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南洋女子中学校
NANYANG GIRLS' HIGH SCHOOL
End-of-Year Examination 2017
Secondary Three

BIOLOGY

Paper 1 Multiple Choice

Monday

2 October 2017

45 minutes

0845 - 0930

Additional materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

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

Write your name, register number and class in the spaces at the top of this page.

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 shade your choice in **pencil** on the separate Multiple Choice Answer Sheet provided.

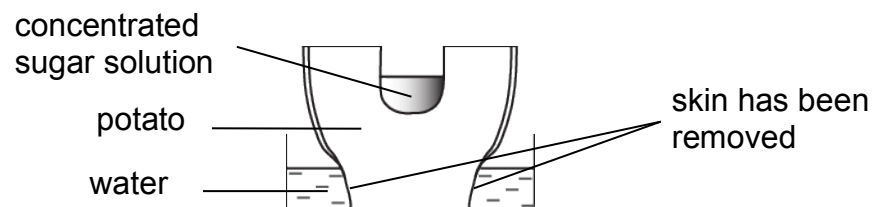
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

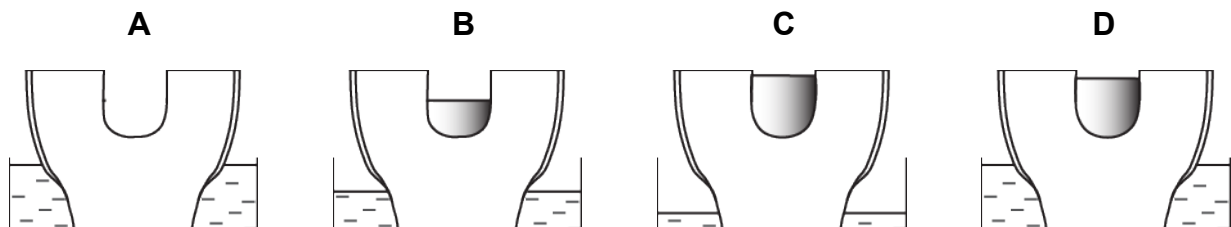
The use of an approved scientific calculator is expected, where appropriate.

- 1 Which of the following substances is the main constituent in protoplasm?
- A dissolved nutrients
 - B dissolved waste substances
 - C mineral salts
 - D water
- 2 Hibernating animals in cold climates are kept warm by the action of brown fat cells. Which organelle will be most abundant in these cells?
- A chloroplast
 - B Golgi apparatus
 - C ribosome
 - D vacuole

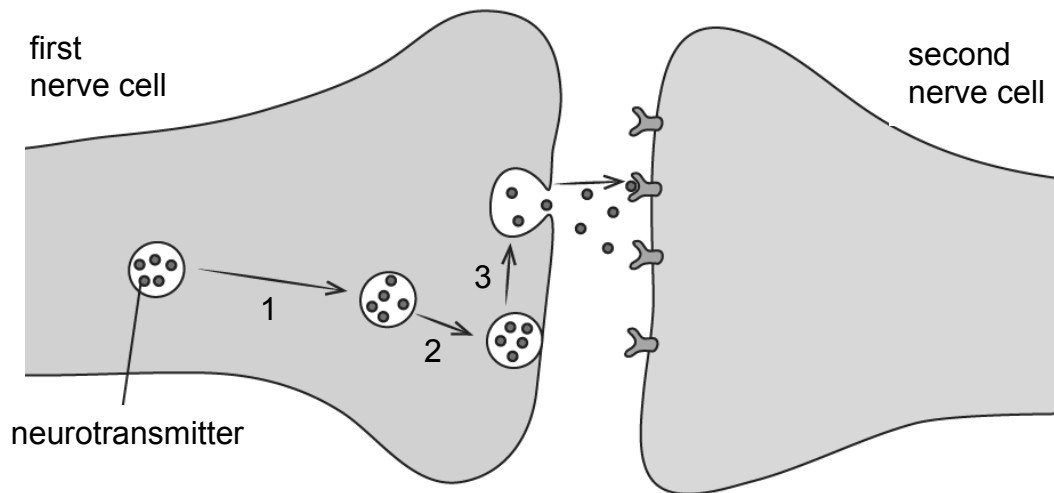
- 3 The diagram shows an experiment using an uncooked potato. The skin of the potato was removed as shown.



Which diagram shows the result of the experiment after 24 hours?



- 4** The diagram shows a synapse, which is a junction between two nerve cells. In order for the nerve cells to communicate, a chemical called a neurotransmitter is used. The arrows show how the neurotransmitter is passed from the first nerve cell to the second nerve cell.



Which process is shown by arrows 1, 2 and 3?

