Surname	Centre Number	Candidate Number
Other Names		0

GCSE

0243/02

SCIENCE
HIGHER TIER
BIOLOGY 3

A.M. TUESDAY, 15 May 2012

45 minutes

Suitable for Modified Language Candidates

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

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020001

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

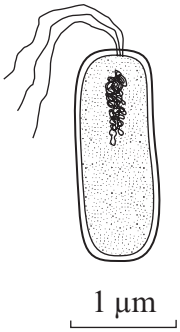
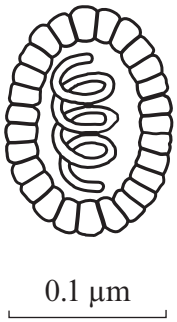
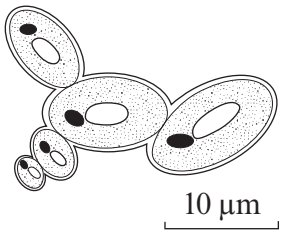
The number of marks is given in brackets at the end of each question or part-question.

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

Answer **all** *questions.*

1. The table below shows diagrams of three different types of micro-organisms **A**, **B** and **C**.

(a) Complete the table by writing in the name and features of each type of micro-organism. [3]

	Micro-organism		
	A	**B**	**C**
Drawing of micro-organism			
Name of type of micro-organism	.....	.....	.....
Outer coat	cell wall	.....	cell wall
Reproduction	.....	inside other cells	by budding
Nucleus	no distinct nucleus	no nucleus	.....

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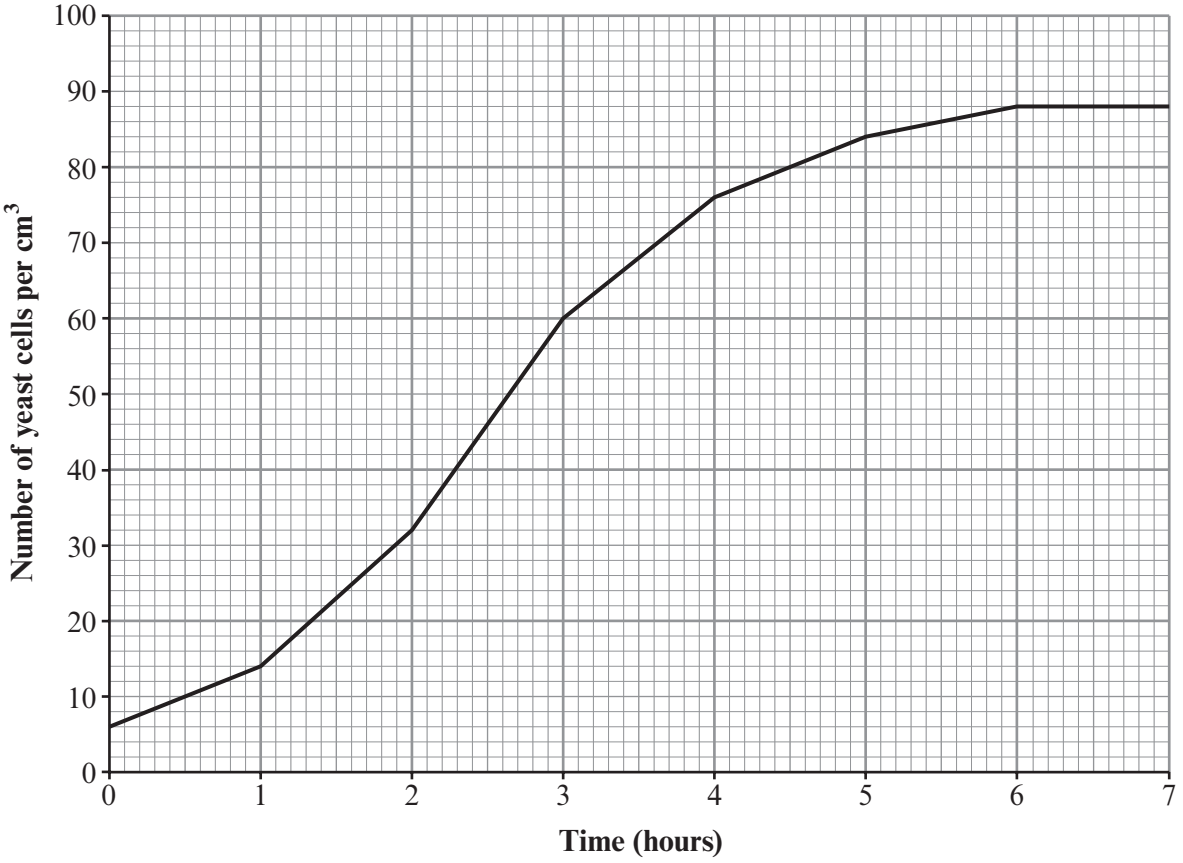
(b) The graph below shows the growth of yeast cells over a 7 hour period. The yeast cells were grown in a sugar solution and kept at 35°C throughout the experiment. At the end of each hour 1 cm^3 of test solution was extracted (taken out) and the number of yeast cells were counted using a microscope.



