



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

BIOLOGY

5090/01

Paper 1 Multiple Choice

May/June 2007

1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

* 3 8 0 5 2 3 0 1 9 0 *

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

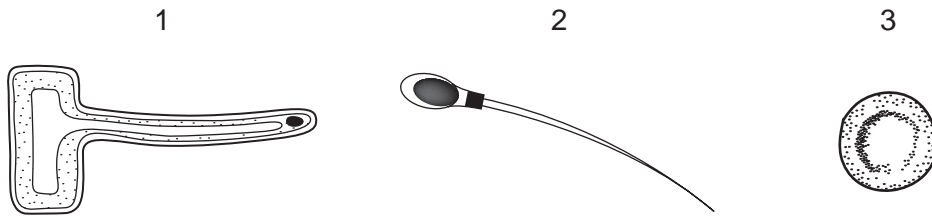
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

This document consists of **19** printed pages and **1** blank page.



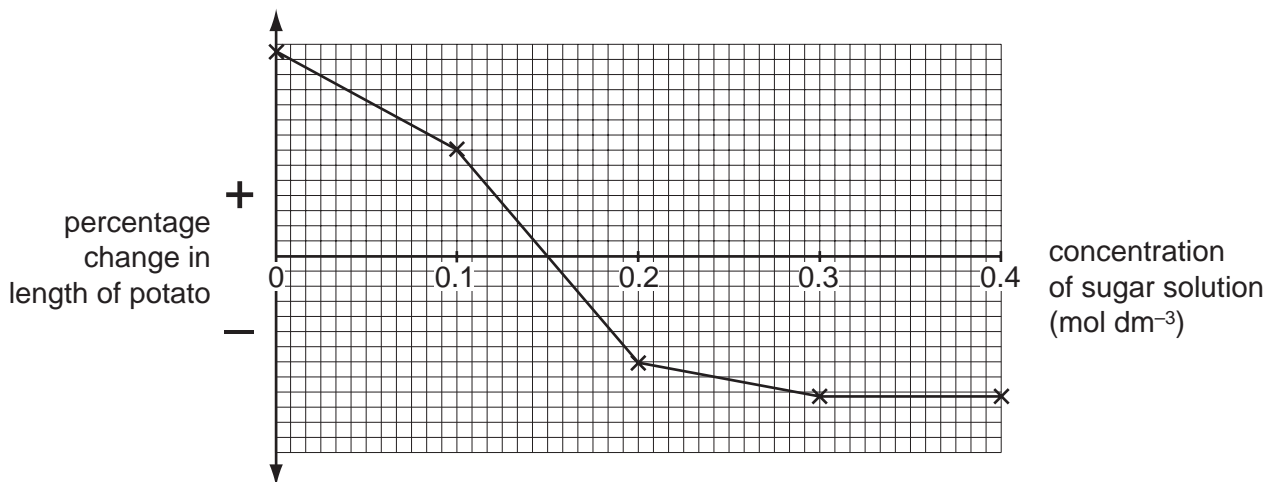
1 The diagram shows three different cells, not drawn to the same scale.



Which are animal cells?

- A** 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3
- 2 Which is an example of active transport?
- A** movement of glucose into the cells of the villi
B movement of glucose molecules down a concentration gradient
C movement of ions in blood plasma
D movement of water in the transpiration stream
- 3 Five pieces are cut from a potato, all of equal size and shape. The pieces are then placed in sugar solutions of different concentrations. After four hours, the change in length of each potato piece is measured.

The results are shown in the graph.

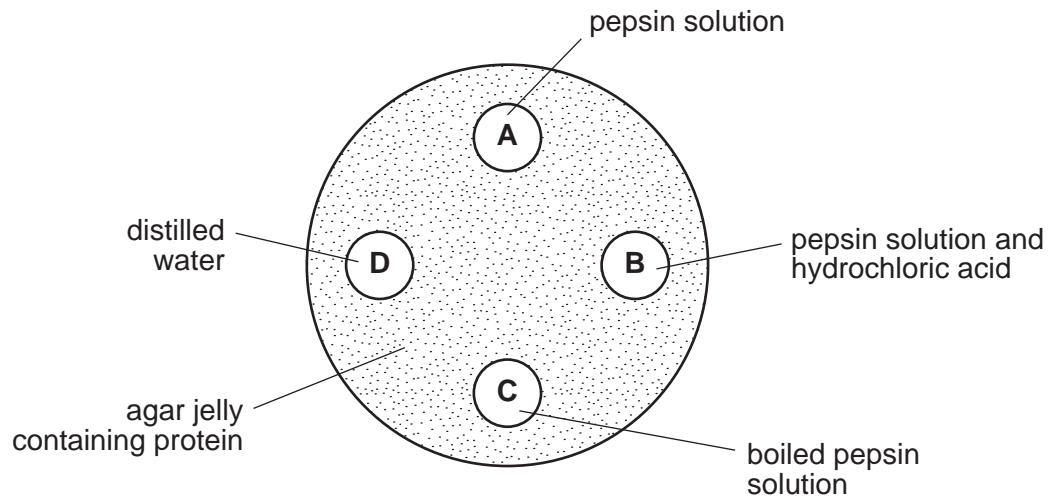


Which concentration of sugar solution has approximately the same water concentration as the potato?

