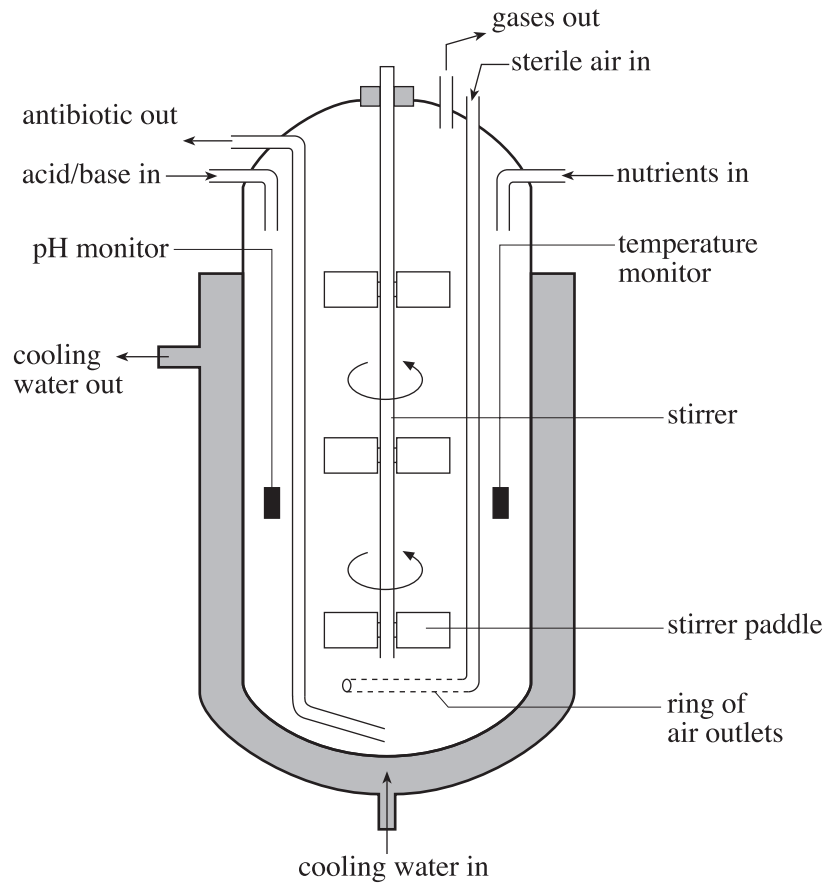
- (b) Explain how disease causing bacteria are prevented from **entering** through the surface of the body. [2]

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3. The antibiotic penicillin is produced in large stainless steel fermenters containing a liquid nutrient culture medium in which *Penicillium* is grown. The diagram below shows a fermenter.



- (a) (i) Name a nutrient that should be added to the fermenter. [1]

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- (ii) Why is air pumped into the fermenter? [1]

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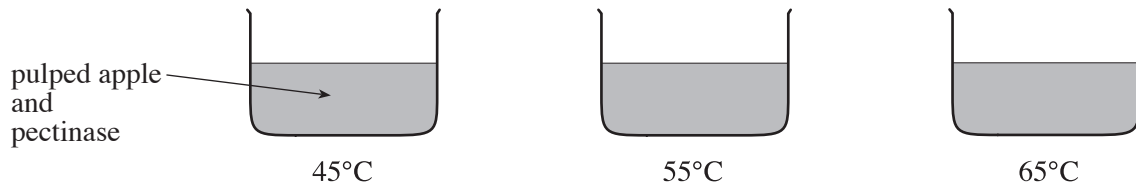
- (b) To which group of living organisms does *Penicillium* belong? [1]