(i) Between which times was the yeast growing at its fastest rate? [1]
Circle the correct answer.

0 - 1 hours 2 - 3 hours 5 - 6 hours

(ii) Suggest **one** reason why the growth of yeast cells slows down. [1]

.....

.....

(iii) Why was the temperature kept at 35°C? [1]

.....

(c) State **one** use of yeast in the food industry. [1]

.....

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2. Biological washing powders contain enzymes. A student carried out an investigation using both biological and non-biological washing powders.

Four white T-shirts were stained with egg yolk which is mainly fat. Each of the T-shirts were treated as follows:

A

Wash with biological washing powder at 35°C

B

Wash with biological washing powder at 60°C

C

Wash with non-biological washing powder at 35°C

D

Wash with non-biological washing powder at 60°C

After the wash the percentage of stain remaining on each of the T-shirts is shown in the table below:

T-shirt	Percentage of stain remaining (%)
A	0
B	68
C	79
D	0

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(a) State **two** factors, which should be kept constant in this investigation. Do not use time. [2]

(i) .....

(ii) .....

(b) From this investigation, what conclusion can be drawn about the effectiveness of **biological** washing powders? [1]

.....

.....

(c) Give **one** advantage of using biological washing powder over a non-biological one. [1]

.....

.....

(d) The enzyme found in the **biological** washing powder, digested the egg yolk. Which type of enzyme is this? [1]

.....

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Turn over.

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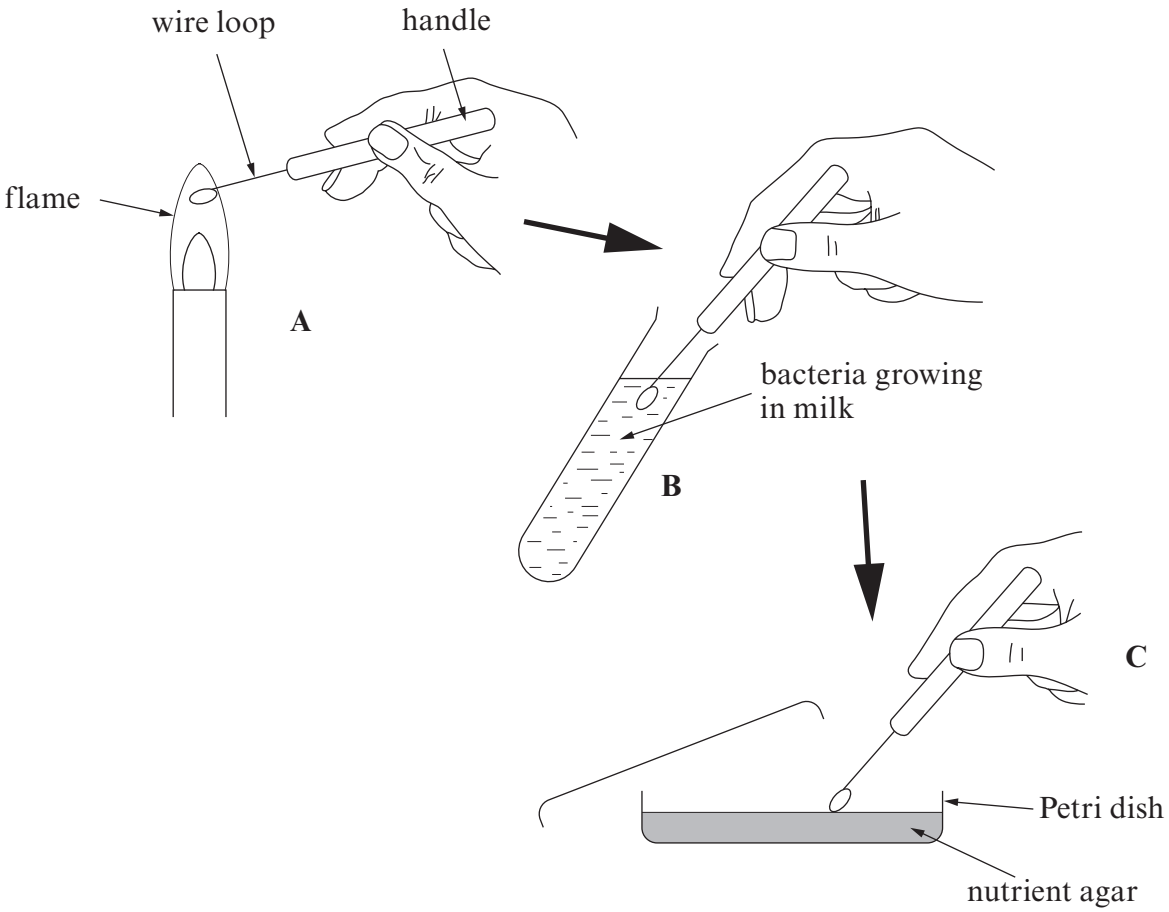
3. The diagrams below show some of the steps used when growing bacteria in a laboratory.