- A** 0.00 mol dm³
B 0.15 mol dm³
C 0.30 mol dm³
D 0.40 mol dm³

- 4 A dish is filled with agar jelly containing protein. Four holes are cut in the jelly and each hole is filled as shown. Pepsin is a protease found in the stomach.

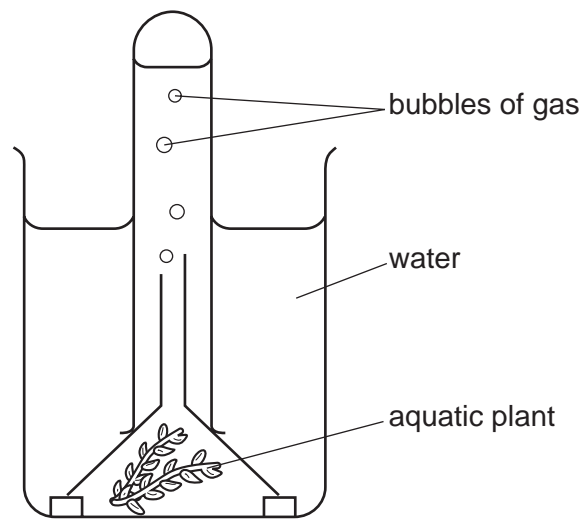
After 30 minutes, which hole will be surrounded by the largest area without protein?



- 5 What is due to the lack of magnesium ions in plant leaves?

- A all leaves very dark green
- B leaves yellow between the veins
- C wilting of the leaves
- D young leaves become long and thin

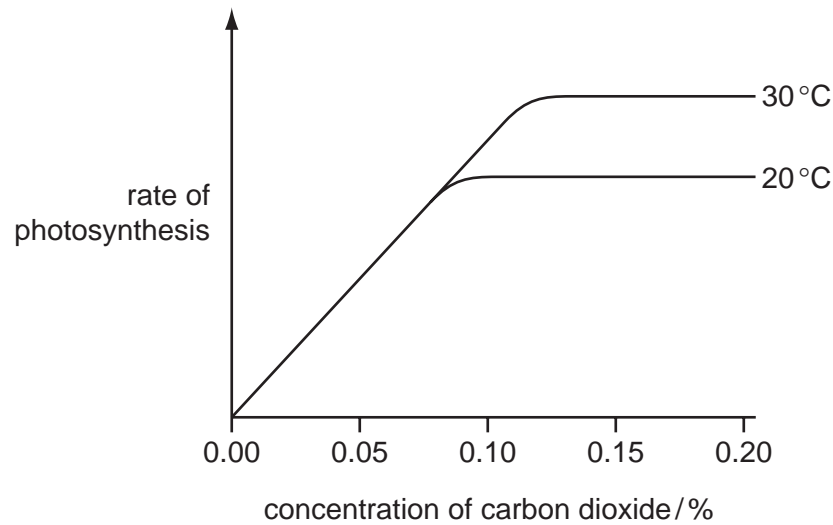
- 6 The diagram shows an experiment to investigate the volume of gas produced by an aquatic plant under different conditions of light intensity and temperature.



Which conditions result in the greatest production of gas by the plant?

| | light intensity | temperature / °C |
|----------|-----------------|------------------|
| A | high | 5 |
| B | low | 5 |
| C | high | 25 |
| D | low | 25 |

- 7 The graph shows the rate of photosynthesis in a plant in full sunlight at two different temperatures and different concentrations of carbon dioxide.



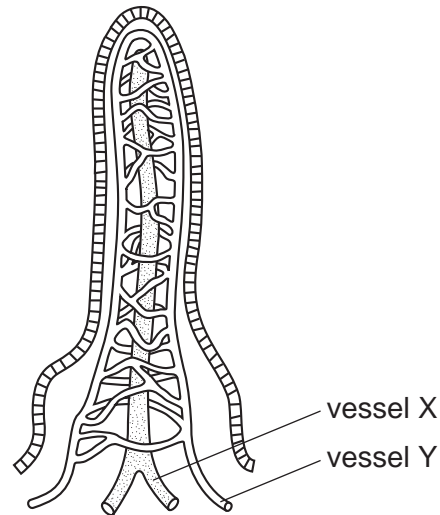
At normal atmospheric carbon dioxide concentrations, the rate of photosynthesis

- A is limited by carbon dioxide.
 - B is limited by light.
 - C is limited by temperature.
 - D is not limited.
- 8 The symptoms of a disease include weakness, fatigue, aching and swollen joints, bruise-like spots round the hair follicles and swollen and soft gums.

