

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

0243/02

**SCIENCE
HIGHER TIER
BIOLOGY 3**

A.M. MONDAY, 28 January 2013

45 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	6	
2.	6	
3.	3	
4.	5	
5.	6	
6.	10	
7.	6	
8.	8	
Total	50	

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

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.

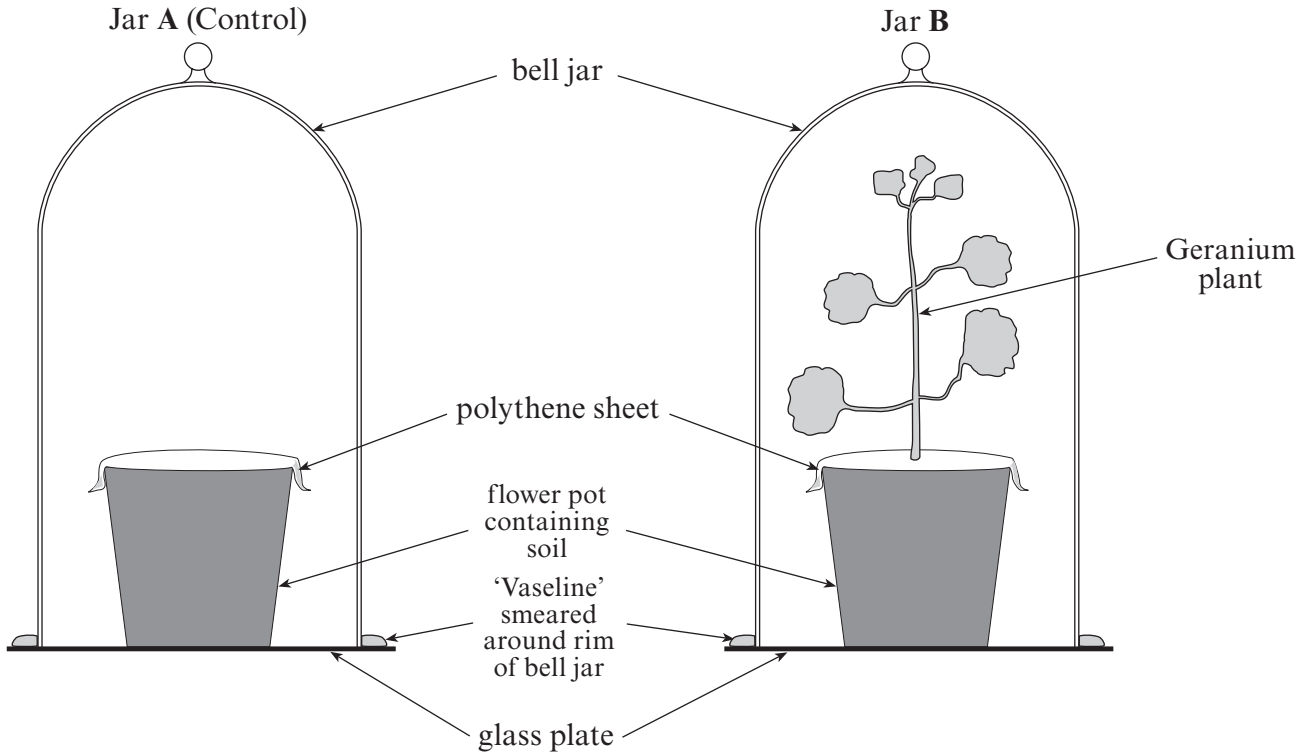
INFORMATION FOR CANDIDATES

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

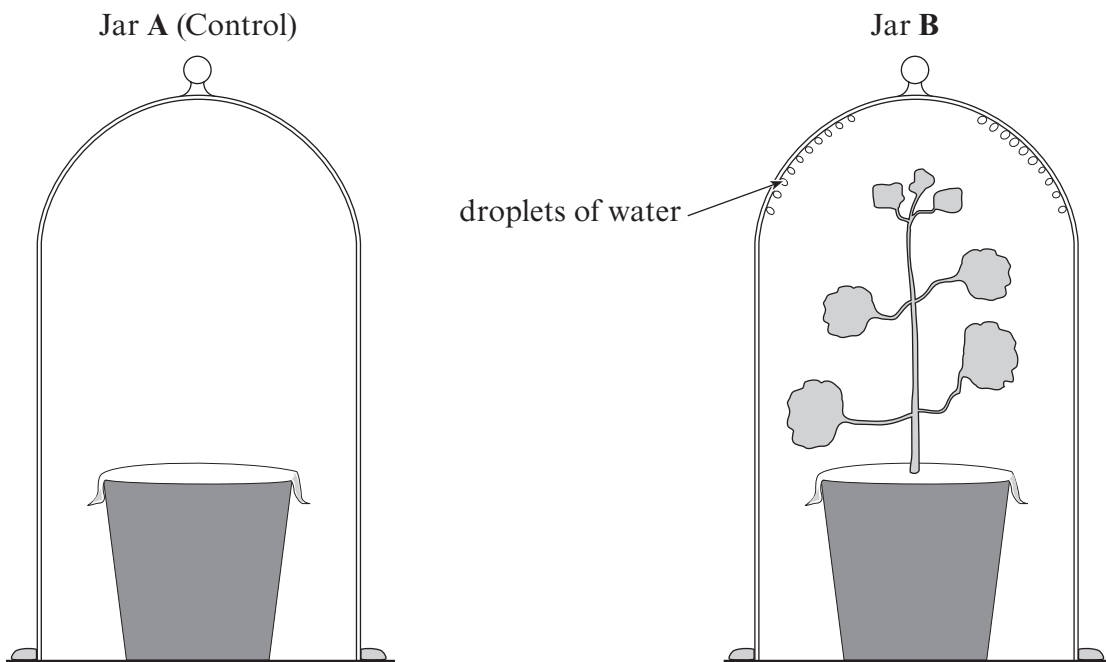
You are reminded of the necessity for good English and orderly presentation in your answers.

Answer **all** questions.

1. Bethan and Alun set up the following experiment and left it for 24 hours.



After 24 hours the jars were examined. Droplets of water had developed on the inside of Jar B. No droplets of water were found on the inside of Jar A.



(a) (i) Explain why droplets of water appear on the inside of jar **B**.

[2]

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

(ii) State the purpose of the control jar **A**.

[1]

.....

(iii) Suggest why

I. the soil in both jars **A** and **B** was covered with polythene;

[1]

.....

II. the rims of both jars **A** and **B** were smeared with 'Vaseline' petroleum jelly.

[1]

.....

(b) Name the vessels which transport water in plants.

[1]

.....