(a) Why is the wire loop placed in the flame? [1]

.....

(b) For safety reasons, what must happen to the Petri dish immediately after the lid is replaced in stage **C**? Explain why this is done. [2]

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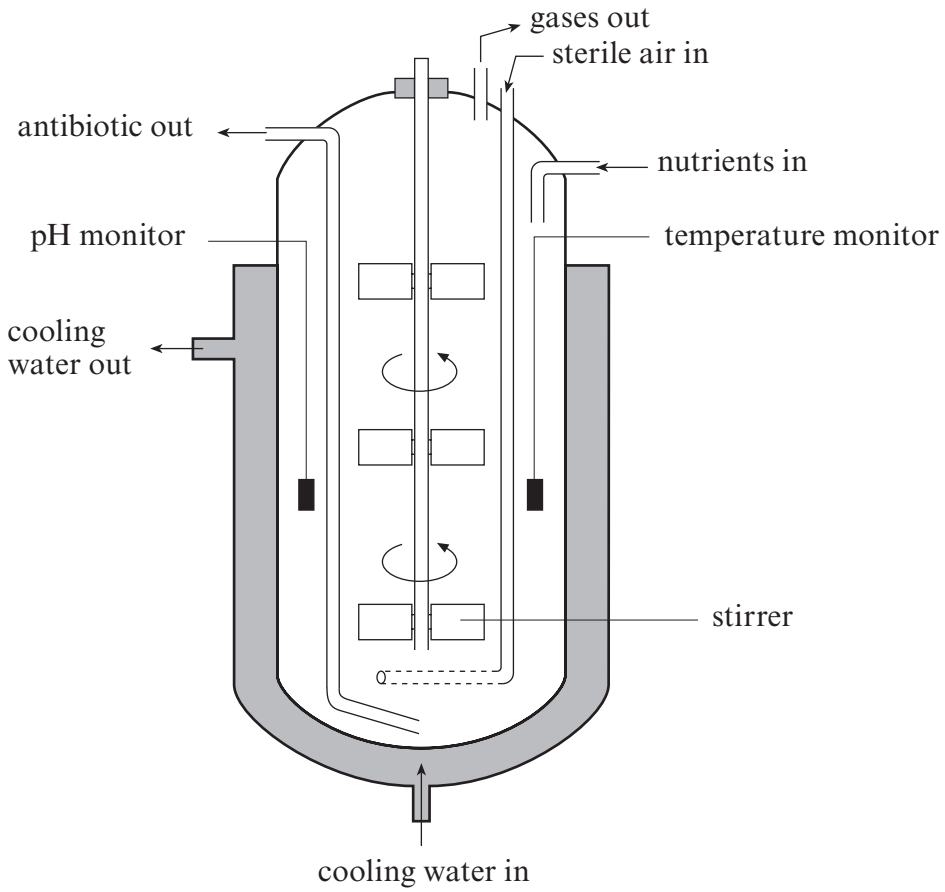
4. The diagram below shows a fermenter used to produce the antibiotic penicillin.