How may this disease be treated successfully?

- A liver as a source of iron
- B milk as a source of calcium
- C oily fish as a source of vitamin D
- D oranges as a source of vitamin C

9 The diagram shows a villus.



After a meal containing starch and oil, which substances are absorbed mainly into vessel X and which substances are absorbed mainly into vessel Y?

| | vessel X | vessel Y |
|----------|--------------------------|--------------------------|
| A | amino acids | water |
| B | fatty acids and glycerol | glucose |
| C | glucose | amino acids |
| D | water | fatty acids and glycerol |

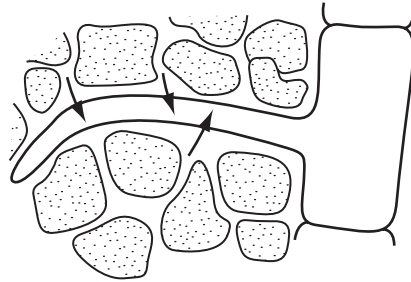
10 Only two of the following statements accurately describe what happens in the mouth.

- 1 Amylase breaks down large starch molecules into smaller maltose molecules.
- 2 Chewing increases the surface area of food for digestion.
- 3 Saliva emulsifies fats into smaller droplets.
- 4 Teeth break up large insoluble molecules into smaller soluble molecules.

Which statements are correct?

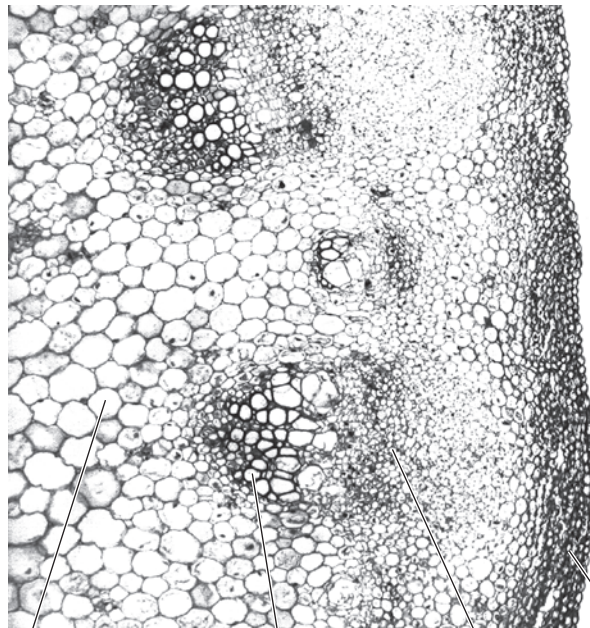
- A** 1 and 2 **B** 2 and 3 **C** 3 and 4 **D** 1 and 4

- 11 The diagram shows a root hair absorbing ions from the surrounding soil.



What will assist the uptake of ions by the root hair?

- A a higher concentration of ions in the root hair than in the soil
 - B a low temperature in the surrounding soil
 - C rapid uptake of water from the soil by osmosis
 - D the large surface area of the root hair
- 12 The photograph shows a cross-section of part of a sunflower stem under the microscope.
- Which tissue transports water and mineral salts?

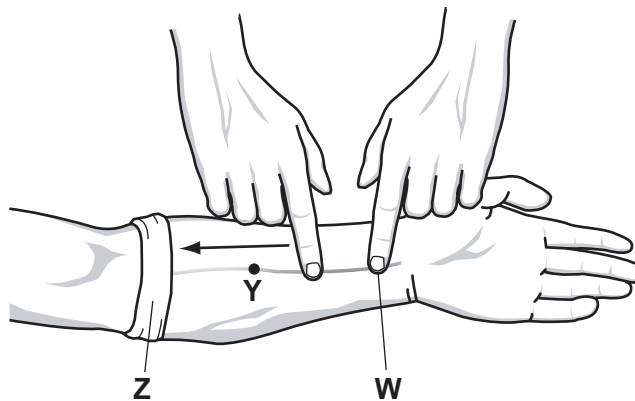


D C B A

13 Which description correctly applies to blood in the pulmonary circulation?

| | pulmonary artery | pulmonary vein |
|----------|------------------|----------------|
| A | deoxygenated | high pressure |
| B | deoxygenated | low pressure |
| C | oxygenated | high pressure |
| D | oxygenated | low pressure |

14 The diagram shows the investigation of blood flow in the veins of the lower arm.



A cloth is tightly wrapped round the arm at point **Z** and the veins stand out clearly. One finger presses on the vein at **W**.