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2. Bacteria cause milk to go sour. During the souring of milk, the concentration of oxygen in it decreases.

(a) Explain how bacteria affect the concentration of oxygen in milk. [1]

(b) Cows' milk can be treated in two main ways to increase the length of time that it can be stored safely.

- Pasteurisation – milk is heated to 71.7°C for 15 seconds and cooled quickly.
- Ultra Heat Treated (UHT) – milk is heated to 135°C for at least 1 second and cooled quickly.

In an experiment to compare the freshness of different kinds of milk, tubes were set up as shown in the table.

- Equal volumes of milk were added to each tube.
- 1 cm³ of a blue dye was also added to each tube. The dye changes from blue to pink to white as oxygen decreases in the milk.
- All tubes were kept at 30°C.
- The colour of the dye was recorded every 30 minutes.

Time (min)	Type of milk in each tube			
	UHT	1 day old pasteurised milk	3 day old pasteurised milk	untreated milk
0	blue	blue	blue	blue
30	blue	blue	blue	pink
60	blue	blue	pink	white
90	blue	pink	white	white
120	blue	pink	white	white

(i) Why were all the tubes treated in the same way? [1]

.....

(ii) Which tube had the greatest number of bacteria after 30 minutes? [1]

.....

(iii) (I) Which milk was the freshest after 120 minutes? [1]

.....

