| Class | Register Number | Name |
|---|---|---|
| | | |

南洋女子中学校

# NANYANG GIRLS' HIGH SCHOOL

## End-of-Year Examination 2014
## Secondary Three

**BIOLOGY** **45 minutes**

**Paper 1** Multiple Choice **0800 – 0845**

**Tuesday** **30 September 2014**

Additional materials: Multiple Choice Answer Sheet

**READ THESE INSTRUCTIONS FIRST**

**Do not open this booklet until you are told to do so.**

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, class and register number on the Multiple Choice Answer Sheet provided.

There are **thirty** questions in 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 answer sheet.

**INFORMATION FOR CANDIDATES**

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.

**1** Which correctly shows the relative size of a eukaryotic cell, a virus and a prokaryotic cell?

| | Eukaryotic cell | Virus | Prokaryotic cell |
|---|---|---|---|
| **A** | 100 | 1 | 1 |
| **B** | 100 | 1 | 10 |
| **C** | 100 | 10 | 1 |
| **D** | 100 | 10 | 10 |

**2** What is/are the advantage(s) of using an electron microscope?

I. very high resolution
II. very high magnification
III. the possibility of examining living material

**A** I only
**B** I and II only
**C** II and III only
**D** I, II and III

**3** What is the correct sequence of events during exocytosis?

I. formation of a vesicle by the Golgi apparatus
II. secretion of the vesicle's contents
III. fusion of the vesicle with the plasma membrane
IV. movement of the vesicle towards the plasma membrane

**A** I, II, III, IV
**B** IV, I, II, III
**C** I, IV, III, II
**D** IV, III, II, I

**4** When mitochondria are extracted from cells for study, they are usually kept in a 0.25 mol $dm^{-3}$ sucrose solution.

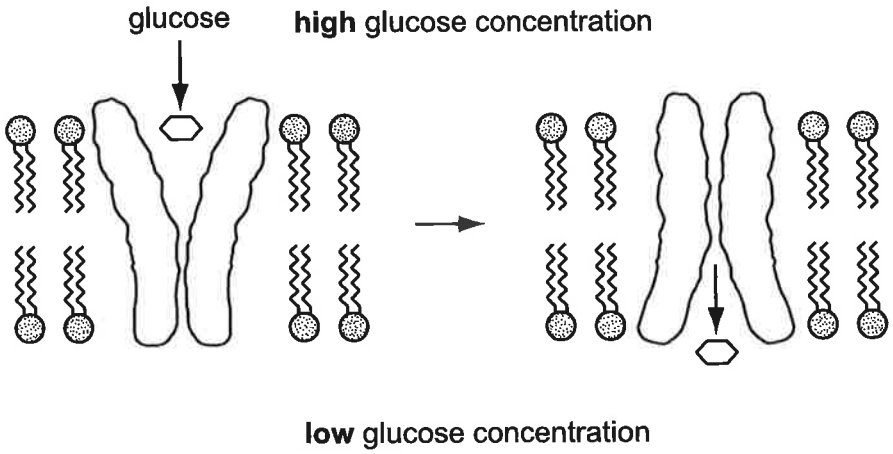
Why is the sucrose solution used?

**A** to act as a solvent
**B** to provide a source of energy
**C** to prevent the mitochondria from changing in structure
**D** to enable the rate of respiration of the mitochondria to be determined

**5** What will happen as a cell grows larger?

**A** the surface area to volume ratio increases
**B** the metabolic rate of the cell increases
**C** heat exchange becomes more efficient
**D** materials are not absorbed quickly enough for the cell's needs

**6** The diagram represents stages in glucose uptake through a cell surface membrane.

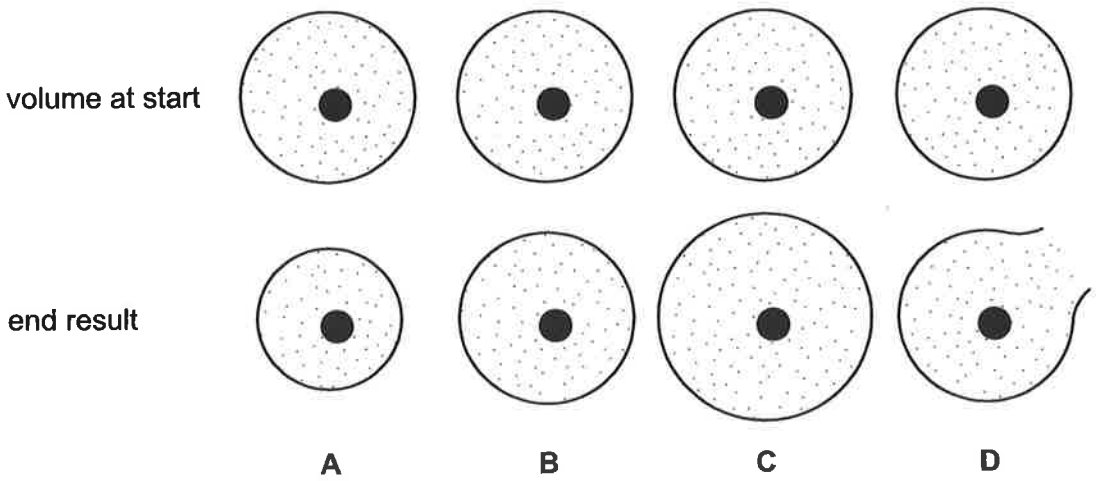



Which process is shown?