When another finger strokes the vein, as shown in the diagram, the vein lies flat between points **W** and **Y**.

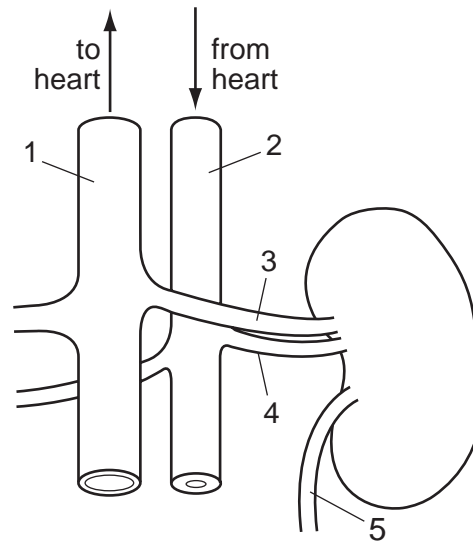
Some possible explanations are listed.

- 1 The bandage at **Z** prevents backflow of blood.
- 2 The finger pressed at **W** prevents more blood entering the vein.
- 3 A valve at **Y** prevents backflow.
- 4 A valve at **Z** prevents more blood from entering the vein.

Which explanations of the vein lying flat are correct?

- A** 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

15 The diagram shows a kidney and its associated vessels.



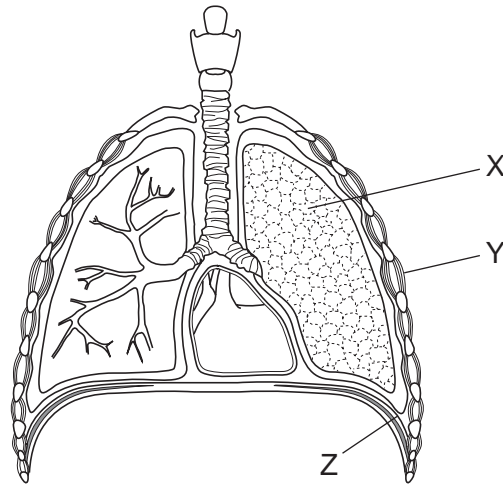
Which structures have the **most** and **least** urea concentrations?

| | most | least |
|----------|------|-------|
| A | 1 | 2 |
| B | 4 | 1 |
| C | 4 | 3 |
| D | 5 | 3 |

16 Which process does **not** depend on respiration?

- A** active uptake of ions
- B** conduction of nervous impulses
- C** diffusion of glucose
- D** muscle contraction

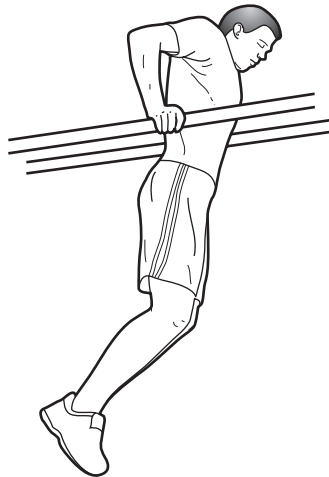
17 The diagram shows the lungs.



Which structures contain muscles that contract when breathing in?

- A X only
 - B X and Y only
 - C Y and Z only
 - D X, Y and Z
- 18 Which feature of alveoli decreases the distance over which oxygen and carbon dioxide molecules diffuse?
- A Each alveolus has a large blood supply.
 - B Each alveolus is only 0.1-0.2mm in diameter.
 - C There are approximately 150 million alveoli in each lung.
 - D The walls of the alveoli are only one cell thick.

19 The diagrams show an athlete holding a 'dipped' position.



What are the actions of the biceps and the triceps while holding this position?

| | action of the biceps | action of the triceps |
|----------|----------------------|-----------------------|
| A | contracted | contracted |
| B | contracted | relaxed |
| C | relaxed | contracted |
| D | relaxed | relaxed |

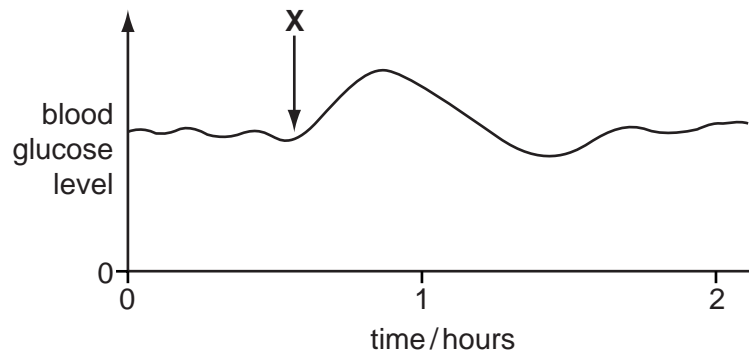
20 What is an example of excretion?