(II) Explain your choice and why it remained freshest. [2]

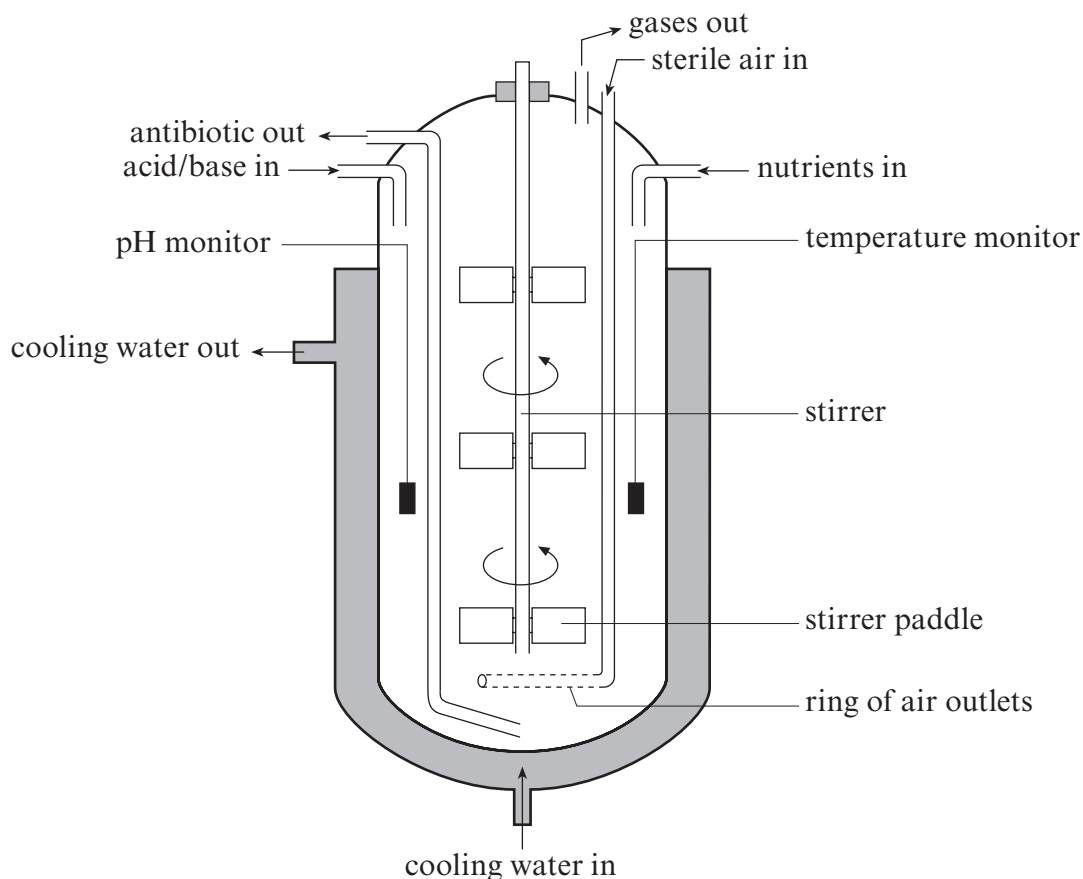
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3. The antibiotic penicillin is produced in large stainless steel fermenters containing a liquid nutrient culture medium in which *Penicillium* is grown.

The diagram shows a fermenter.



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

.....

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

.....
.....

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

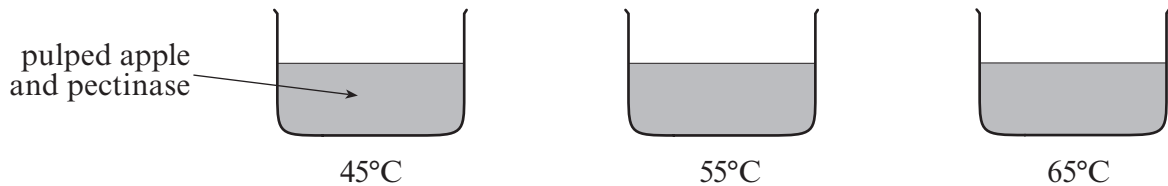
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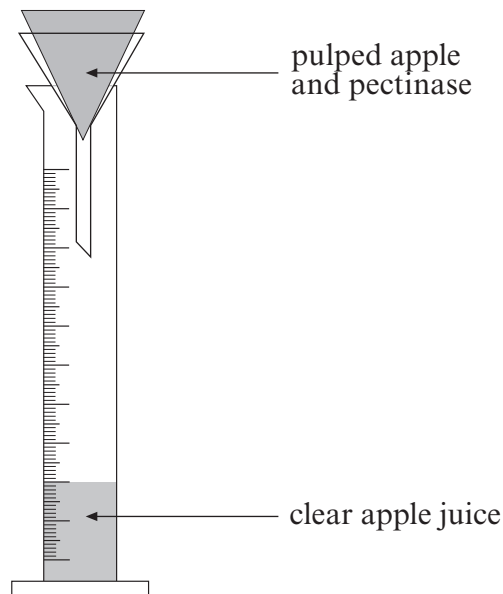
4. The cell walls of fruit, like apples, contain a chemical called pectin which holds the cells together. An enzyme called pectinase can break down the pectin causing the cell walls to breakdown. Pectinase is used in the commercial production of apple juice because it speeds up the extraction of clear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

