

Class	Register Number	Name
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南洋女子中学校
NANYANG GIRLS' HIGH SCHOOL
End-of-Year Examination 2018
Secondary Three

IP BIOLOGY
Paper 1 Multiple Choice

Friday

Additional materials: OAS

5 October 2018

45 minutes
0845 – 0930

READ THESE INSTRUCTIONS FIRST

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

Write your name, register number and class at the top of this page and on the OAS in the spaces 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 **pencil** on the separate OAS provided.

Read the instructions on the OAS very carefully.

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

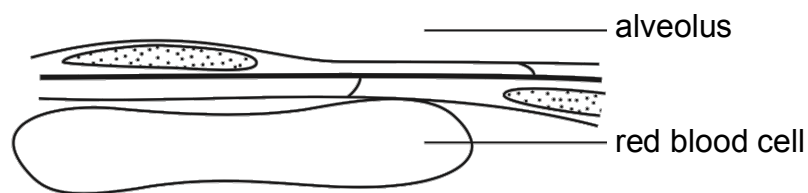
Any rough working should be done in this booklet.

The use of an approved scientific calculator is expected, where appropriate.

- 1** A 150 million-year-old unicellular fossil was discovered in rocks. Scientists studied the cell structure of several samples under the electron microscope.
- 1 The nucleus is enclosed by a nuclear envelope.
 - 2 The rough endoplasmic reticulum is continuous with the nuclear envelope.
 - 3 There are oval organelles that are 1 to 2 μm long, with an outer membrane and convoluted inner membrane.
 - 4 There is a cell wall.

Which observations are critical in determining that the fossil is an eukaryote?

- A** 1 and 2 only
B 1 and 4 only
C 1, 2 and 3 only
D 2, 3 and 4 only
- 2** The drawing shows part of an alveolus and a red blood cell in a blood capillary. The magnification of the drawing is $\times 5000$.

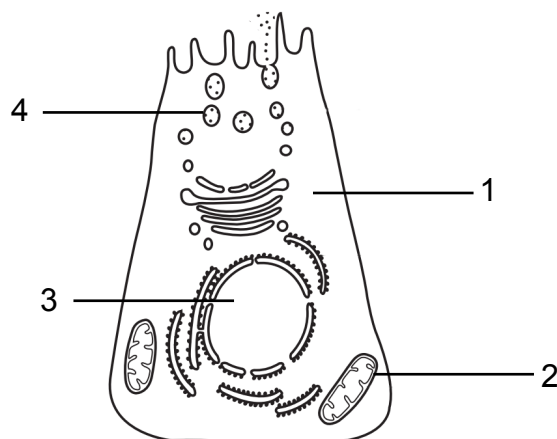


[adapted from Biology June 2003/1]

What is the minimum actual distance that oxygen must diffuse across from air in an alveolus into a red blood cell?

- A** 0.1 μm
B 1.0 μm
C 0.1 nm
D 1.0 nm

3 The diagram shows an animal cell.



[adapted from Biology November 2012/1]

Which rows correctly links the cellular component to its function?

	cellular component	function
A	1	medium for reactions
B	2	anaerobic respiration
C	3	synthesis of fats
D	4	absorption of proteins

4 Which row is correct in matching the tissue to the correct organ found in a living organism?

	organ	tissue
A	brain	hepatic cells
B	leaf	mesophyll cells
C	oesophagus	hepatic cells
D	stem	mesophyll cells

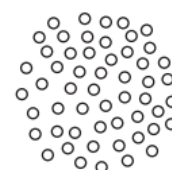
- 5 The diagrams show the different cellular components found in the blood of a mammal.

Which cellular component is involved in phagocytosis?

A



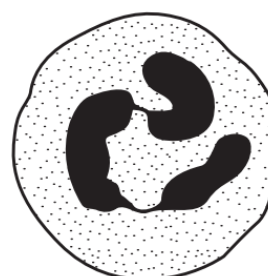
C



B



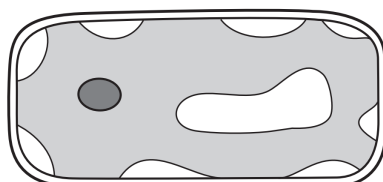
D



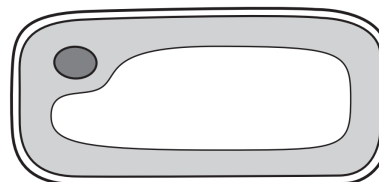
[adapted from Science Biology November 2015/1]

- 6 Initially, a plant cell was placed in solution 1 for 30 minutes. Then, the same plant cell was transferred to solution 2 for another 30 minutes.