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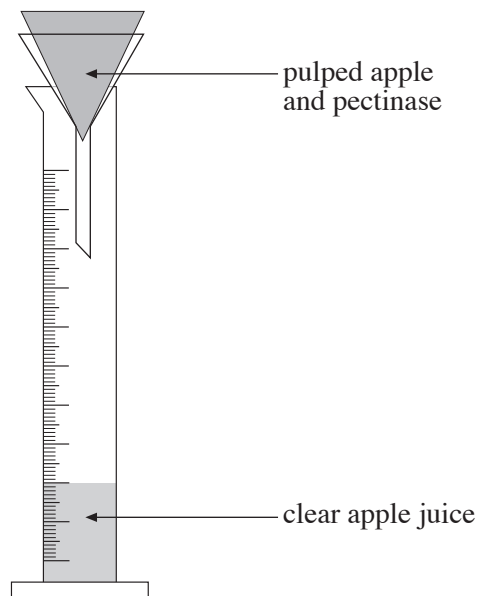
4. The cell walls of fruit, like apples, contain a chemical called pectin which holds the cells together. An enzyme called pectinase can break down the pectin causing the cell walls to breakdown. Pectinase is used in the commercial production of apple juice because it speeds up the extraction of clear fruit juice from the fruit.

The following sequence of diagrams show some of the stages of an experiment using pectinase:

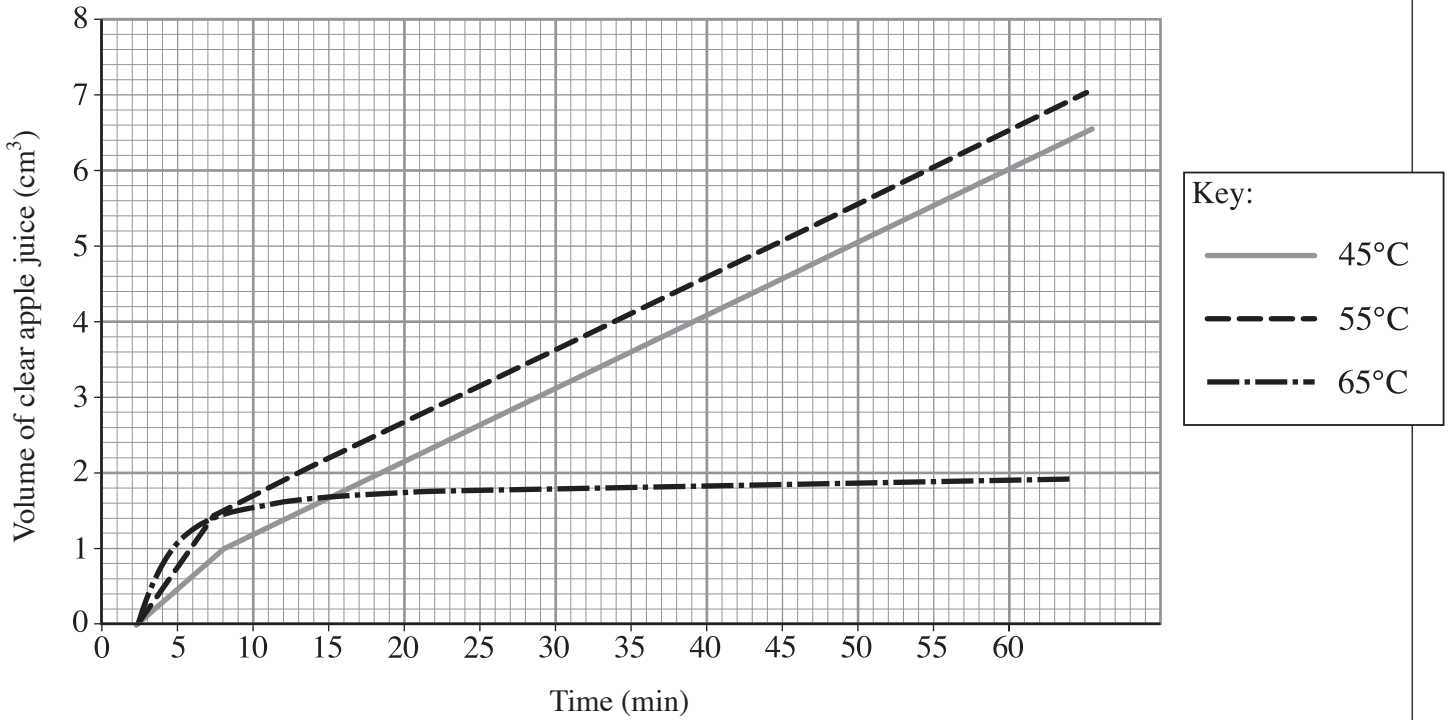
- pectinase was added to equal masses of pulped apple at 3 different temperatures.