**A** osmosis
**B** active transport
**C** facilitated transport
**D** simple diffusion

**7** Identical animal cells were placed in solutions of differing water potentials. The diagram shows the volume of the cells at the start and the end result.

Which cell was placed in the solution with the lowest (most negative) water potential?




**8** What is produced when starch is completely broken down?

**A** glucose
**B** maltose
**C** amino acids
**D** glycerol

**9** Three pure substances **X, Y and Z** are analysed. The table shows the elements that each contains. + indicates that the element is present while -- indicates an absence of the element.

| | C | H | O | N | P | S |
|---|---|---|---|---|---|---|
| X | + | + | + | -- | -- | -- |
| Y | + | + | + | -- | -- | -- |
| Z | + | + | + | + | -- | + |

Key:

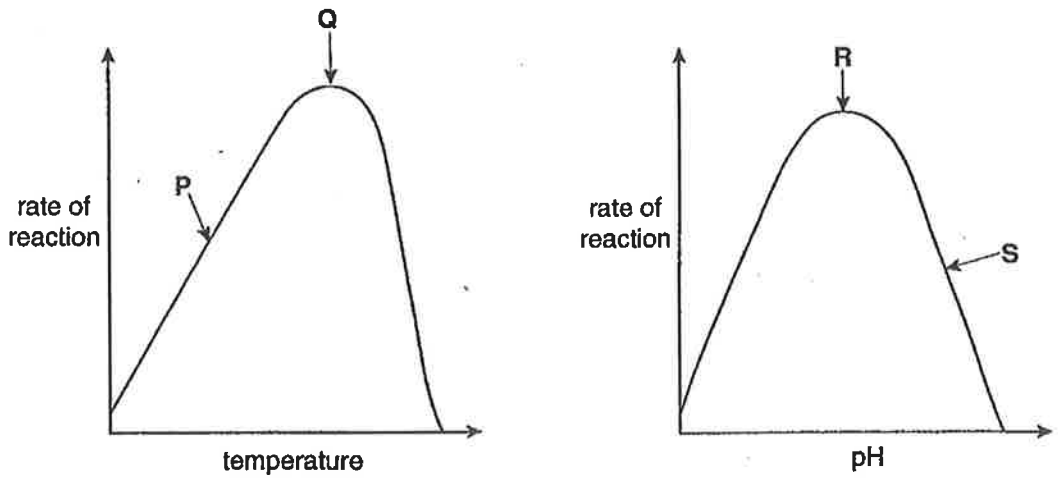
+ present

-- absent

Which combination could be correct?

| | X | Y | Z |
|---|---|---|---|
| **A** | nucleic acid | carbohydrate | fat |
| **B** | nucleic acid | fat | amino acid |
| **C** | amino acid | fat | carbohydrate |
| **D** | fat | carbohydrate | amino acid |

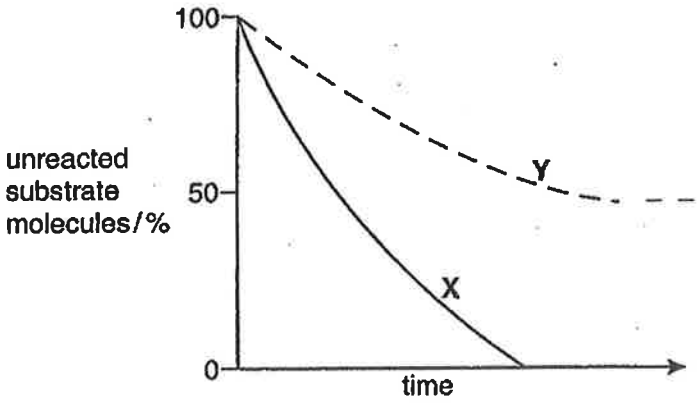
**10** The graphs show the effects of temperature and pH on enzyme activity.




Which statement is a correct explanation of the rate of reaction at the point shown?

**A** At P, concentration of enzyme substrate complexes is the highest.
**B** At Q, the kinetic energy of the enzyme and substrate is highest.
**C** At R, concentration of enzyme substrate complexes is the lowest.
**D** At S, bonds holding the three dimension structure of the enzyme are broken

**11**




Graph **X** represents the course of an enzyme-catalysed reaction under optimum conditions.