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

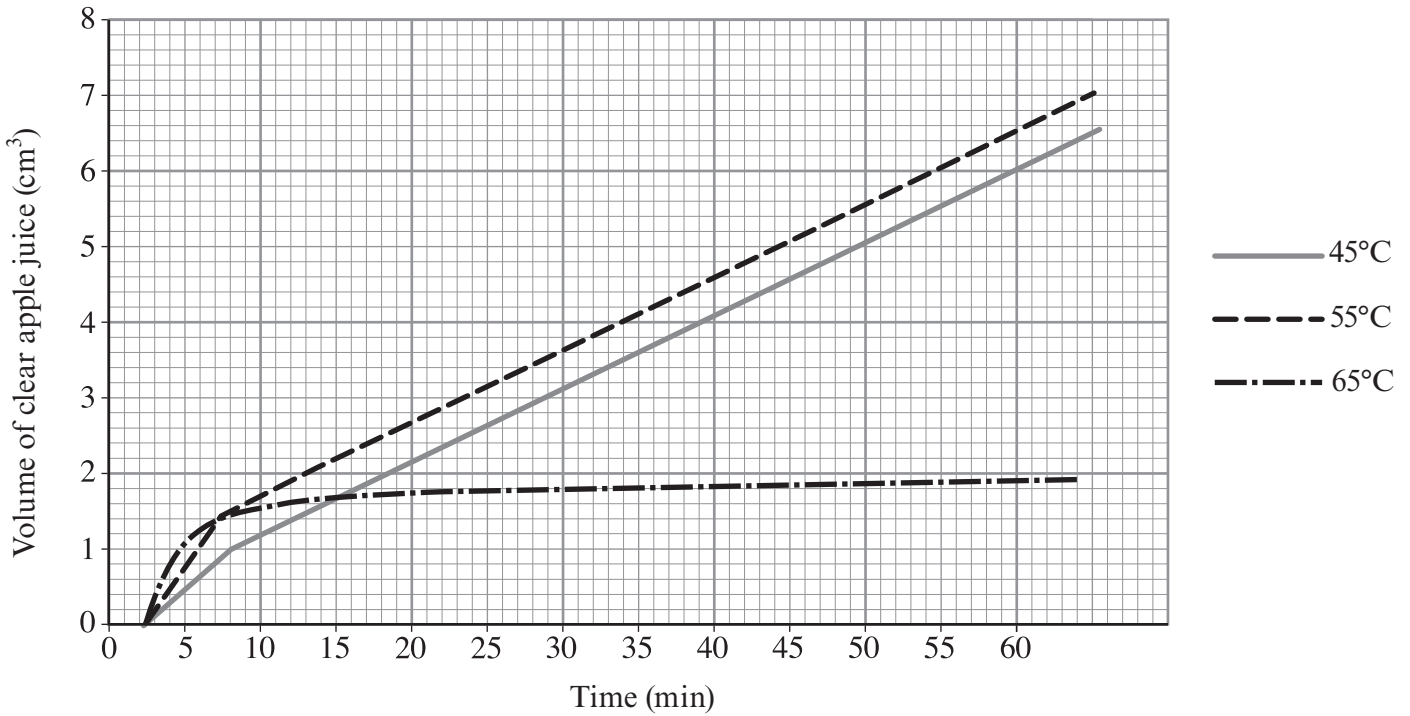
- pectinase was added to equal masses of pulped apple at 3 different temperatures.