- after 30 minutes the pulped apple/pectinase mixture was poured into a filter funnel



- the volume of clear apple juice collected in the measuring cylinder was recorded every 5 minutes for each temperature.
- the results were plotted on a graph which is shown opposite.



(a) (i) At which temperature was the greatest volume of clear apple juice produced? [1]
 °C

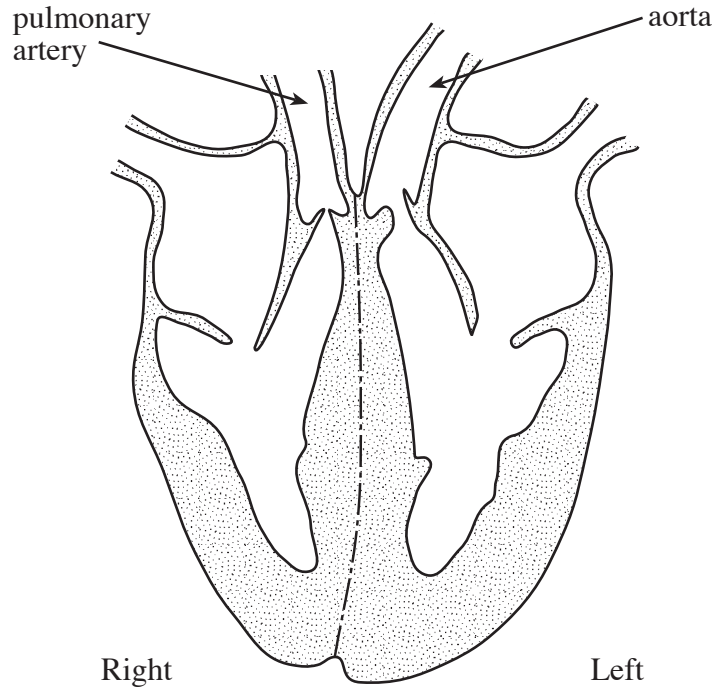
(ii) Explain why 65°C produces a low volume of apple juice. [1]

(iii) The optimum temperature for pectinase is 55°C. The 55°C line will eventually level out. Explain why. [1]

(iv) Apart from the mass of pulped apple used, state **one** other factor that must be kept constant during the experiment to make it a fair test. [1]

(b) State **one** other **commercial** use of digestive enzymes. [1]

5. The diagram below shows a section through the heart.



Describe the passage of the blood through the heart and organs starting at the pulmonary artery and ending at the aorta. [5]