Graph **Y** shows the action of the same enzyme on the same substrate but with one alteration to the reaction conditions.

What contributes to graph Y?

**A** increase enzyme concentration
**B** decrease in pH
**C** increase substrate concentration
**D** decrease enzyme concentration

**12** 5% starch solution was each added to different solutions.

After 5 minutes at room temperature, the solutions were tested with iodine solution and the depth of colour was recorded using a colorimeter (with an arbitrary scale of 1 to 5, 5 being the darkest blue).

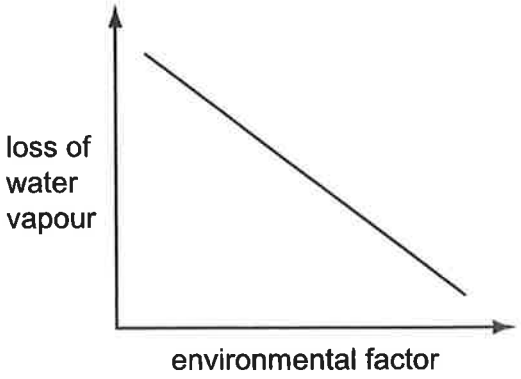
The results are given in the table.

| solution | colorimeter reading |
|---|---|
| 1. saliva and dilute hydrochloric acid | 4 |
| 2. saliva and dilute hydrogencarbonate | 1 |
| 3. dilute hydrochloric acid only | 4 |
| 4. saliva at 100°C | 5 |
| 5. saliva at 20°C | 3 |

What does the experiment likely suggest?

**A** saliva contains a substance that hydrolyses starch in acid conditions
**B** saliva contains a substance that is denatured by the dilute hydrochloric acid
**C** saliva contains a substance that is promoted in its action by high temperatures
**D** saliva contains a substance that may be activated by hydrogencarbonate ions

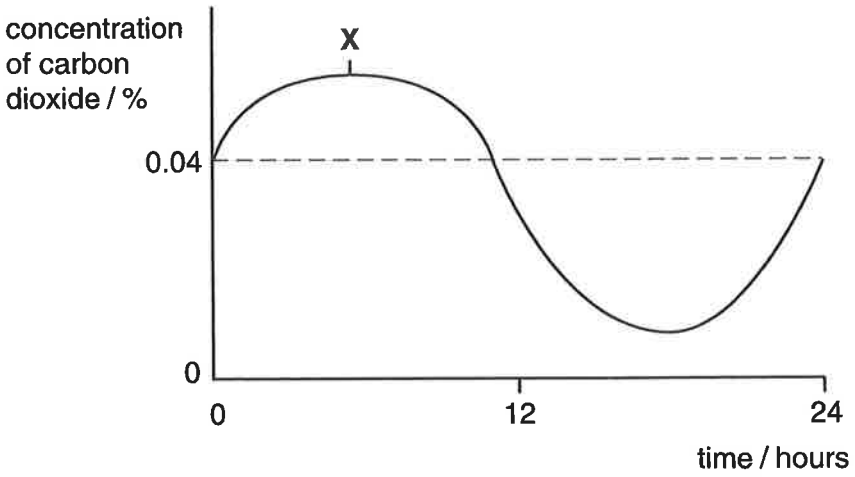
**13** The graph shows the relationship between the loss of water vapour through stomata and an environmental factor.




What is the environmental factor?

**A** air temperature
**B** wind velocity
**C** light intensity
**D** atmospheric humidity

**14** The graph shows the concentration of carbon dioxide in the air surrounding a plant measured over 24 hours.

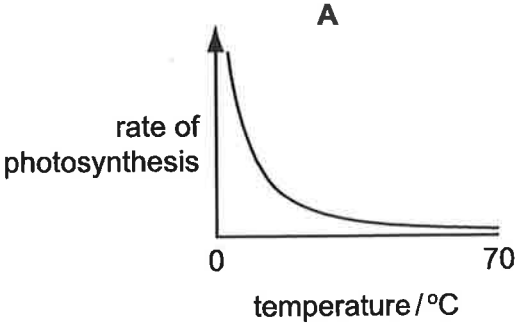



Which of the following explains the carbon dioxide concentration at time **X**?