(a) Explain why the air entering the fermenter must be sterile. [1]

.....

.....

(b) Use the diagram to suggest how the temperature of the fermenter is controlled. [2]

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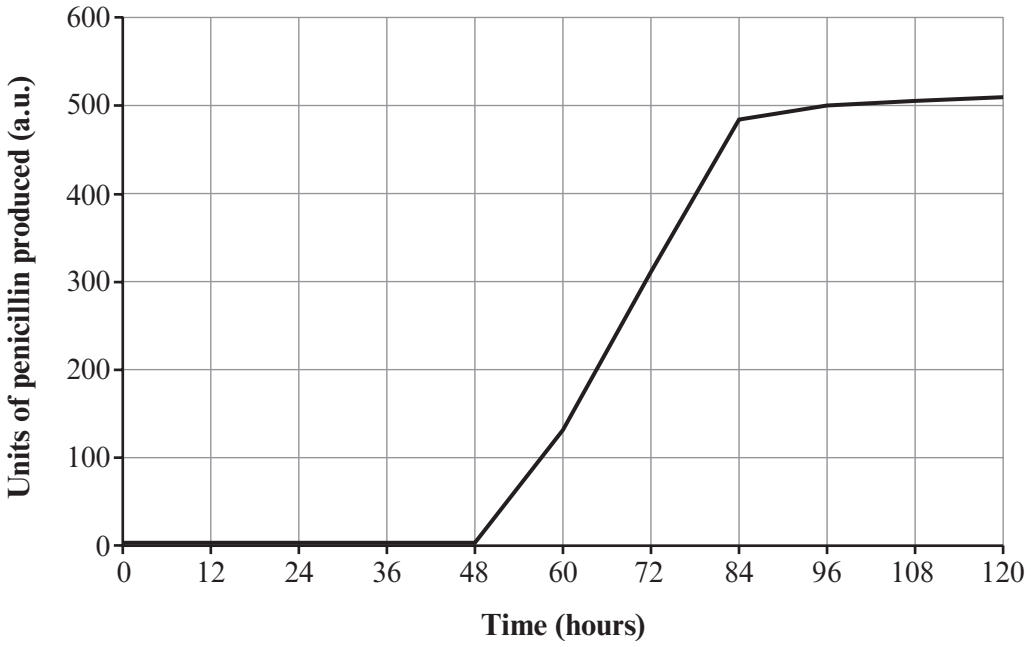
(c) The graph below shows the production of penicillin in a fermenter.



(i) Use the graph to suggest at what time the penicillin should be removed from the fermenter to obtain the highest yield in the **shortest** time. [1]

..... hours

(ii) State the name of the organism that produces penicillin. [1]

.....