The diagrams show the appearance of the plant cell after the treatments.



solution 1 only



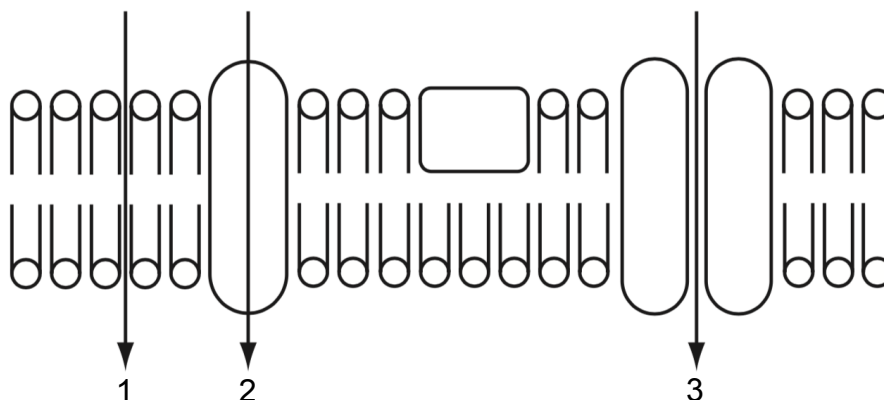
solution 1 and solution 2

[adapted from Biology June 2013/1]

Which row explains the change in appearance of the plant cell after the 1-hour treatment and shows the relative water potential of solution 1 compared to solution 2?

	change is caused by water molecules moving	relative water potential of solution 1 compared to solution 2
A	into the plant cell	less negative
B	into the plant cell	more negative
C	out of the plant cell	more negative
D	out of the plant cell	less negative

- 7 The diagram shows three routes, 1, 2 and 3, through which substances can pass across a cell surface membrane.

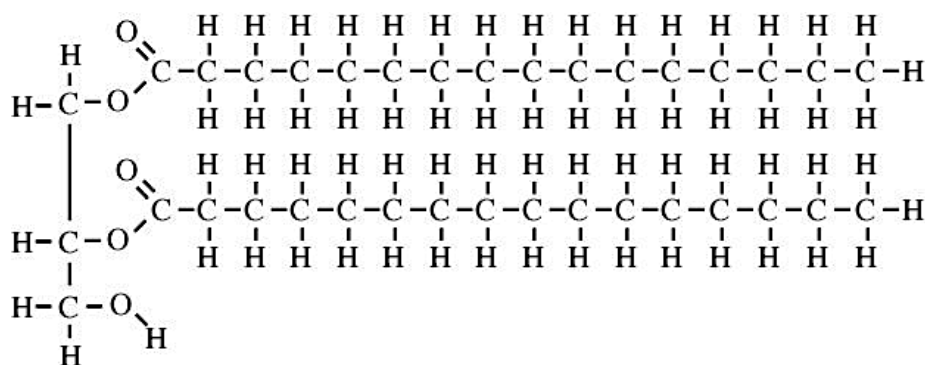


[adapted from Biology November 2014/1]

Which correctly shows the routes taken by an amino acid, which is water soluble, and vitamin K, which is fat soluble?

	amino acid	vitamin K
A	1	2
B	1	3
C	2	1
D	3	1

- 8 The diagram shows a fat molecule that has been partially hydrolysed.

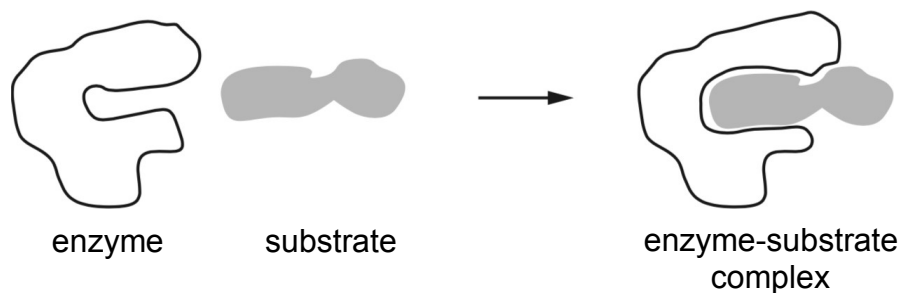


[adapted from Principles of Anatomy and Physiology, 14th Edition, Tortora et. al.]

What are the products of the total hydrolysis of the molecule shown?

- A** a molecule of glycerol and two saturated fatty acid molecules only
- B** a molecule of glycerol and two unsaturated fatty acid molecules only
- C** a molecule of water, a molecule of glycerol and two saturated fatty acid molecules
- D** a molecule of water, a molecule of glycerol and two unsaturated fatty acid molecules

- 9 Which chemical element is found in every protein?
- A calcium
 - B iron
 - C nitrogen
 - D zinc
- 10 What makes digestive enzymes soluble in the intestinal juice?
- A the hydrogen bonds between the amino acids
 - B the non-polar R-groups of the amino acids
 - C the peptide linkages between the amino acids
 - D the polar R-groups of the amino acids
- 11 The diagram shows an enzyme, its substrate and an enzyme-substrate complex.