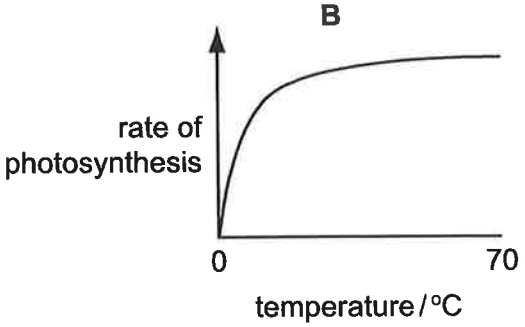
| | Light Intensity | Plant Process |
|---|---|---|
| **A** | Darkness | Respiration |
| **B** | Darkness | Transpiration |
| **C** | Daylight | Photosynthesis |
| **D** | Daylight | Respiration |

**15** Which graph shows the effect of temperature on the rate of photosynthesis?

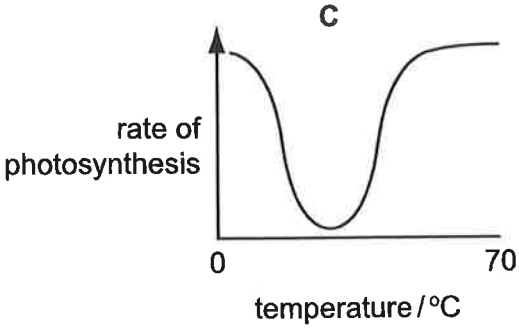
A



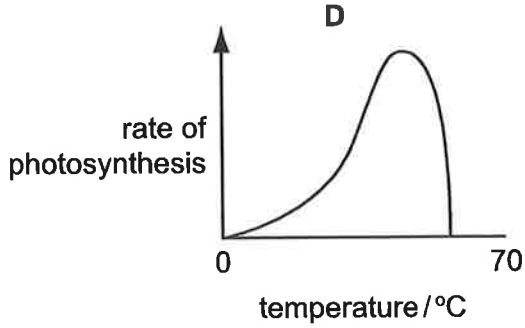

B



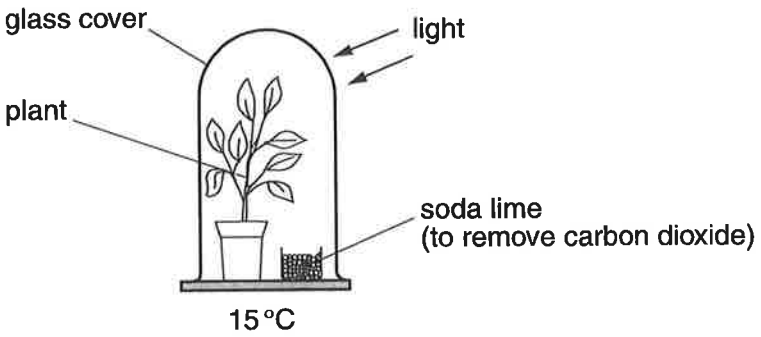

C




D

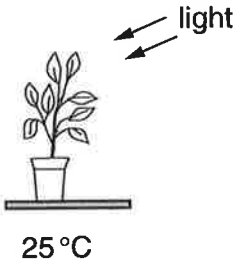



**16** The diagram shows an experiment to find out whether carbon dioxide is needed for photosynthesis.

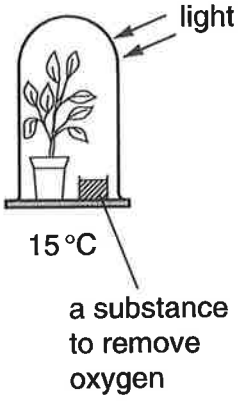



Which is the most suitable control for this experiment?

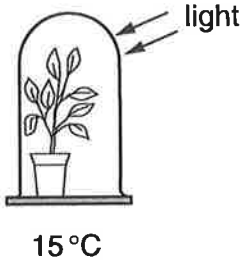
A



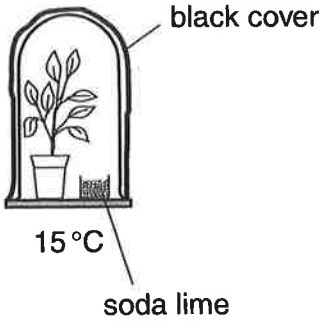

B




C




D



**17** What is responsible for the movement of water up xylem vessels in plants?

**A** active loading of water against the water potential gradient in the roots and osmosis in the vessels
**B** increasing water potential at the top of xylem vessels, and osmosis in the roots
**C** decreasing water potential at the top of the xylem vessels, with cohesion of water in the vessels
**D** translocation in the leaves, with capillarity in the xylem vessels

**18** In which part of the digestive tract is fat primarily digested?

**A** duodenum
**B** stomach
**C** gall bladder
**D** oesophagus

**19** Compound X is a protease that is activated by a low pH and is responsible for the digestion of proteins into polypeptides or peptones.

What is compound X likely to be?