- A** release of adrenalin from the adrenal glands
- B** release of sweat from the sweat glands
- C** removal of carbon dioxide from the lungs
- D** removal of faeces from the alimentary canal

21 Which response to a drop in body temperature does **not** involve muscle contraction?

- A** blood vessels narrowing
- B** hairs standing up
- C** shivering
- D** reduced sweating

22 The graph shows changes in the glucose concentration in the blood of a person during two hours.



What explains the shape of the graph after **X**?

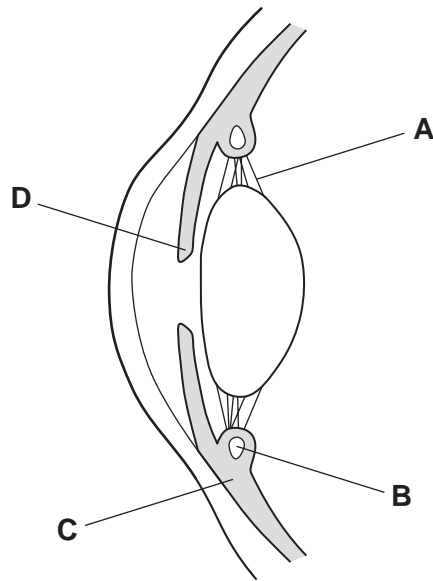
- A The person has eaten a sugary food.
- B The person has had an insulin injection.
- C The person is suffering from diabetes mellitus.
- D The person starts some physical exercise.

23 In a reflex action, after the hand touches a hot object, what is the role of the brain?

| | receives information | initiates the withdrawal response |
|----------|----------------------|-----------------------------------|
| A | ✓ | ✓ |
| B | ✓ | x |
| C | x | ✓ |
| D | x | x |

24 The diagram shows a section through a human eye.

Which structure contains the muscles which contract to produce a focused image on the retina?



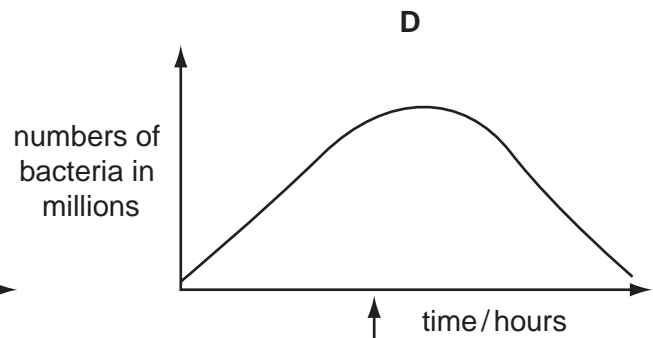
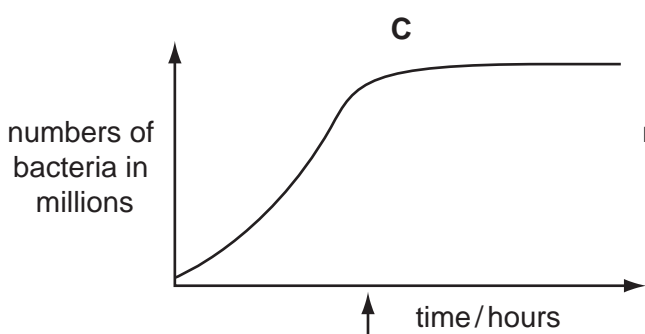
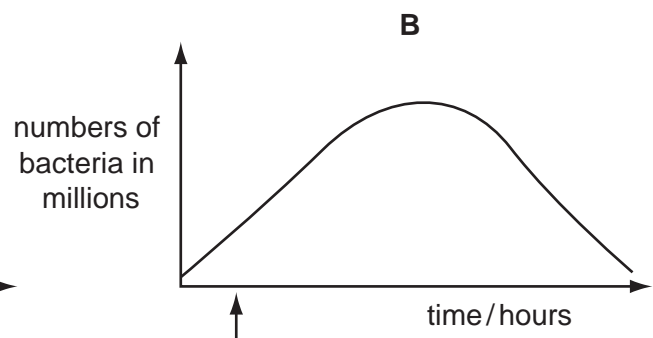
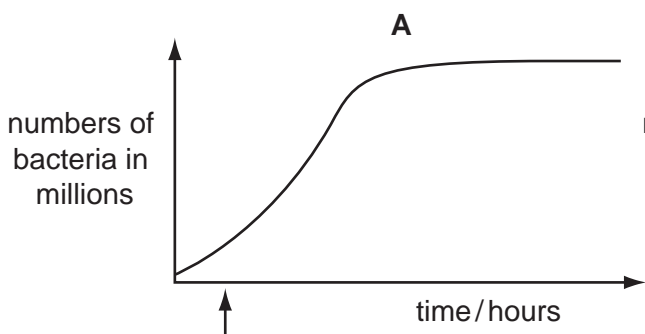
25 A student was investigating the growth of a culture of bacteria in flasks of nutrient broth.