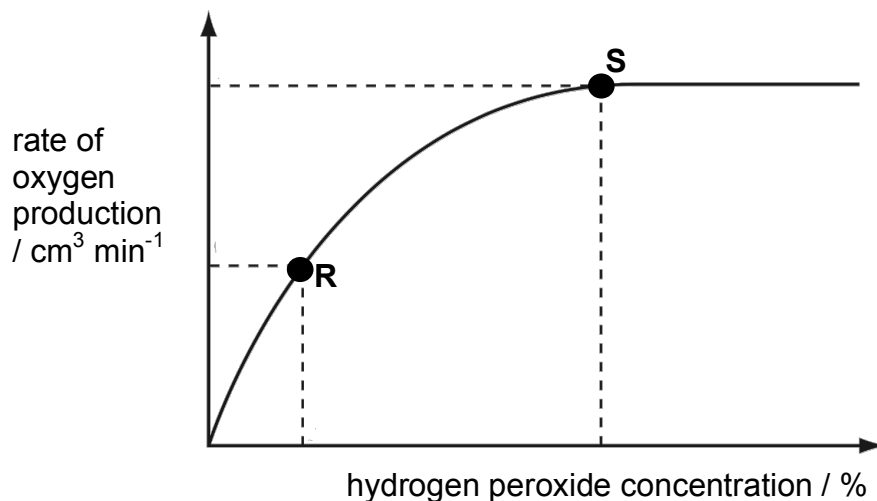
[adapted from Biology March 2018/1]

Which statement explains how the substrate is able to enter the active site of the enzyme?

- A An effective collision between the substrate and the enzyme causes a change in the shape of the active site of enzyme.
- B The shape of the active site of enzyme and the shape of the substrate are complementary.
- C The substrate within the active site of enzyme forms strong hydrogen bonds with the R-groups of amino acids.
- D When the enzyme-substrate complex forms, the activation energy of the enzyme and substrate decreases.

- 12** Catalase (enzyme) catalyses the hydrolysis of hydrogen peroxide (substrate) into water and oxygen.

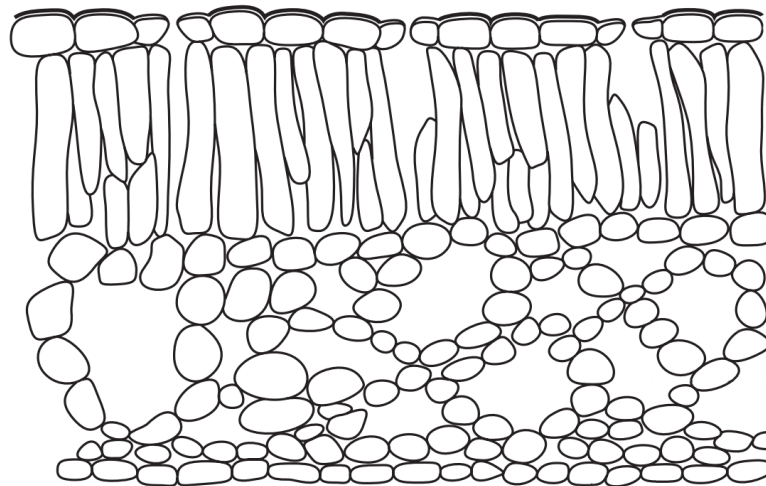
The graph shows how changing the concentration of hydrogen peroxide affected the rate of oxygen production.



Which statement is **not** correct?

- A** At point **R**, all of the enzyme active sites are occupied by substrate molecules.
- B** At point **R**, the rate of reaction is limited by the concentration of the substrate.
- C** At point **S**, enzyme-substrate complex is formed the fastest per unit time.
- D** At point **S**, the rate of reaction is limited by the concentration of the enzyme.

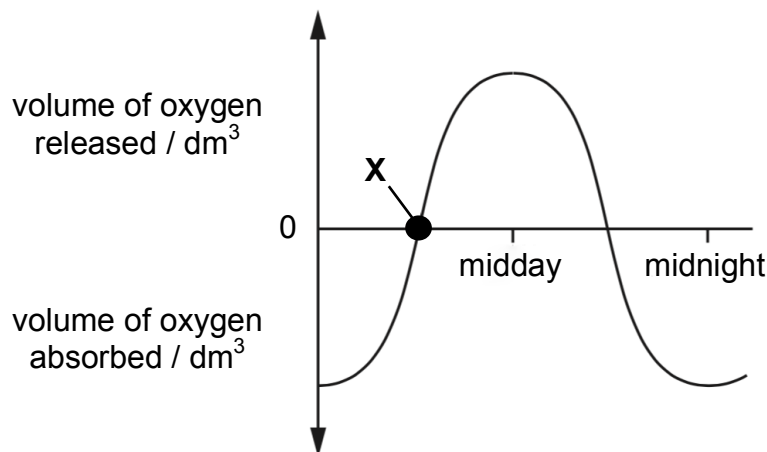
- 13** The diagram shows a transverse section of a small part of the water lily leaf.



[adapted from Biology June 2014/2]

Suggest which one of the observable physical characteristics helps the water lily leaf to float on the surface of water.