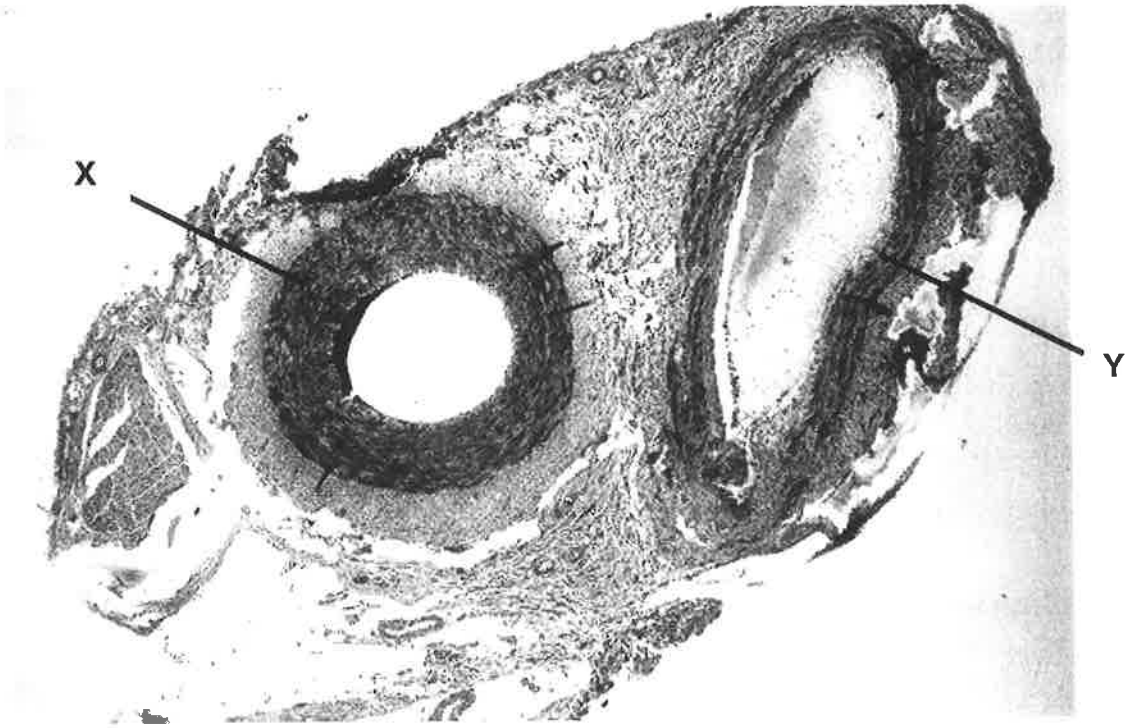
**A** pepsin
**B** maltase
**C** trypsin
**D** renin

**20** When compared to a human at rest, it was found that the uptake rate of amino acids in a human intestinal epithelial cell decreased about 50% during strenuous sporting activity.

What is a valid conclusion that can be drawn from this information alone?

**A** Absorption of amino acids relies on active transport.
**B** Diffusion is involved in the absorption of amino acids.
**C** The activity of amylase is lowered during periods of low oxygen content.
**D** As the body is continually in motion, the diffusion of amino acids across the intestinal epithelial cells is affected.

**21** The following micrograph shows two blood vessels, **X** and **Y**.




Identify **X** and **Y**.

| | X | Y |
|---|---|---|
| **A** | artery | vein |
| **B** | arteriole | artery |
| **C** | vein | artery |
| **D** | venule | vein |

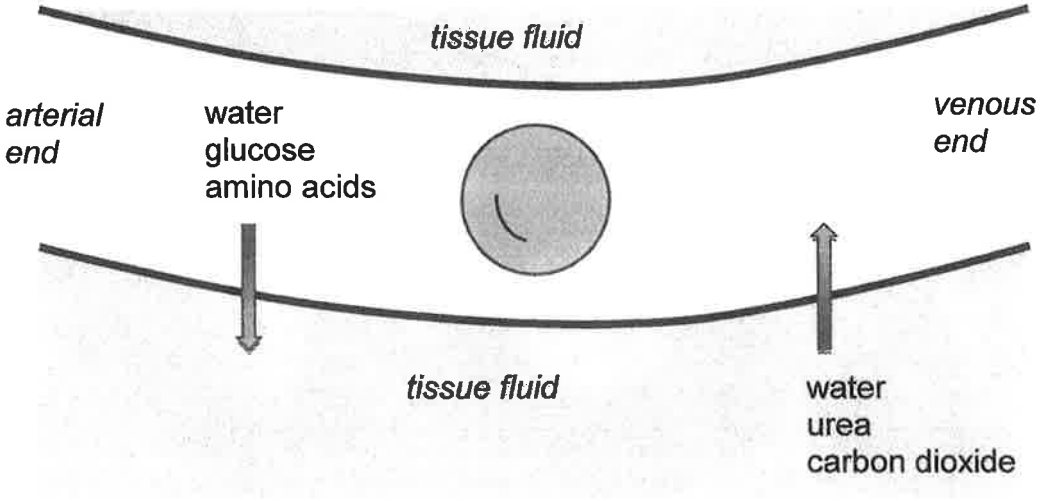
**22** The following people have their blood types shown in the table.