- 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]

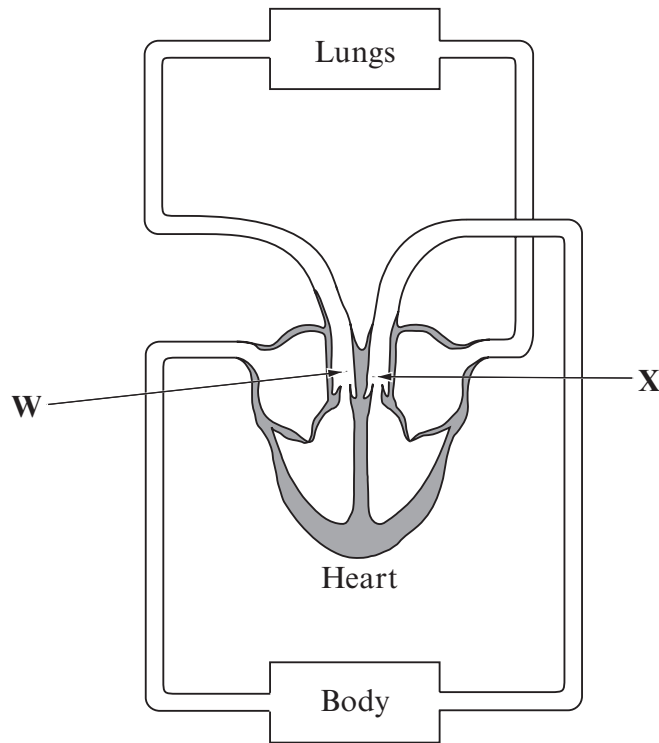
(iii) The optimum temperature for pectinase is 55°C. The 55°C line will eventually level out. Explain why. [1]

(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]

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5. The diagram shows the human circulatory system.



(a) (i) Name the blood vessels labelled: [2]

W

X

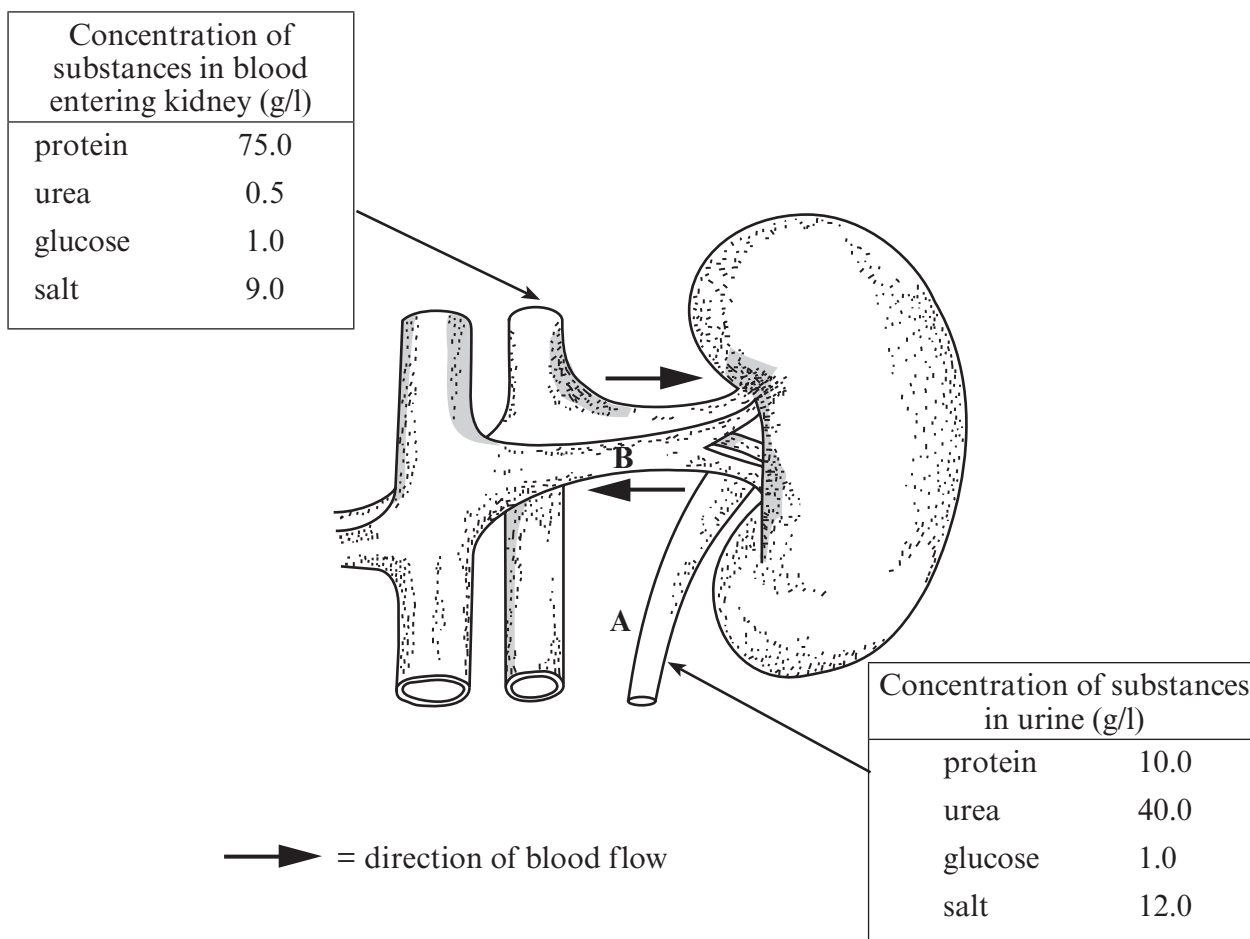
(ii) State **two** differences between the blood in vessels **W** and **X**. [2]