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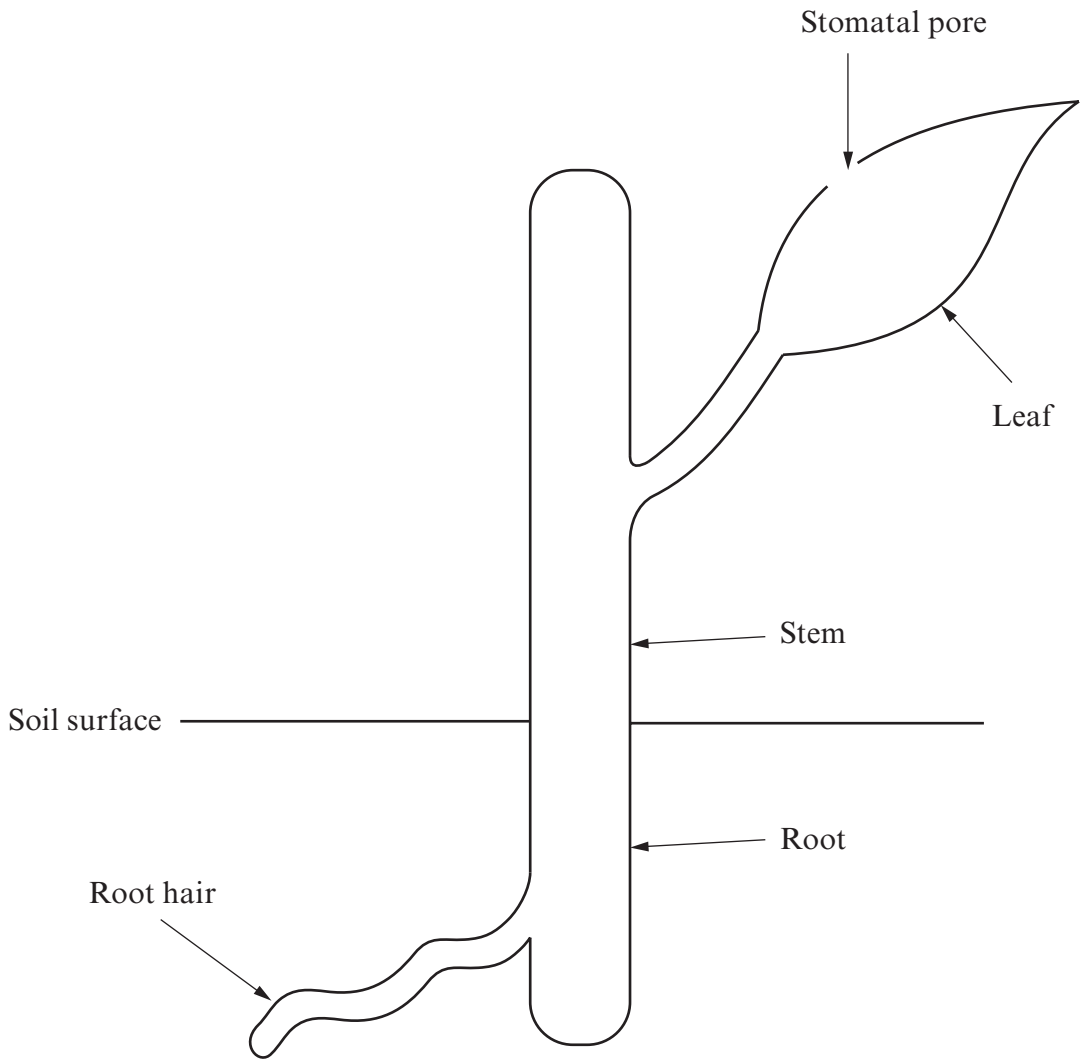
5. The diagram below shows a simplified plant.



(a) Draw a single continuous arrow through the whole plant to show the pathway taken by water as it travels from the **soil** to the **air**. [1]

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(b) Describe and explain how the movement of water takes place through the plant, from the **soil** to the **air**. [4]

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Turn over.