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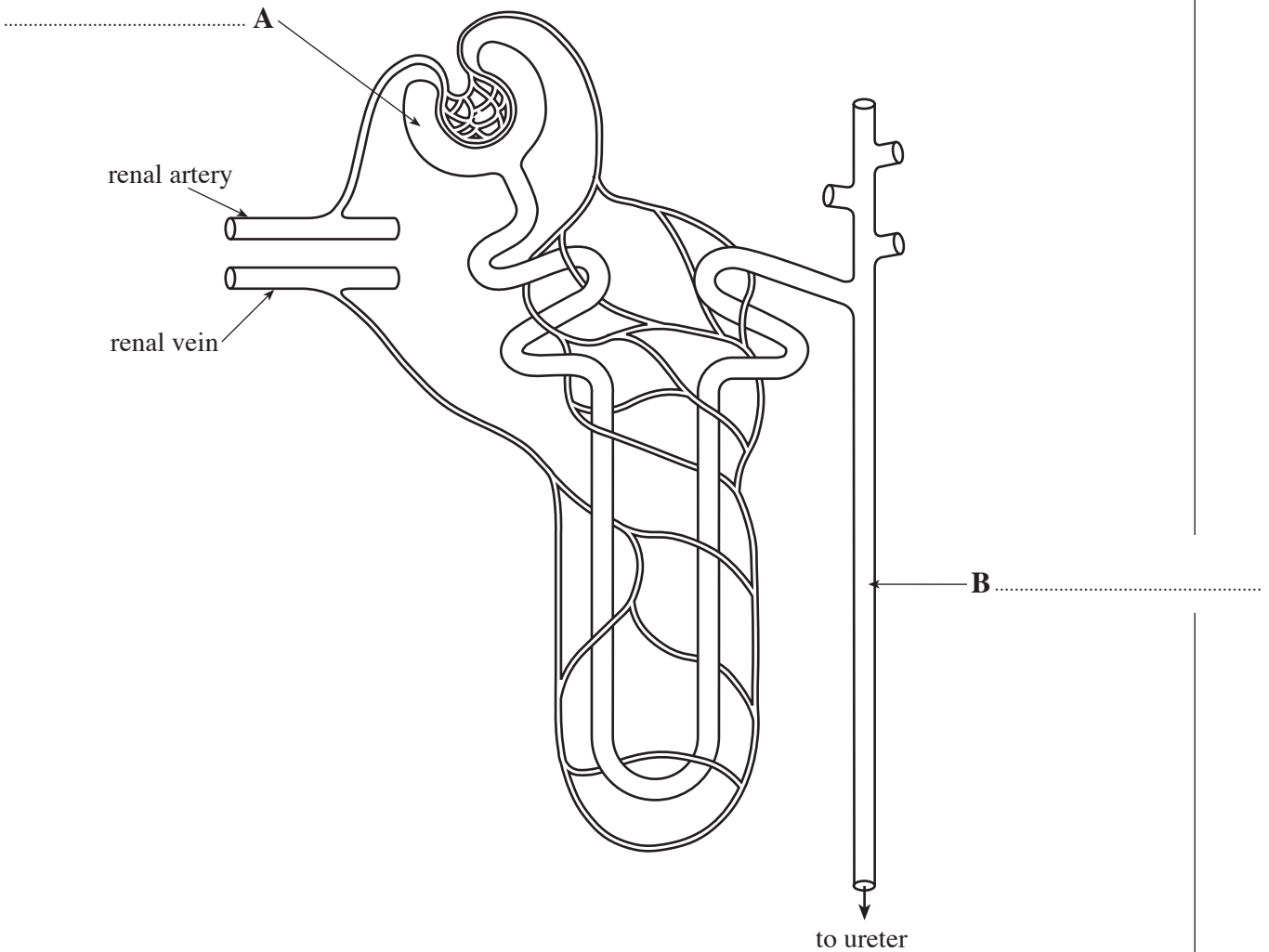