	Blood in vessel W	Blood in vessel X
1
2

(b) Using the diagram only, state whether the ventricles are contracting or relaxing. Explain your answer. [2]

.....
.....

6. The diagram shows a simplified summary of what happens in a human kidney which is diseased and does not function correctly.



- (a) Name parts **A** and **B** shown in the diagram above.

A

B

[2]

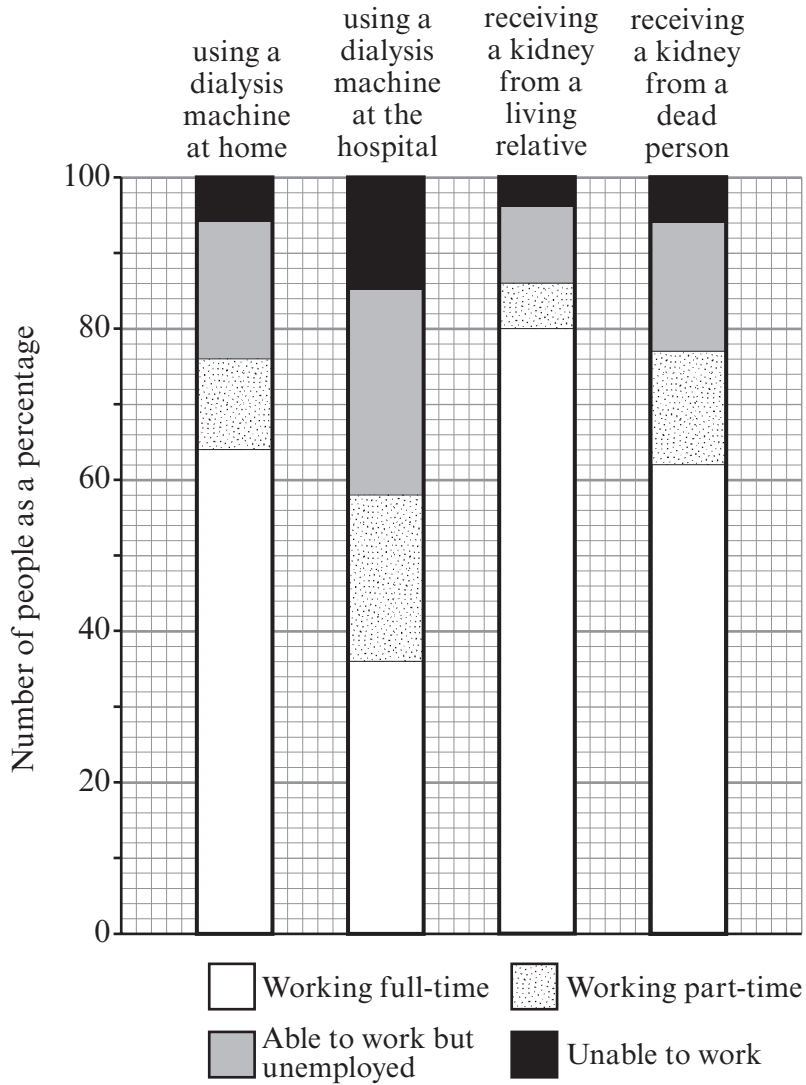
- (b) What **two** pieces of evidence in the boxes suggest that the person's kidney is not working properly? [2]

.....