| Name | Blood type |
|---|---|
| Amy | AB |
| Billy | A |
| Carol | O |
| David | B |

Who is able to donate blood to whom?

| | Donor | Recipient |
|---|---|---|
| **A** | Amy | Billy |
| **B** | Billy | Amy |
| **C** | Billy | David |
| **D** | David | Carol |

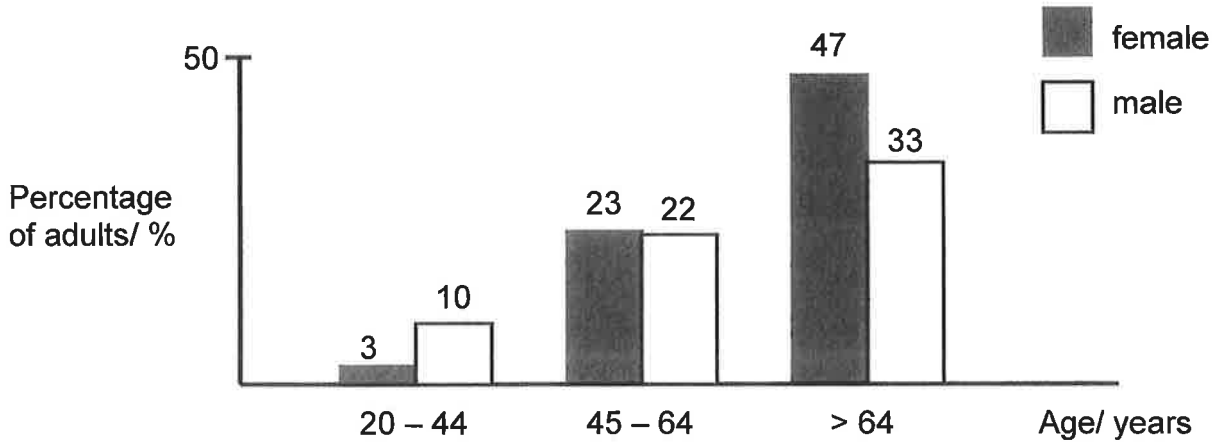
**23** The arrows on the diagram show the direction of movement of some of the substances carried in plasma as they enter and leave a capillary.




Which two factors help water to re-enter the capillary at the venous end?

| | Plasma water potential | Blood pressure in capillary |
|---|---|---|
| **A** | more negative | decreased |
| **B** | more negative | increased |
| **C** | less negative | decreased |
| **D** | less negative | increased |

**24** The chart shows the incidence of adults aged 20 and older with high blood pressure, grouped by age and gender.



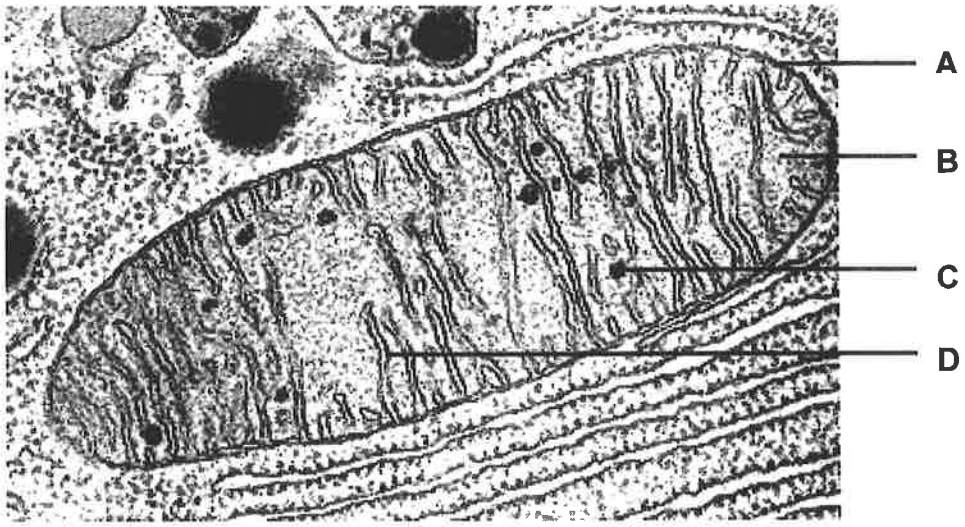

Which conclusion can be drawn from the chart?

**A** About 1 in 5 adults aged more than 64 years do not have high blood pressure.
**B** At any age, females are less likely to develop high blood pressure than males.
**C** Males aged 20 to 44 years are more active than females of the same age.
**D** More than half the adults aged 45 to 64 years have high blood pressure.