- A** densely packed plant cells
 - B** irregularly shaped palisade cells
 - C** large intercellular air spaces
 - D** thick cuticle on epidermis
- 14** The graph shows the volume of oxygen released and absorbed by a plant during a 24-hour period.



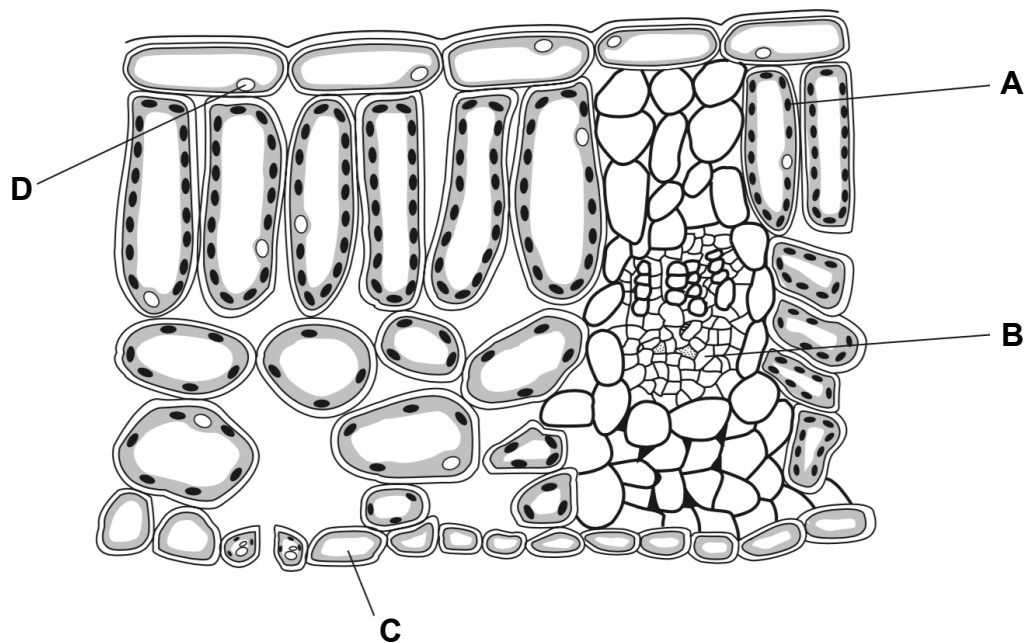
[adapted from Biology June 2003/1]

Which statement correctly describes point **X**?

- A** Both the rates of respiration and photosynthesis are the same.
- B** The rate of respiration is higher than the rate of photosynthesis.
- C** The rate of photosynthesis is higher than the rate of respiration.
- D** There is neither respiration nor photosynthesis.

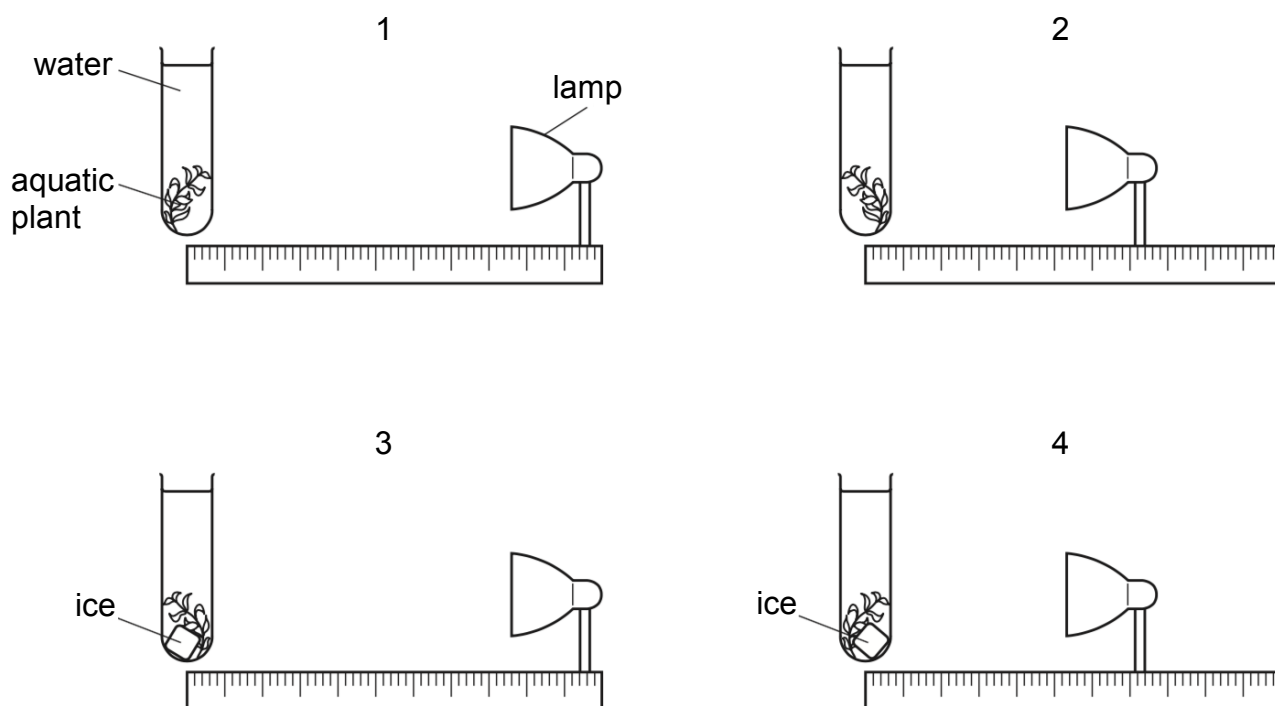
15 The diagram represents a transverse-section of a leaf.