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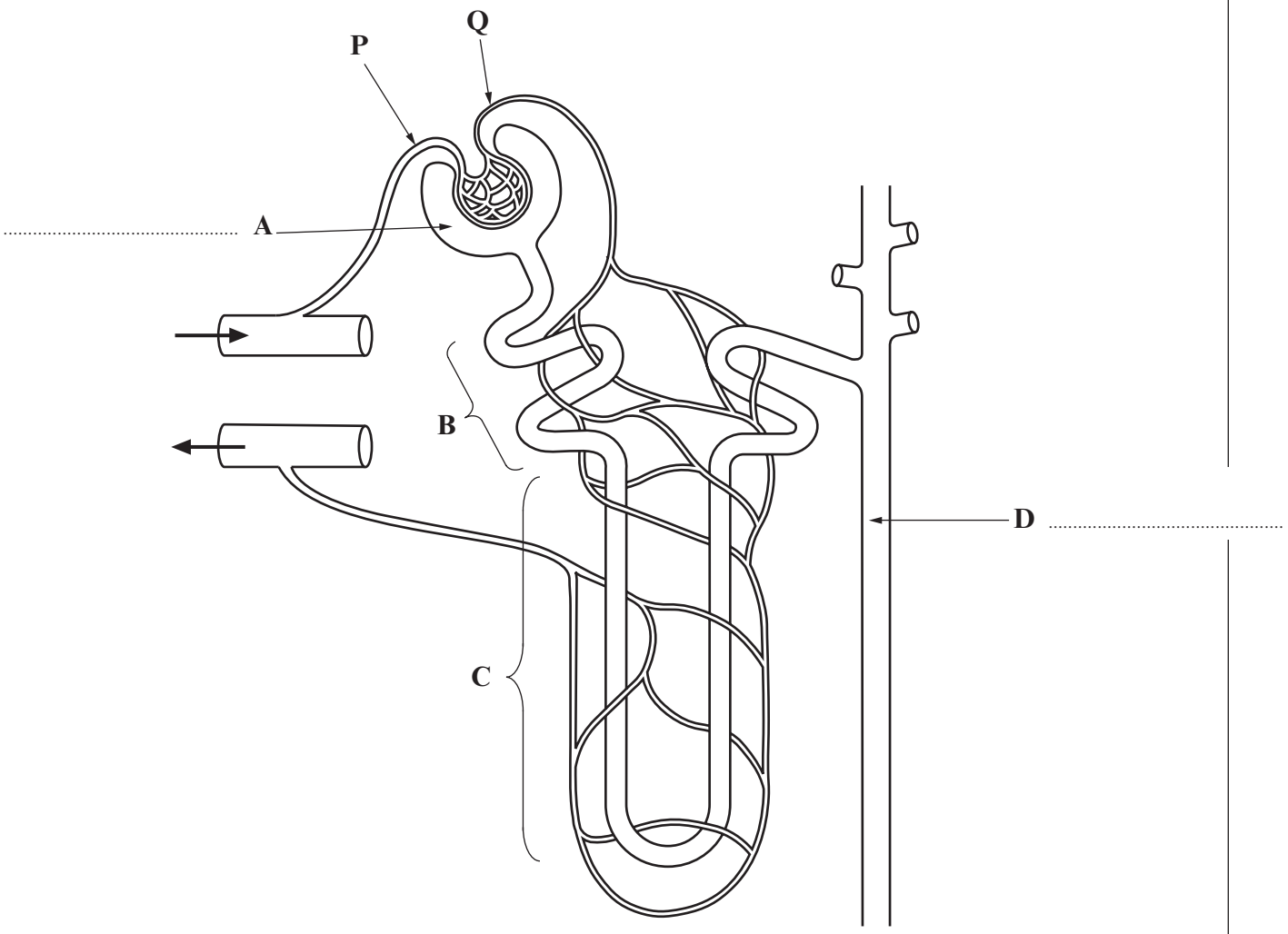
6. *(a)* The diagram below shows a kidney tubule.



(i) Label parts **A** and **D**. [2]

(ii) Explain the advantage of part **P** being wider in diameter than part **Q**. [2]

.....

.....

.....

(iii) Name the liquid found in part **D**. [1]

.....

(iv) Explain why protein is not found in part **A** of the tubule in a healthy kidney. [1]

.....

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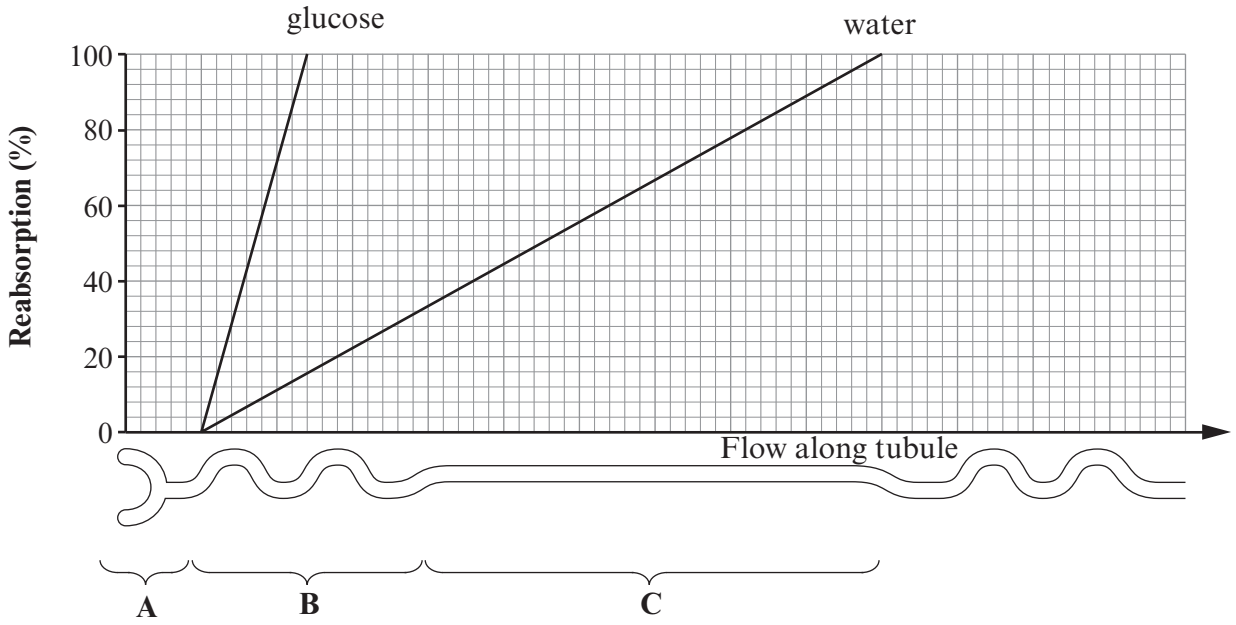
(b) The graph below shows the changes in composition of the liquid as it flows along the tubule.
The diagram below the graph shows a kidney tubule that has been straightened.