**25** Which of the following statements about blood transfusion is correct?

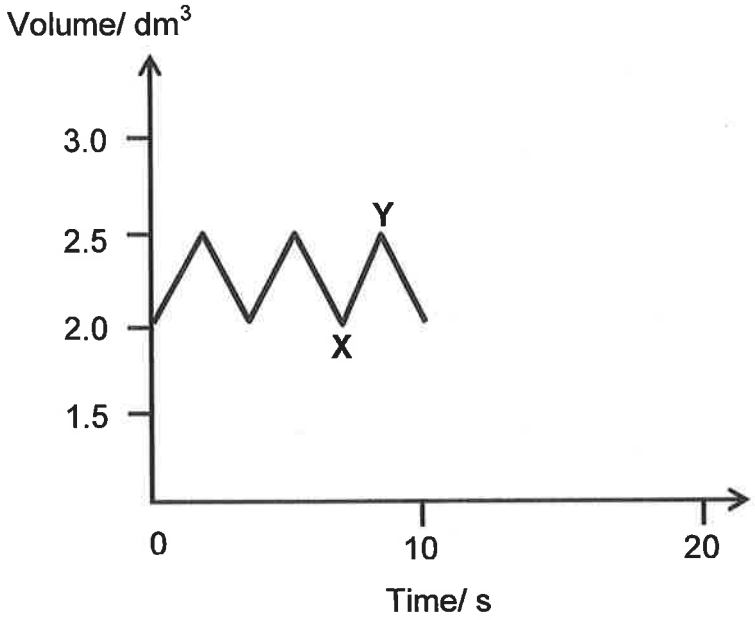
**A** Type A cannot be donated to type AB because type AB has A antigens.
**B** Type B cannot be donated to type B because of the anti-a antibodies.
**C** Type AB cannot be donated to type A because of the B antigens.
**D** Type O cannot be donated to type B because of the B-antigens.

**26** The electron micrograph shows a mitochondrion.




Where can the enzymes of the Krebs cycle be found?

**Questions 27 to 29** refer to the graph below which shows the changes in volume of lungs of a person over 10 seconds.



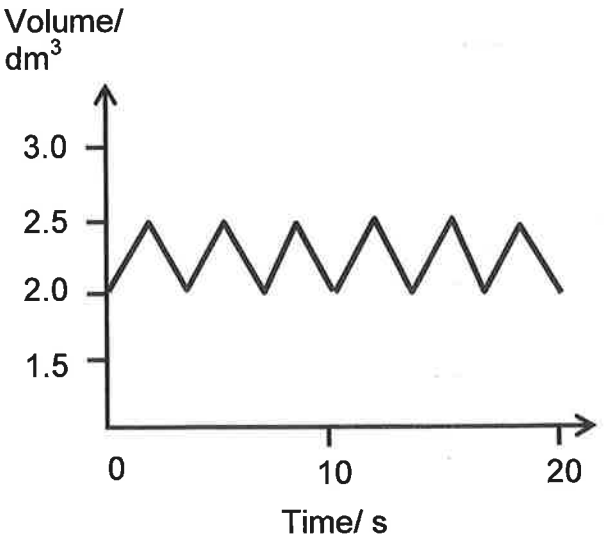

**27** What is happening at period **XY**?

| | **External intercostal muscles** | **Diaphragm** |
|---|---|---|
| **A** | Relaxed | Relaxed |
| **B** | Relaxed | Contracted |
| **C** | Contracted | Relaxed |
| **D** | Contracted | Contracted |

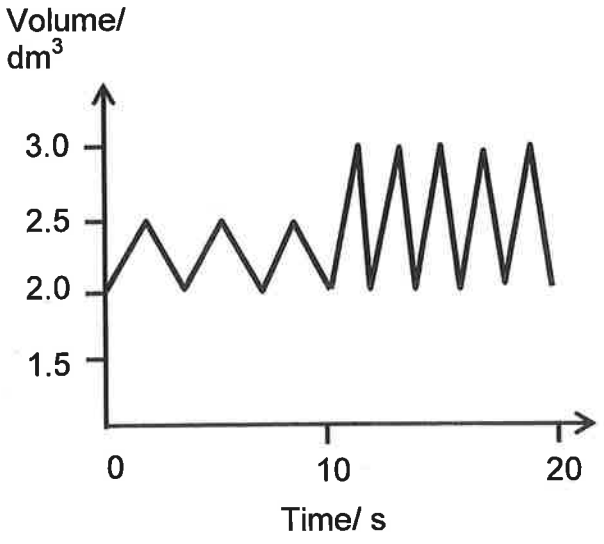
**28** Assuming that the breathing rate is constant, what is the volume of air inhaled per minute?