Where are amino acids most likely to be synthesized from glucose molecules?



[adapted from Biology June 2018/1]

- 16** The diagrams show four different experimental setups used to determine the rate of photosynthesis in an aquatic plant in different conditions.



[adapted from Biology June 2018/1]

Which row shows the correct order of the setups in terms of bubbles produced per minute?

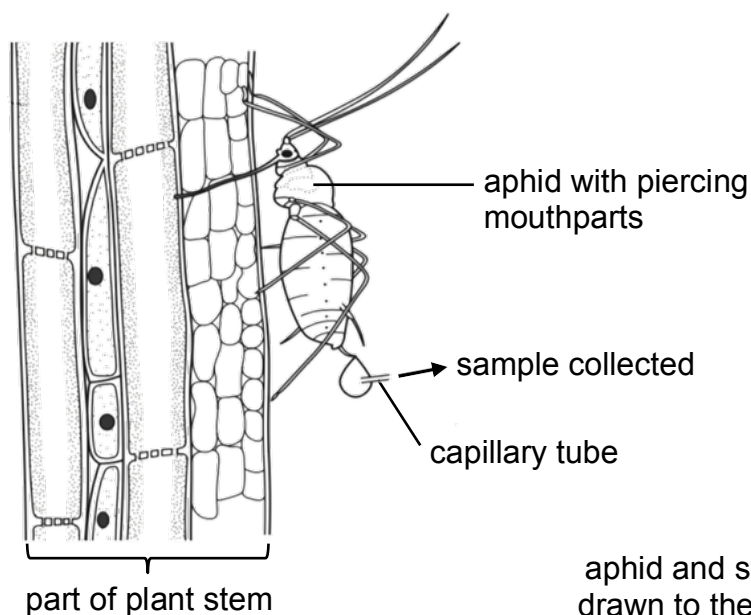
	least bubbles produced per minute	→			most bubbles produced per minute
A	1	2	3	4	
B	2	1	4	3	
C	3	4	1	2	
D	4	3	2	1	

17 Which of the following are included in the apoplast pathway?

- 1 living components
- 2 plant vacuoles
- 3 cell walls
- 4 xylem vessels

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

18 Aphids use their piercing mouthparts to obtain nutrients from plant stems. Samples of the contents inside the stem were collected from the aphids and tested.



[adapted from Biology June 2012/1]

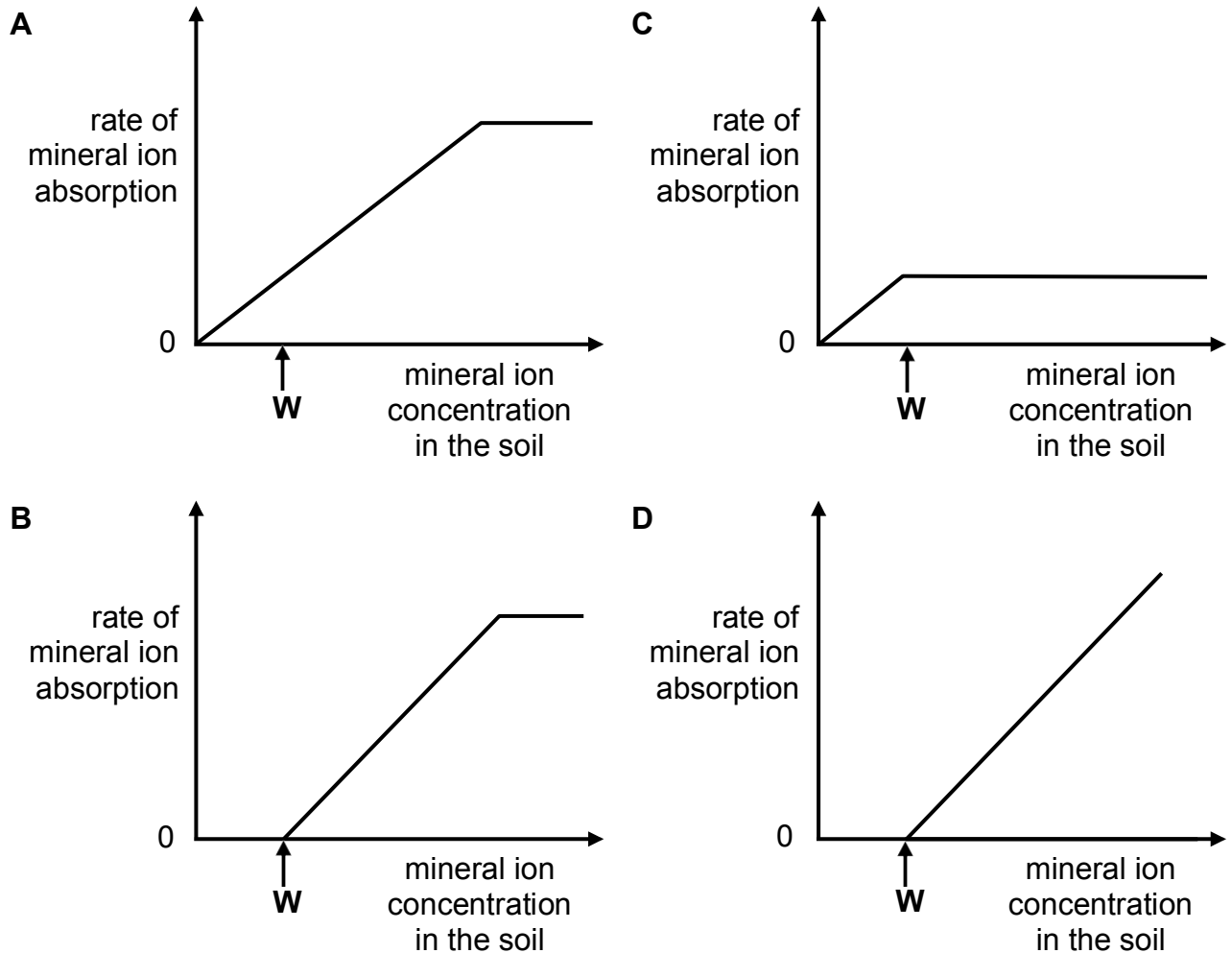
Which of the following shows the correct result of the food test shown?