Using the graph and diagram. Write letters, **A**, **B** or **C** in the following table to show in which parts of the tubule each process takes place. [2]

Process	Part of tubule (**A**, **B** or **C**)
Most selective reabsorption of glucose.	
Most water reabsorption.	

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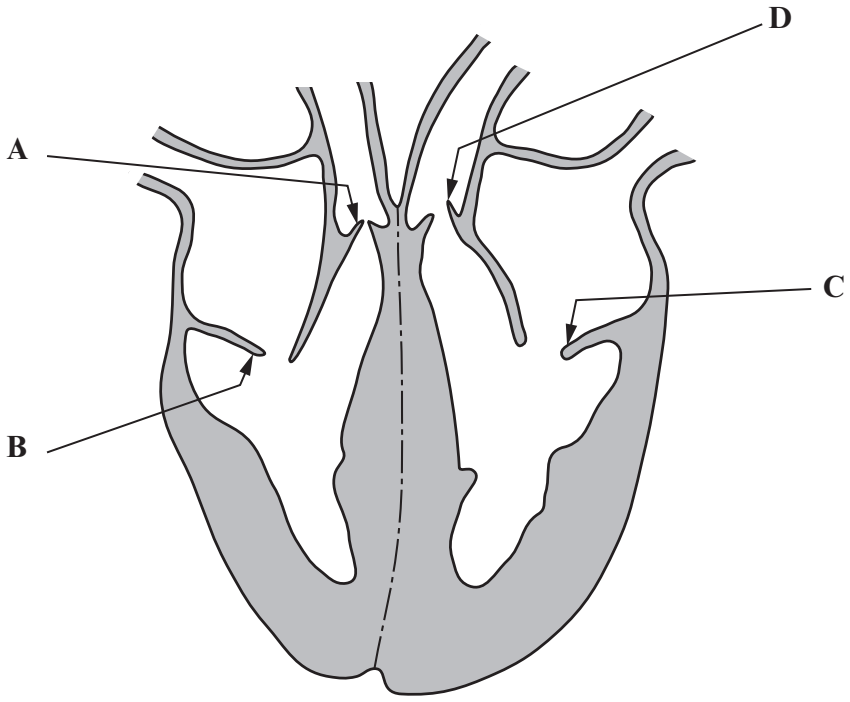
7. The diagram below shows a section through the heart with its valves labelled **A**, **B**, **C** and **D**.



(a) On the diagram label:

(i) the pulmonary vein; [1]

(ii) the vena cava. [1]

(b) On the diagram, draw arrows to show the direction of blood flow in the pulmonary artery and the aorta. [2]

(c) Underline the correct statement in (i) and (ii) below.

(i) When the pressure in the ventricles is highest the valves: [1]

I. **A** and **D** are open and **B** and **C** are closed;

II. **A** and **B** are open and **D** and **C** are closed;

III. **B** and **C** are open and **A** and **D** are closed;

IV. **C** and **D** are open and **A** and **B** are closed.

(ii) When the pressure in the ventricles is lowest the valves: [1]

I. **A** and **B** are closed and **D** and **C** are open;

II. **B** and **C** are closed and **A** and **D** are open;

III. **A** and **D** are closed and **B** and **C** are open;

IV. **C** and **D** are closed and **A** and **B** are open.

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Examiner only

8. In the 20th century it was believed that the virus that caused squirrel pox killed **all** red squirrels that became infected.
In 2008 new evidence suggested that the red squirrel was becoming immune to the virus.