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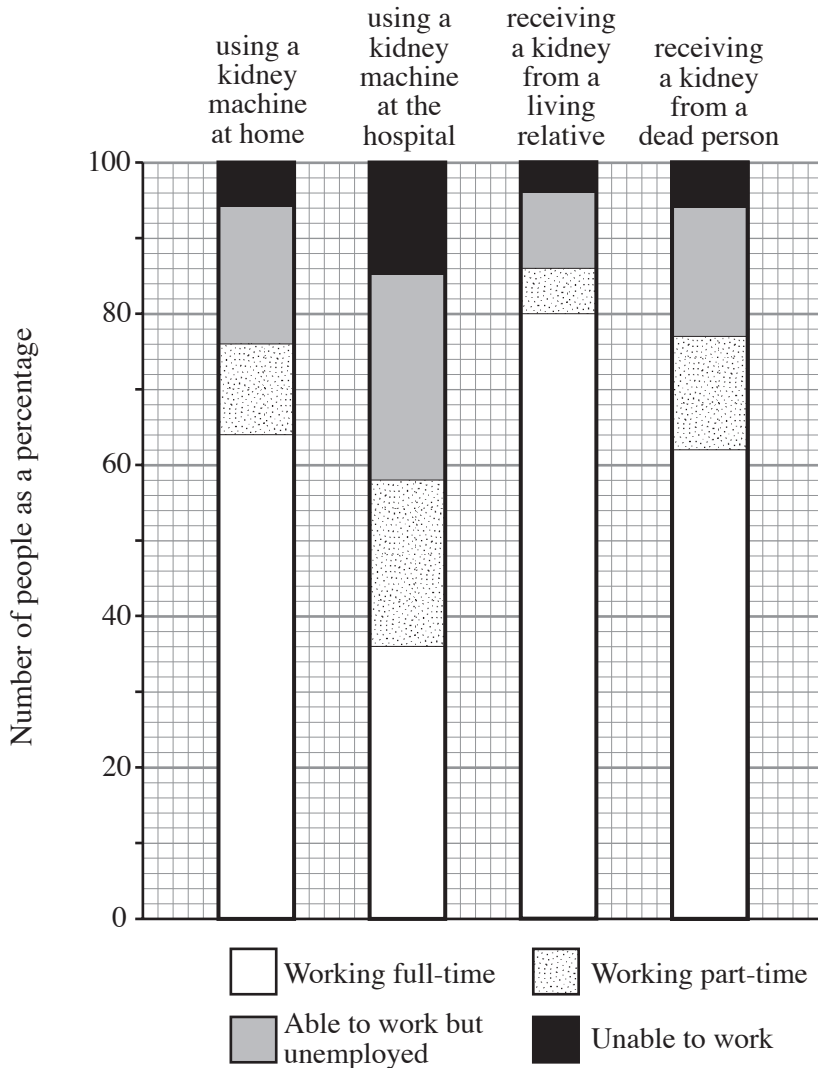
6. The diagram shows a kidney nephron.