- (c) Explain why the concentrations of urea and salt are higher in urine than in the blood. [2]

.....

(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.



(i) From this chart 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]

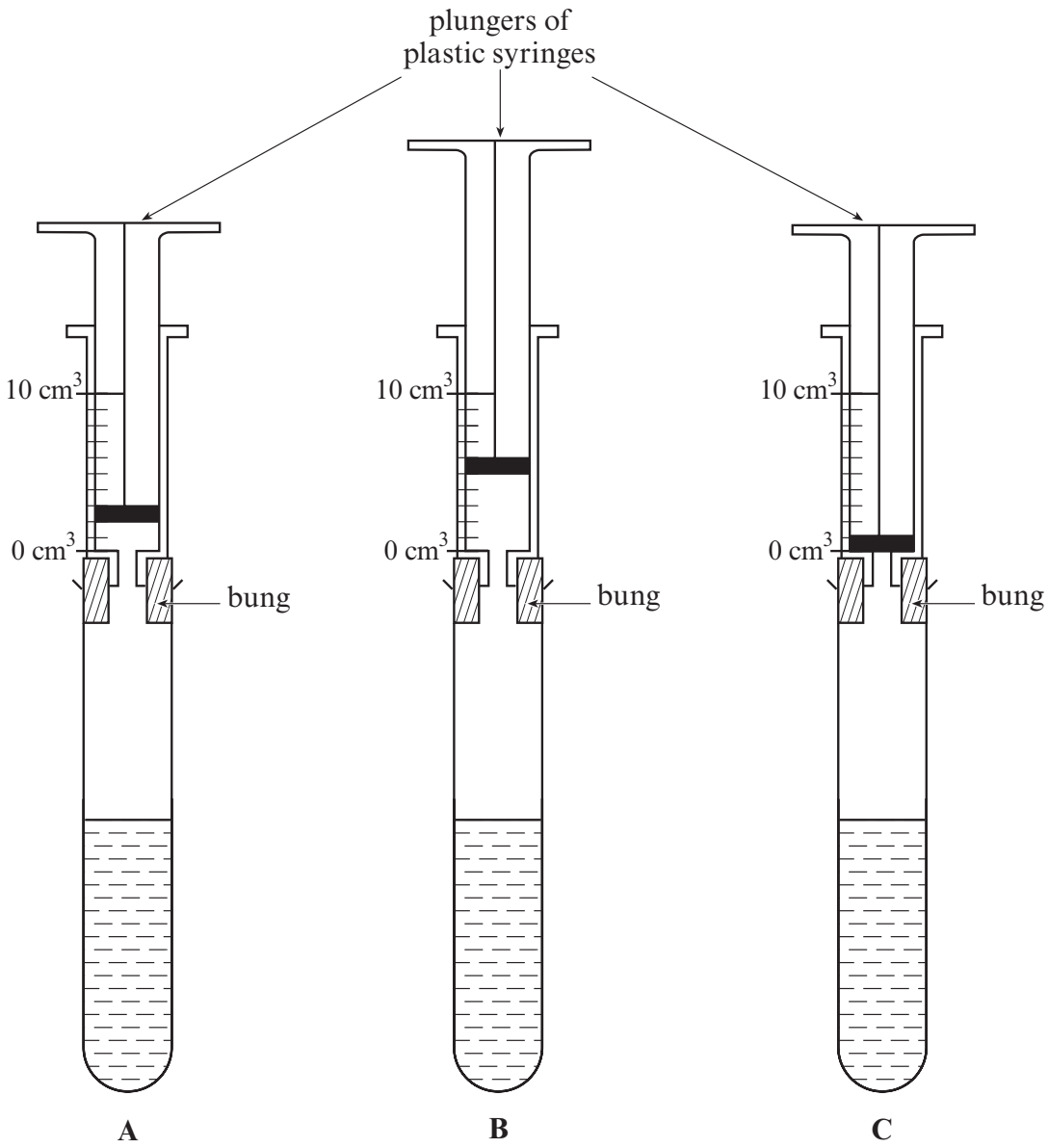
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(e) Why does a transplant from a living relative have more chance of success than from a living non-relative? [1]

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.....