(a) 500 red squirrels were examined. It was found that 8 had been infected by the virus but were not killed by it.
The eight surviving squirrels were infected by the virus. What evidence did the scientists look for in the blood to prove this? [1]

.....

.....

(b) (i) What name do we give to the protein in the virus that triggered (started) the immune response? [1]

.....

(ii) Name the type of cells in the squirrel's immune system that responded to this protein. [1]

.....

(c) Research is taking place to develop a vaccine that can be fed to red squirrels. They will develop immunity to the squirrel pox virus.
Name the cells that would have to remain in the body to produce immunity if the vaccine were to be successful. [1]

.....

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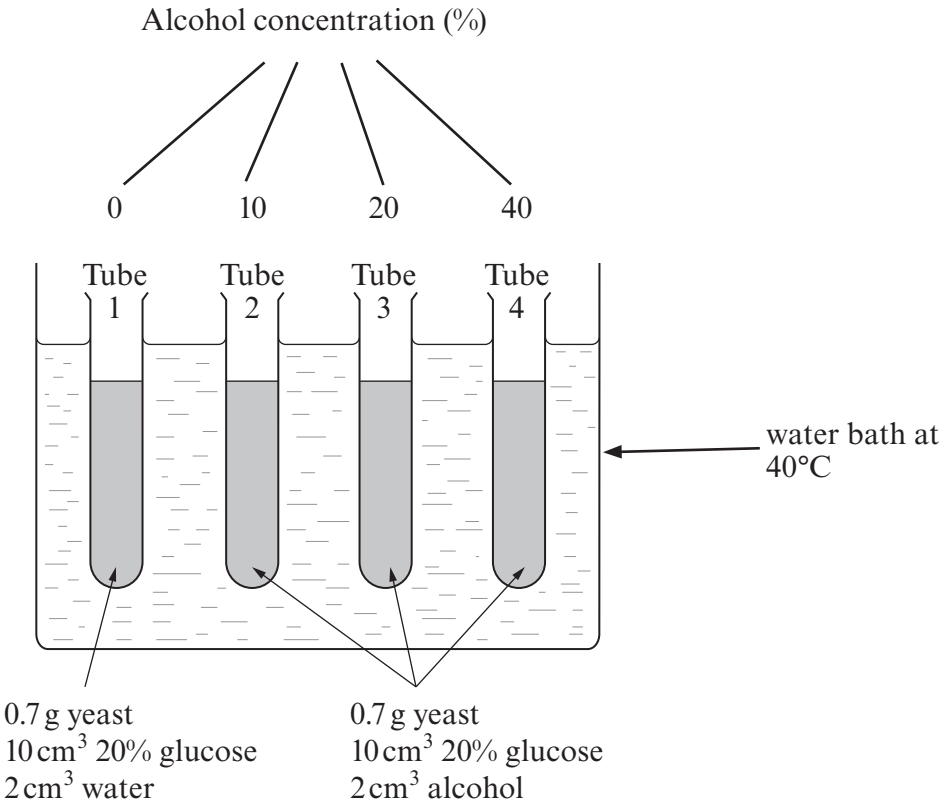
9. During fermentation, yeast uses glucose and produces carbon dioxide and alcohol.
Carbon dioxide dissolves in water to produce carbonic acid.
The effect of different concentrations of alcohol on the activity of yeast was investigated using the following apparatus.



The pH of the contents of each test tube was measured after 1 minute, then after 10 minutes.

The results are shown in the table below:

Tube	Alcohol concentration (%)	pH at start	pH at 10 min
1	0	7	4
2	10	7	5
3	20	7	6
4	40	7	7

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(a) Explain the results

(i) in tube 2; [3]

.....

.....

.....

(ii) in tube 4. [3]

.....

.....

.....

(b) What could you conclude about the effect of increasing concentrations of alcohol on yeast? [1]

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THERE ARE NO MORE QUESTIONS IN THIS EXAMINATION.

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