- (a) Label **A** and **B**. [2]
- (b) Label, with an **X**, the part where filtration under pressure takes place. [1]
- (c) Blood is filtered as it passes through the kidney.
Complete the table by putting ticks in the boxes to show where each substance can be found in a healthy person.

<i>Substance</i>	<i>Found in</i>		
	<i>blood</i>	<i>filtrate in tubule</i>	<i>urine</i>
protein			
water			
urea			
glucose			

(d) If a person's kidney fails to work, he or she can be treated either on a dialysis machine, or by having a kidney transplant. The bar-chart below shows a way of comparing the success rates of different treatments.



From *Science at work*, Longman Group UK Ltd

(i) What percentage of people receiving a kidney from a living relative are [2]

I working full time;

II working part time?

(ii) How does the chart show that receiving a kidney from a living relative is considered to be more successful than treatment with a dialysis machine at a hospital? [1]

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(iii) Why does a transplant from a living relative have more chance of success than from a living non-relative? [1]

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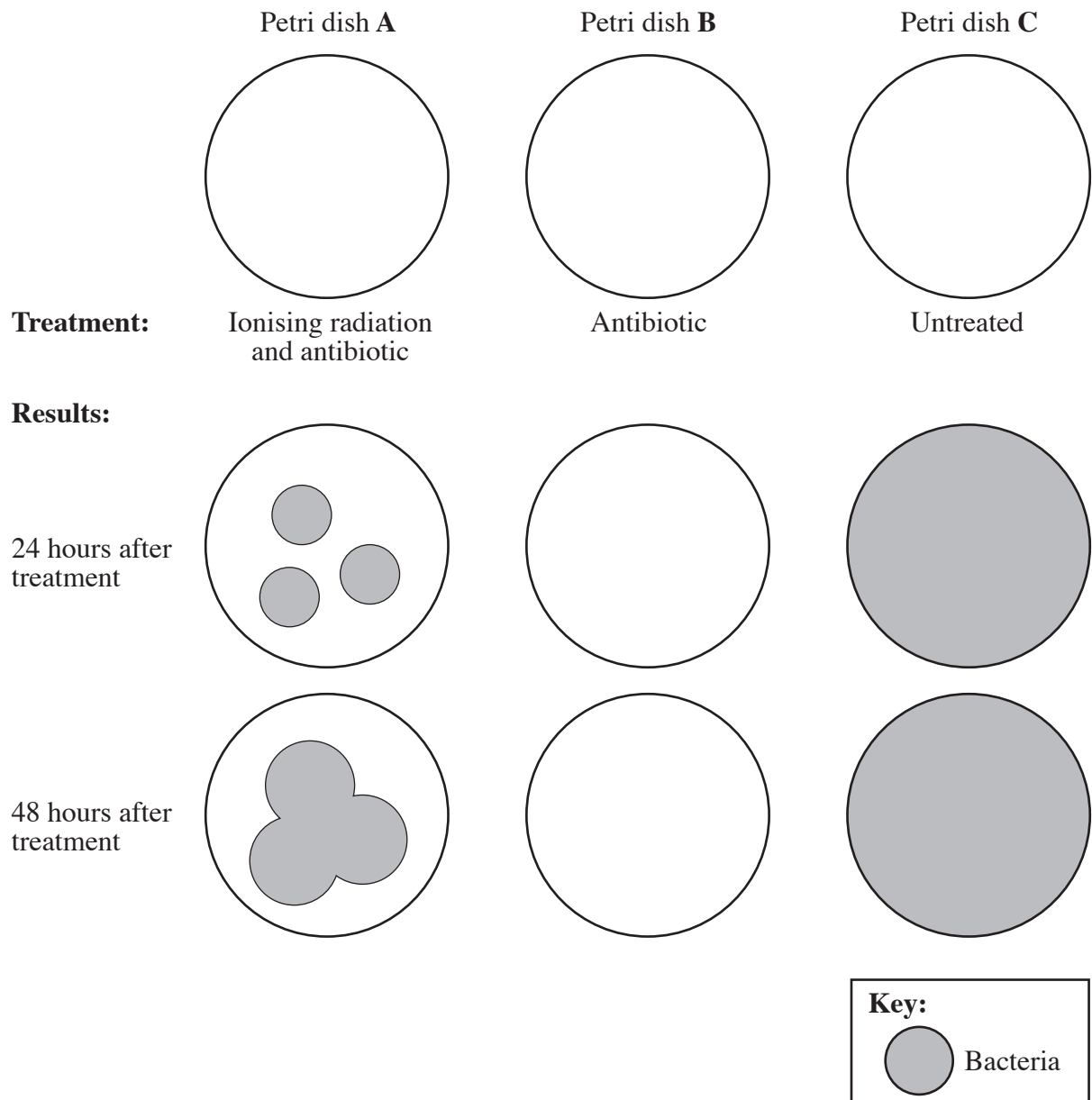
7. Public health scientists grew bacterial colonies of *Salmonella typhi* in the Petri dishes labelled **A**, **B** and **C**.

Petri dish **A** : was subjected to ionising radiation followed immediately by a dose of antibiotic X.

Petri dish **B** : an equal dose of antibiotic X was added.

Petri dish **C** : was given neither ionising radiation nor antibiotic X.

The Petri dishes were kept at 25°C for 48 hours, observing the bacteria at intervals. The diagrams show the results.