	Benedict's test		biuret test
	before hydrolysis	after hydrolysis	
A	blue	blue	violet
B	blue	red	blue
C	orange	blue	violet
D	yellow	red	blue

- 19** The rate of mineral ion absorption by a root hair cell was measured at different mineral ion concentrations in the presence of cyanide, an inhibitor of mitochondrial function.

At **W**, the concentration of mineral ions in the soil is the same as in the root hair cell.

Which graph shows how the rate of mineral ion absorption varies with mineral ion concentration in the soil in the presence of cyanide?

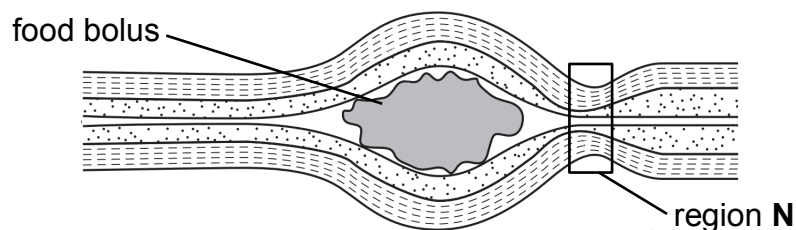


- 20** Four similar leafy plants are exposed to a variety of conditions.

Which row correctly shows the combination of conditions that result in a leafy plant having the greatest rate of transpiration?

	air movement	humidity	temperature / °C
A	moving	humid	25
B	still	dry	25
C	still	humid	35
D	moving	dry	35

- 21** The diagram shows a food bolus moving along the oesophagus.



[adapted from Science Biology June 2006/1]

Which row identifies the direction of movement of food bolus and the muscle type with its actions at region **N**?

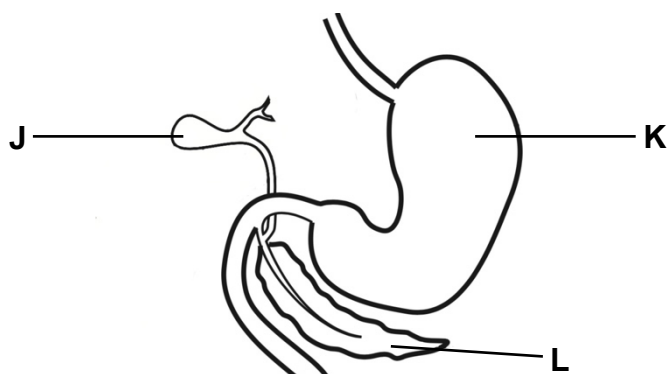
	direction of movement of food bolus	muscle type	muscle action
A	left	circular	relaxing
B	left	longitudinal	relaxing
C	right	circular	contracting
D	right	longitudinal	contracting

- 22** The bacterium *Salmonella enterica* can cause severe food poisoning and the lining of the alimentary canal may be damaged. In these cases, the absorption of water cannot take place easily.

Which region in the alimentary canal is the **most** affected in terms of water absorption from the contents of the alimentary canal?

- A** colon
- B** duodenum
- C** gall bladder
- D** ileum

23 The diagram shows part of the alimentary canal and its associated organs.



The table compares the processes that the structures labelled in the diagram could be involved in.