Four substances were tested as possible antibiotics to be used against this bacterium. They were added at different times.

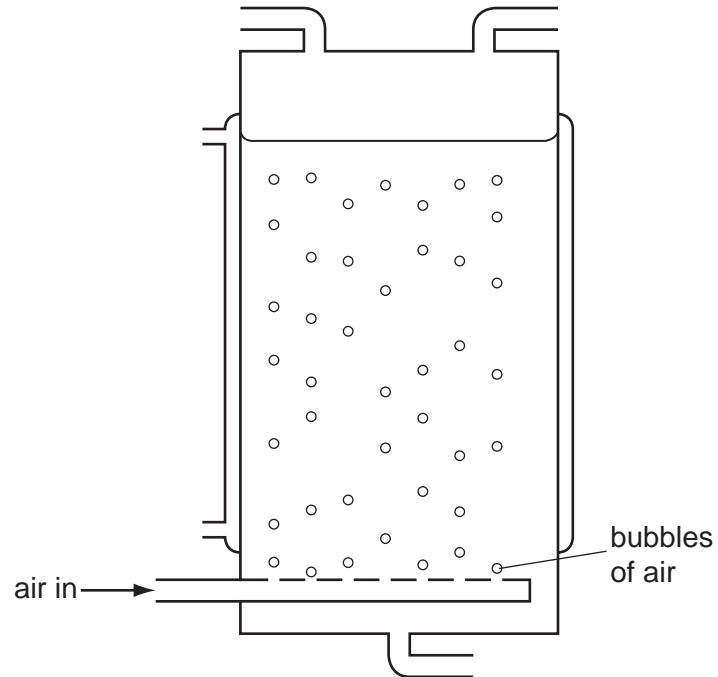
Which substance is most likely to be effective against the bacterium?

key

↑ time at which substance is added



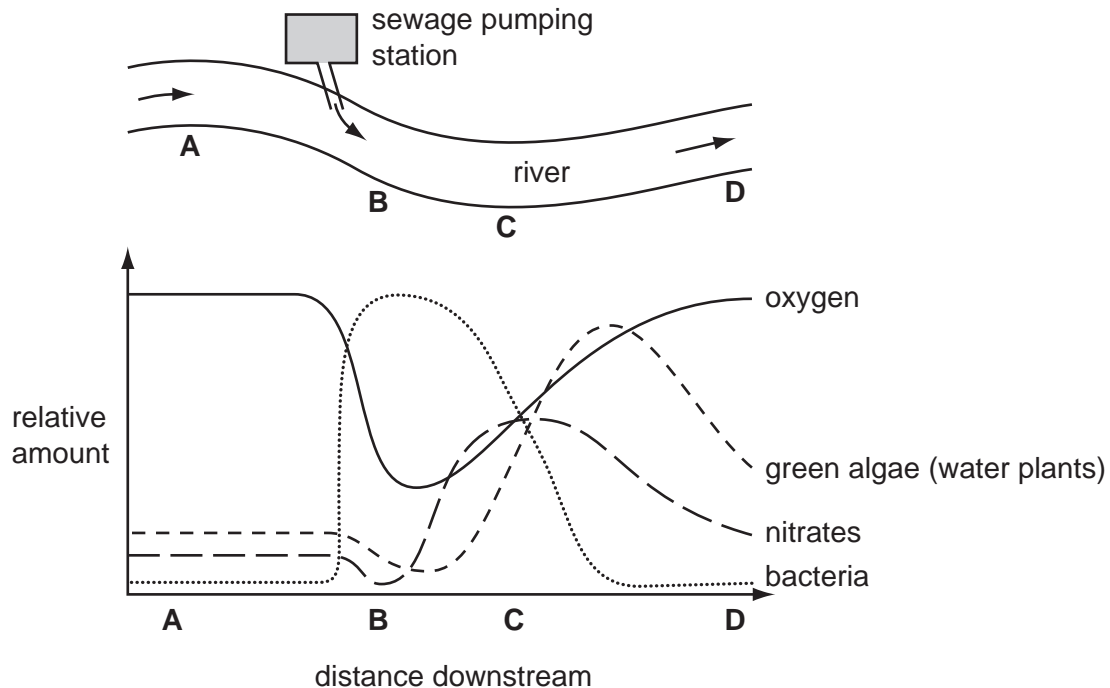
26 The diagram shows a fermenter used to produce penicillin.