10

7. The apparatus shown in the diagram was set up to investigate the effect of temperature on the rate of fermentation.



A
 20 cm³ distilled water
 10 g sugar
 0.5 g yeast
 5°C

B
 20 cm³ distilled water
 10 g sugar
 0.5 g yeast
 40°C

C
 20 cm³ distilled water
 10 g sugar
 0.5 g boiled and cooled yeast
 40°C

The plungers in the syringes were set at 0cm^3 in **A**, **B** and **C** at the start. At the end of 30 minutes, the plungers were in the positions shown in the diagrams.

(a) Name the gas produced during fermentation. [1]

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(b) Calculate the rate of gas production per minute in **B**. [1]

Answer

(c) Explain why gas production would stop in **A** and **B** after 24 hours. [1]

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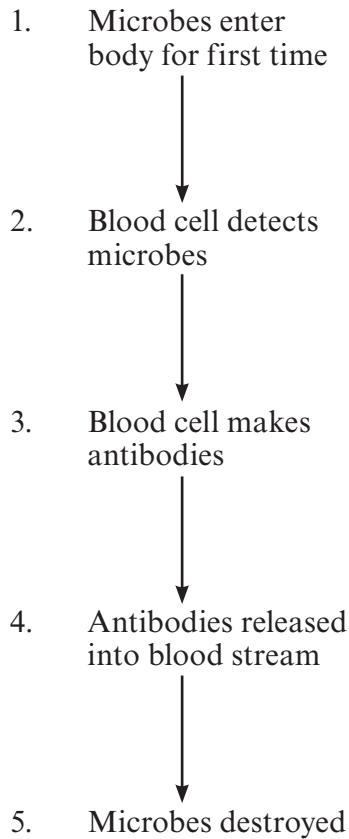
(d) In this investigation, what evidence is there to suggest that enzymes are responsible for fermentation? [2]

.....
.....

(e) State **one other** factor which affects the rate of fermentation in yeast. [1]

.....

8. The diagram below shows some of the stages which follow a first infection with disease-causing microbes.



(a) (i) What part do antigens play in the response shown? [2]

.....

.....

.....

.....

(ii) To which group of chemicals do antigens belong? [1]

.....

(b) With a second infection at a later date, a person may show no effect of the disease. Explain why this happens. [2]

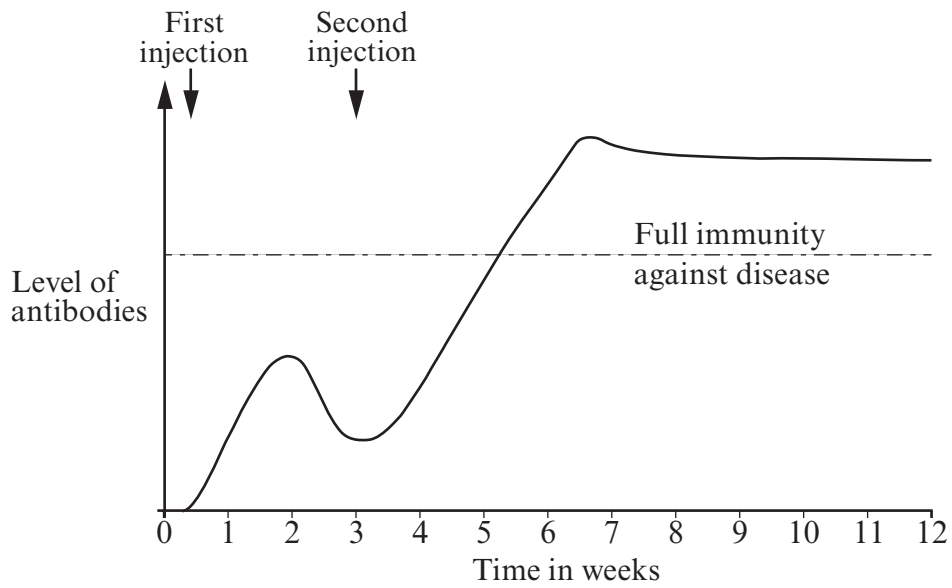
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(c) The graph shows the effect of two injections of a vaccine on the level of antibodies in the blood. The purpose of the injections was to give immunity against a particular disease.



Describe what the graph shows about the effect of the injections.

[3]

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