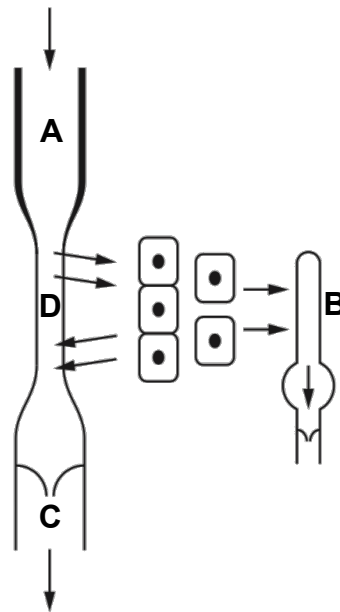
	absorption of alcohol	digestion of fats	secretion of enzymes
J	1	2	3
K	4	5	6
L	7	8	9

Which combination of numbers links the structures labelled to the correct processes involving them?

- A** 1, 2, 3, 6 and 7
- B** 1, 3, 5, 6 and 9
- C** 2, 4, 6, 8 and 9
- D** 2, 4, 5, 7 and 8

- 24** The diagram shows the vessels associated with the flow of fluids to and from body tissues.

Which segment of the vessel has the highest blood pressure?



[adapted from Biology November 2017/1]

- 25** The table shows the blood groups of four patients and the type of blood received in a blood transfusion.

patient number	blood group of patient	blood type received during blood transfusion
1	A	AB
2	B	O
3	O	AB
4	AB	O

Which two patients are at risk from agglutination?

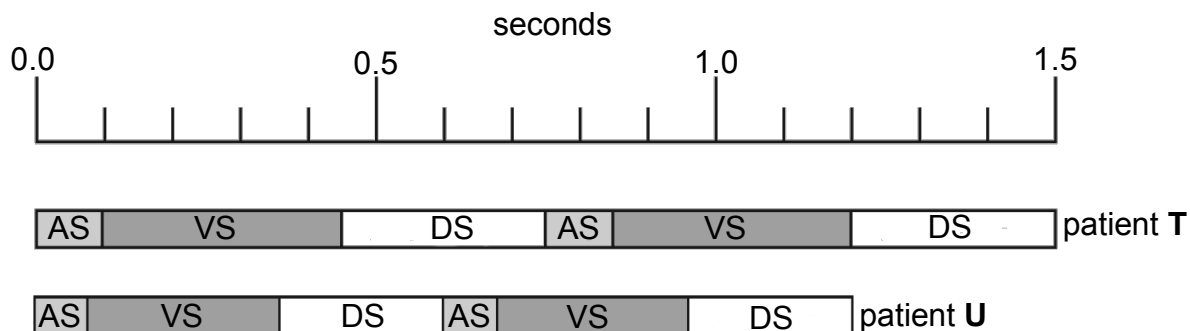
- A** 1 and 2
- B** 1 and 3
- C** 2 and 4
- D** 3 and 4

- 26** Ventricular septal defect (VSD) is diagnosed when the left and right ventricle walls are not completely separated. VSD usually results in blood moving from the left ventricle into the right ventricle.

Which row describes the effects of VSD on blood pressure and oxygenation?

	blood pressure in aorta	blood pressure in pulmonary artery	% oxygenation of blood in right ventricle
A	decreased	increased	decreased
B	decreased	increased	increased
C	increased	decreased	decreased
D	increased	decreased	increased

- 27** The diagram shows two cardiac cycles of a patient **T** and another patient **U**. The sequence of events is set against a time scale.

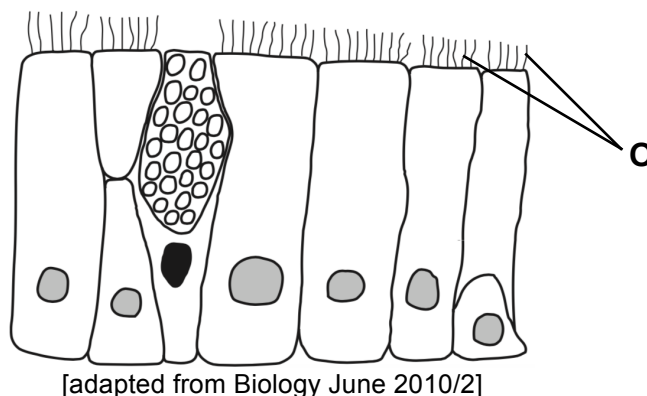


key
AS = atrial systole
DS = diastole
VS = ventricular systole

What is the difference between the two patients' heart rates?