(a) Explain the effect of the ionising radiation on the bacteria. [1]

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(b) What was the purpose of Petri dish C? [1]

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(c) Explain why scientists must continue to develop new antibiotics. [3]

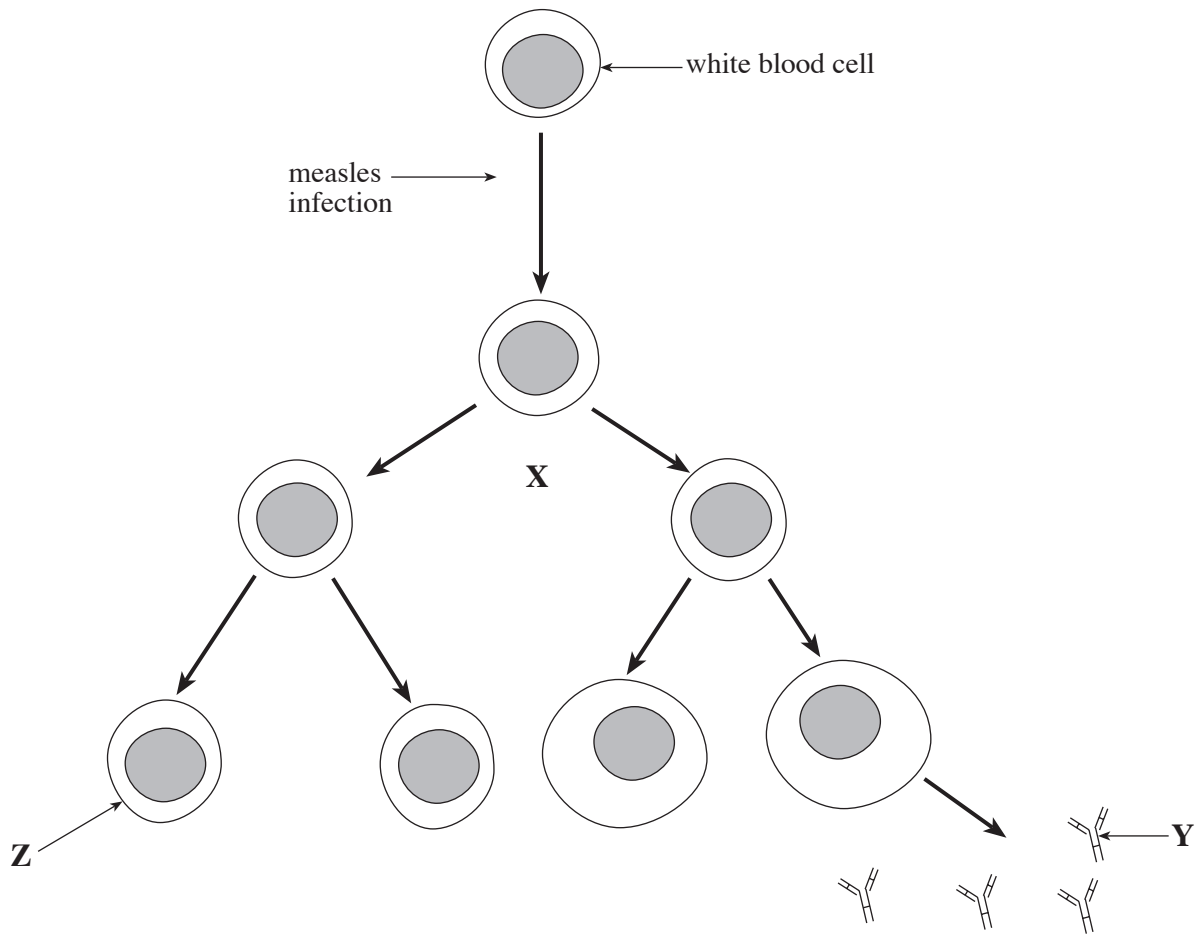
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8. The diagram shows part of the immune response following an infection with the measles virus.