Why is air pumped into the fermenter?

| | to mix culture | to provide O ₂ | |
|----------|----------------|---------------------------|---------|
| A | ✓ | ✓ | key |
| B | ✓ | ✗ | ✓ = yes |
| C | ✗ | ✓ | ✗ = no |
| D | ✗ | ✗ | |

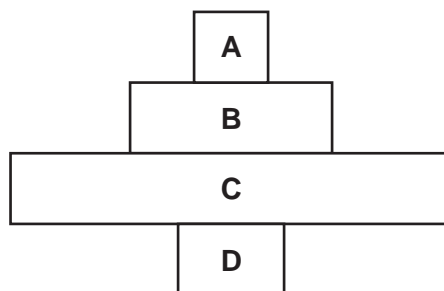
- 27 The diagram shows part of a river into which sewage is being pumped. Some of the effects of adding sewage to the river are shown in the graph. At which point in the river are **decomposers** most active?



- 28 Which statement correctly describes factors that are passed on in an ecosystem?
- A Carbohydrates are passed from decomposers to producers.
 - B Energy is passed from secondary consumers to primary consumers.
 - C Proteins are passed from primary consumers to producers.
 - D Water is passed from respiring decomposers to producers.

- 29 The diagram shows a pyramid of numbers in an ecosystem.

In which group of organisms are the individuals largest?



30 In the nitrogen cycle, which conversion processes can be carried out by animals, by bacteria and by plants?

| | animals | bacteria | plants |
|----------|------------------------|-------------------------|-------------------------|
| A | nitrate to amino acids | protein to nitrogen gas | nitrite to nitrate |
| B | urea to protein | nitrogen gas to ammonia | amino acids to proteins |
| C | protein to urea | nitrite to nitrate | nitrate to amino acids |
| D | urea to ammonia | urea to protein | protein to nitrogen gas |

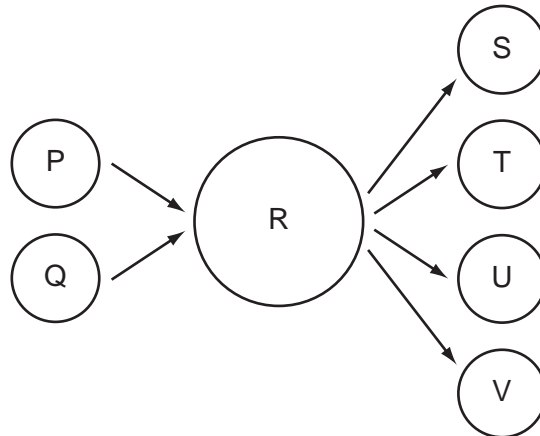
31 Which stages of the life cycle of the malarial vector live in water?

| | larva | pupa | adult |
|----------|-------|------|-------|
| A | ✓ | ✓ | ✓ |
| B | ✓ | ✓ | x |
| C | ✓ | x | x |
| D | x | x | x |

32 Why is it important to control the amount of nitrate fertiliser used on farm land?

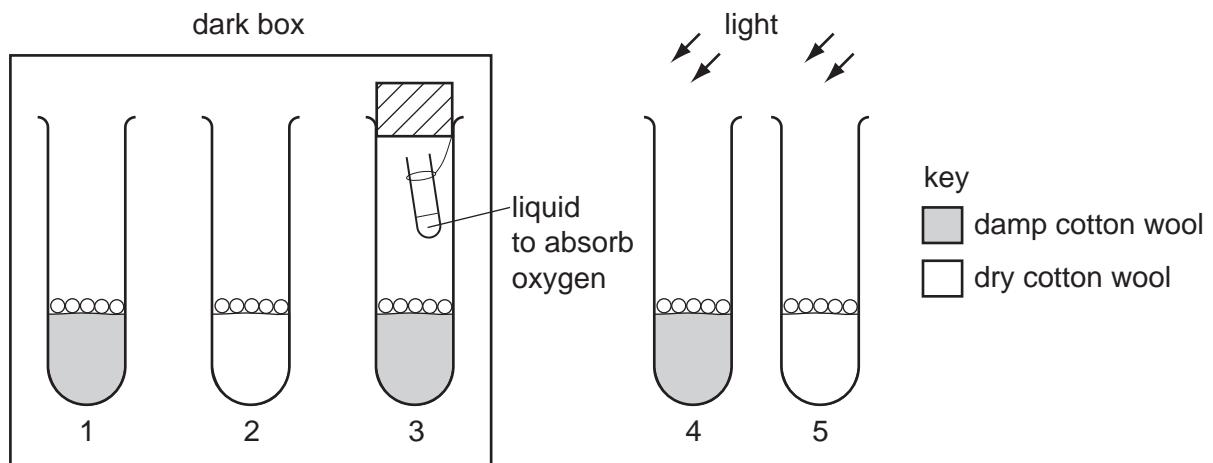
- A** Nitrate causes acid rain which kills trees and fish.
- B** Nitrate decreases the fertility of the soil.
- C** Nitrate may lead to excessive growth of water plants.
- D** Nitrate poisons many kinds of crop plants.