- A** 10 beats per minute
B 20 beats per minute
C 40 beats per minute
D 100 beats per minute

28 The diagram shows a part of an epithelium lining in the human body.

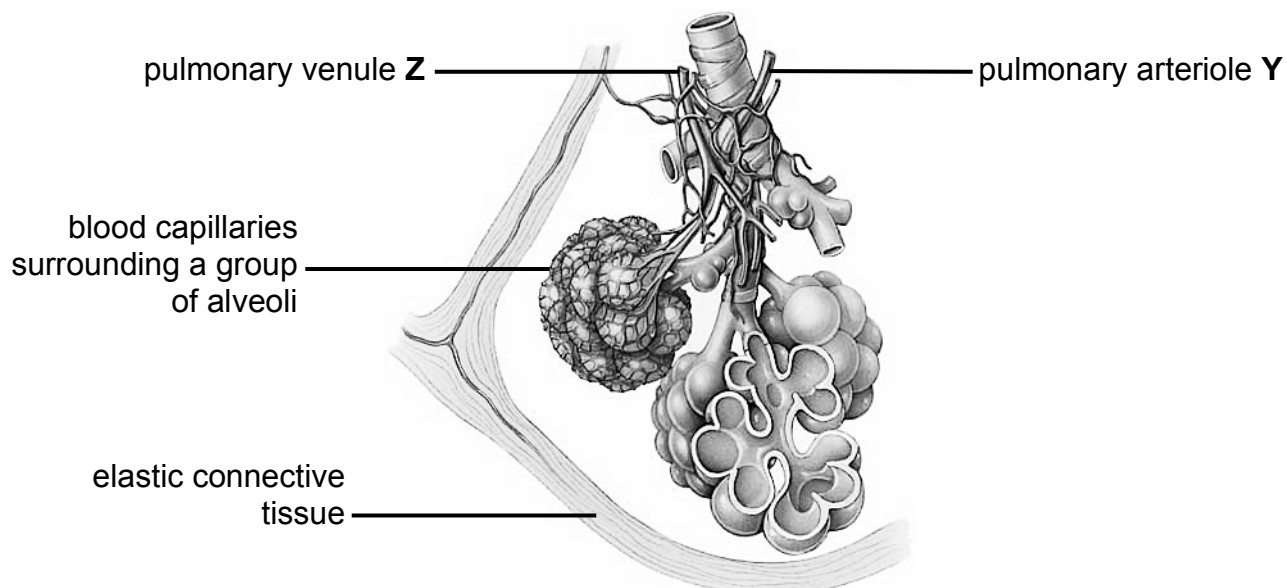


[adapted from Biology June 2010/2]

What row correctly identifies the name and function of structure **O**?

	name	function
A	cilia	movement of mucus
B	cilia	secretion of mucus
C	microvilli	movement of mucus
D	microvilli	secretion of mucus

- 29** The diagram shows a group of alveoli and the surrounding blood capillaries.

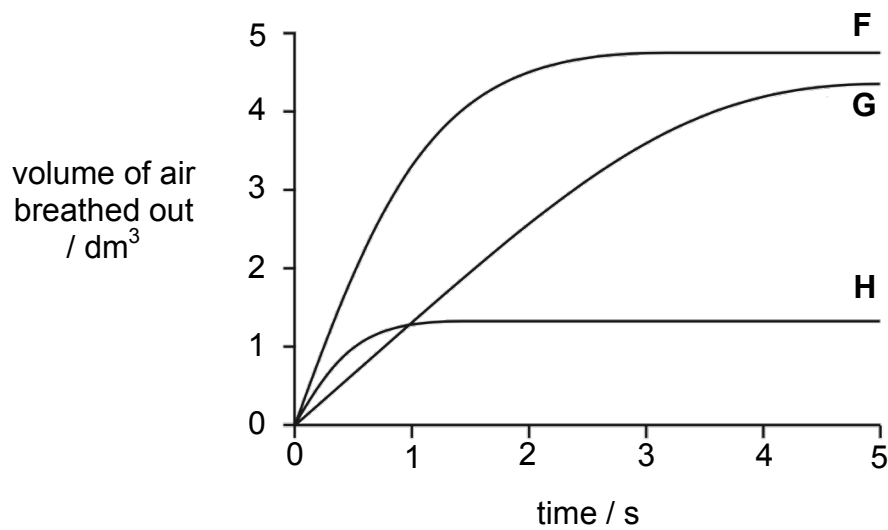


[adapted from Principles of Anatomy and Physiology, 14th Edition, Tortora et. al.]

Which row correctly describes the difference in chemical composition between the blood at **Y** and the blood at **Z**?

	concentration of chemical in the blood at Y compared to the blood at Z		
	carbon dioxide	glucose	oxygen
A	less	more	more
B	less	same	more
C	more	more	less
D	more	same	less

- 30** The graph shows the volume of air breathed out quickly and with force, following a deep breath in, for three different people, **F**, **G** and **H**.



[adapted from Biology November 2009/1]

Based on the graph, which of the following statement(s) could be true?

- 1 **F** and **G** are healthy adults with different lung capacities.
 - 2 **F** is a healthy adult, whereas **H** is a healthy child.
 - 3 **F** is a healthy adult, where **G** and **H** are adults with chronic bronchitis and emphysema respectively.
- A** 3 only
B 1 and 3 only
C 2 and 3 only
D 1, 2 and 3

End of Paper

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