(a) (i) Name the process that occurs at **X**. [1]

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(ii) State the term given to the foreign molecules on the surface of the measles virus that stimulate an immune response. [1]

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(iii) Name the molecule labelled **Y**. [1]

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(iv) Cell **Z** is responsible for long-term immunity to measles. Name cell **Z** and describe its function. [2]

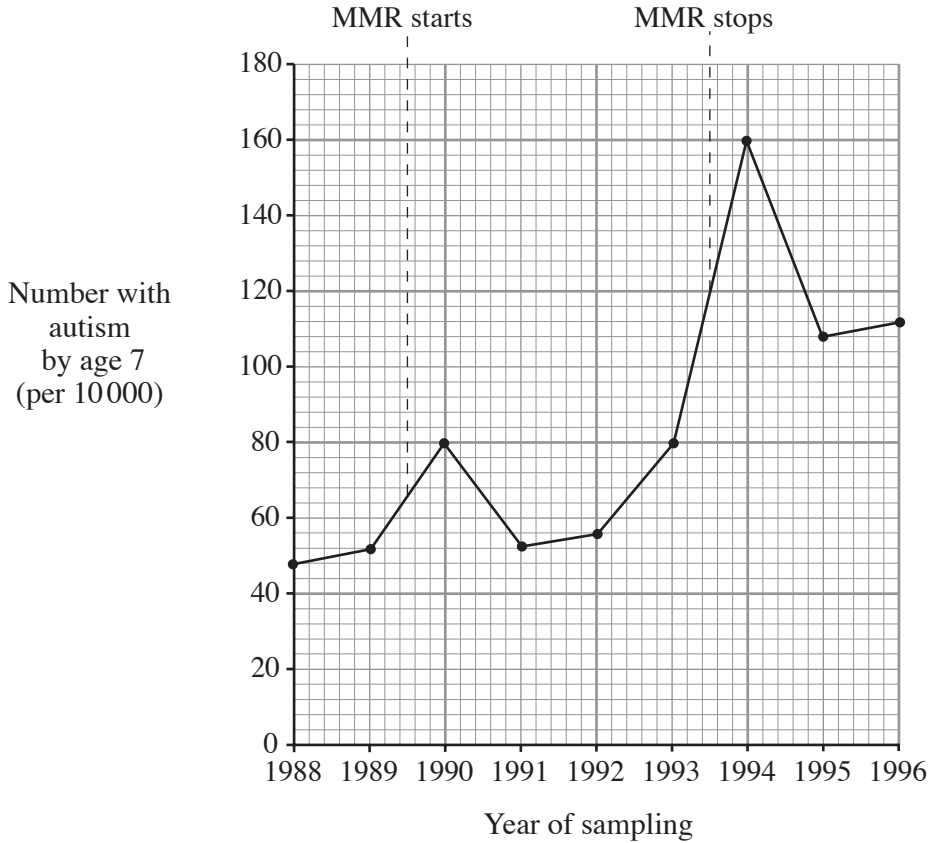
Name

Function

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- (b) In 1998, some newspapers reported that there is a link between the combined vaccine against measles, mumps, and rubella (MMR) and a condition called autism. The graph shows the results of a study in Japan of a sample of seven-year-old children.



(Modified from New Scientist 2005)

- (i) State the highest number per 10 000 children to suffer from autism [2]
- I before withdrawal of the MMR vaccine;
- II after the withdrawal of the MMR vaccine.

- (ii) Does this data support the newspaper claim? Explain your answer. [1]
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- (c) There has been an increase in the number of cases of measles in Britain since 1998 leading to the first death for 14 years. As a result of newspaper reports, large numbers of parents refused to have their children vaccinated with MMR. Use the information given to make a case for compulsory vaccination. [1]
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