**A** 3 $dm^3$/min
**B** 9 $dm^3$/min
**C** 15 $dm^3$/min
**D** 45 $dm^3$/min

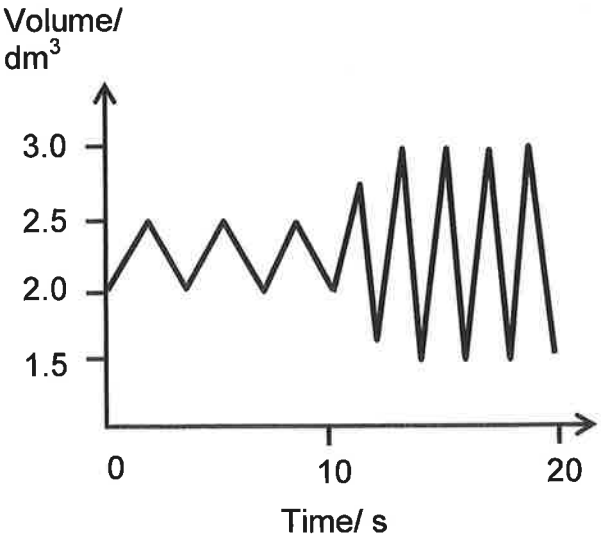
**29** If the person began to sprint at 10 seconds, which graph shows the most likely pattern from 10 to 20 seconds?



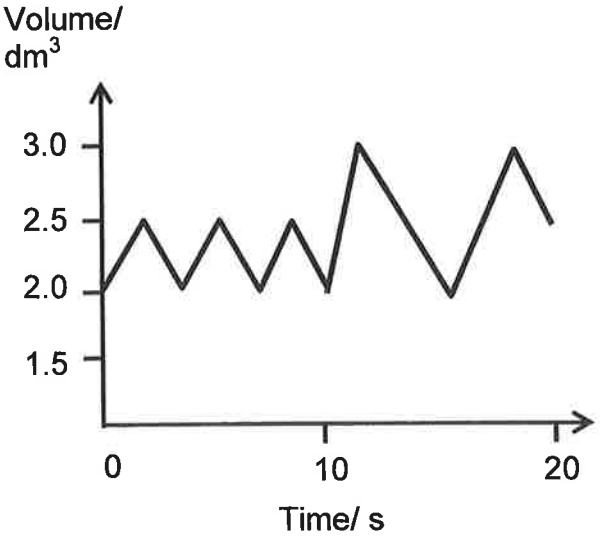

**A**




**B**

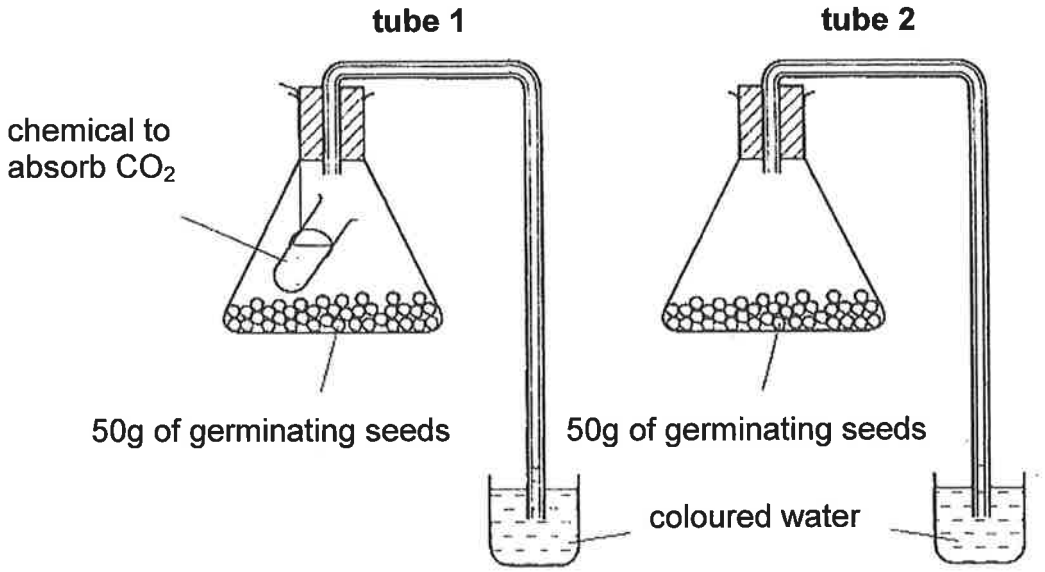



**C**




**D**

**30** The diagram shows apparatus used to investigate respiration.




After four hours, what would the levels of coloured water in the two tubes be?

| | Tube 1 | Tube 2 |
|---|---|---|
| **A** | Higher | Higher |
| **B** | Higher | No change |
| **C** | No change | Higher |
| **D** | No change | No change |

End of paper