- 33 The diagram represents gametes P and Q fusing to give cell R. Cell R then produces gametes S, T, U and V.



Which statement about the numbers of chromosomes in the cells and gametes is correct?

- A** The numbers of chromosomes in P and Q are different.
B The numbers of chromosomes in P and S are the same.
C The number of chromosomes in S is one quarter of the number of chromosomes in R.
D The number of chromosomes in T is half the number of chromosomes in Q.
- 34 In the experiment shown, each test tube contains mustard seeds on cotton wool.

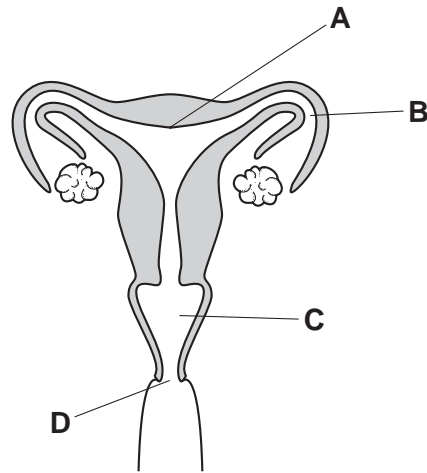


Which two test tubes should be compared to discover whether light is needed for germination of these seeds?

- A** 1 and 4 **B** 2 and 4 **C** 3 and 5 **D** 4 and 5

35 This diagram shows the reproductive system of a human female.

Where does fertilisation take place?



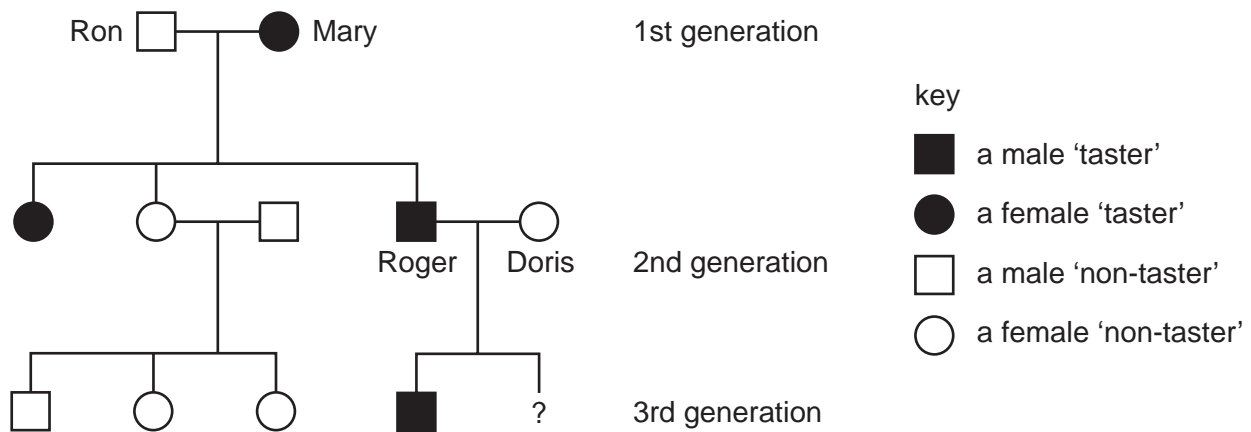
36 The table shows the average pregnancy rates amongst couples using different methods of contraception.

| contraception method | average number of pregnancies per 1000 couples per year |
|----------------------|---|
| condom | 55 |
| contraceptive pill | 4 |
| rhythm method | 125 |
| spermicide | 80 |

Which type of contraception is the least reliable?

- A chemical
- B hormonal
- C mechanical
- D natural

- 37 Below is a family tree showing the inheritance of the ability to taste a certain substance. The allele for the ability to taste this substance is dominant to the allele for the inability to taste it.



What is the probability of the second child of Roger and Doris being a 'non-taster'?

- A** 0.25 **B** 0.34 **C** 0.5 **D** 1.00
- 38 In rabbits the allele for black hair is dominant. A heterozygous black-haired rabbit is crossed with a heterozygous black-haired rabbit.
- Which phenotypic ratio would result?
- A** 1:1 **B** 1:2:1 **C** 3:1 **D** all similar
- 39 A farmer saves the seeds from his best maize crop plants to sow for next year's crop.
- This is an example of
- A** artificial selection.
B genetic engineering.
C natural selection.
D variation.
- 40 Two heterozygotes are crossed. Some of the offspring show the recessive characteristic.
- What is the probability that the offspring that show the recessive characteristic are homozygous?
- A** 0.00 **B** 0.25 **C** 0.50 **D** 1.00

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