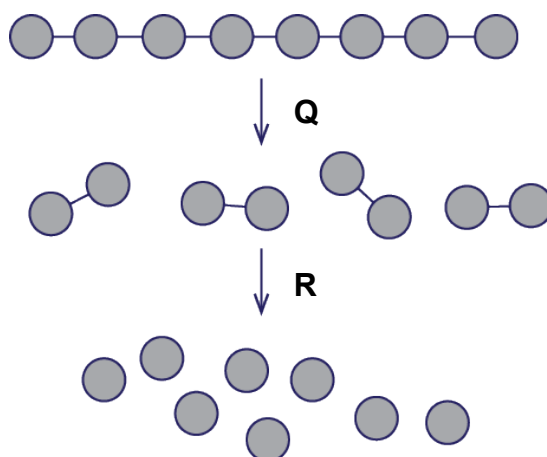
- A** active transport
- B** endocytosis
- C** exocytosis
- D** osmosis

For questions **5** and **6**, refer to the following table of observations of food tests on four different substances.

substance	observations			
	biuret test	Benedict's test	ethanol-emulsion test	iodine test
A	violet	brick red with ppt	colourless	blue-black
B	blue	green with ppt	white emulsion	brown
C	violet	yellow with ppt	white emulsion	blue-black
D	blue	blue	colourless	brown

- 5** Which substance is likely to contain only two nutrients?
- 6** Which substance would provide a marathon runner with a quick source of energy during her race?

- 7 The diagram shows the digestion of a large molecule to its basic units.



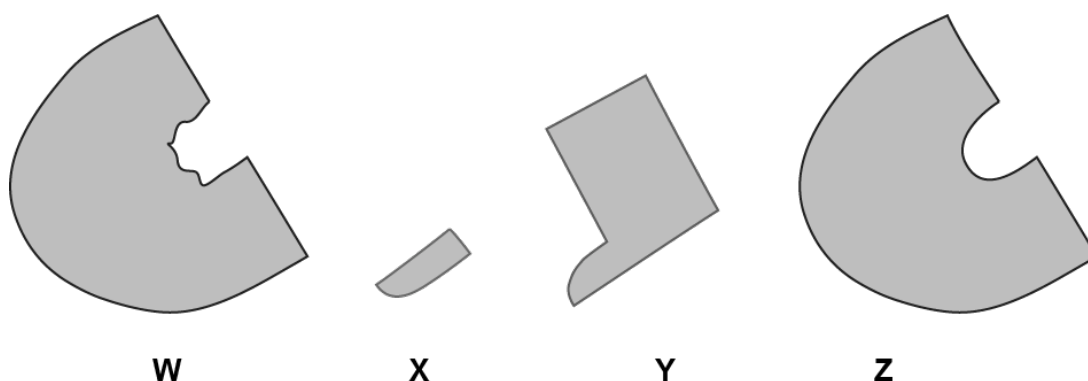
Which row correctly identifies **Q** and **R**?

	Q	R
A	amylase	maltase
B	amylose	maltose
C	pepsin	trypsin
D	pepsinogen	trypsinogen

For Questions 8 and 9 refer to the enzyme phenylalanine hydroxylase (PAH). The enzyme catalyses the addition of a hydroxyl group to phenylalanine to form tyrosine.

- 8 Phenylketonuria (PKU) is a disease where a person has a defective form of the enzyme PAH.

The diagrams represent some substrates and enzymes.

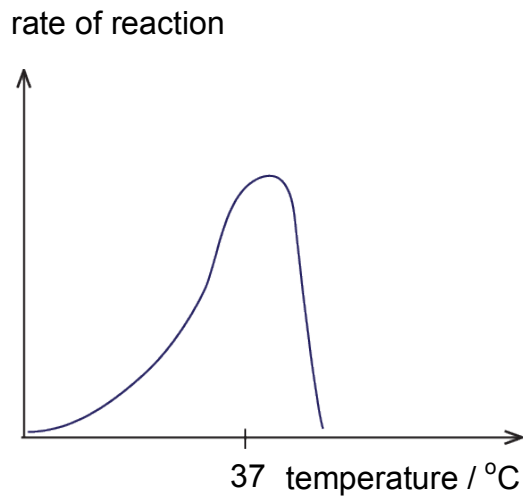


Which row correctly identifies phenylalanine, the hydroxyl group, PAH and the defective PAH?

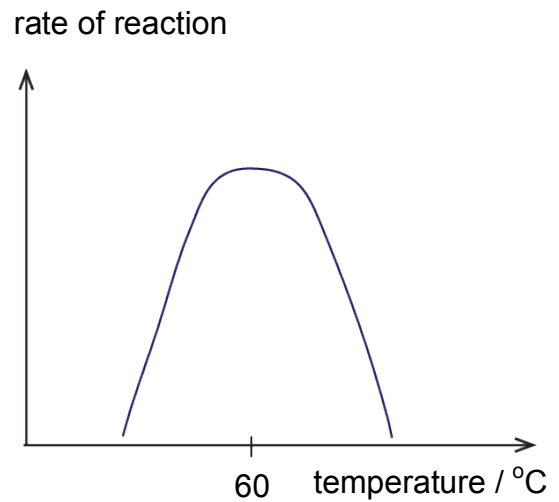
	phenylalanine	hydroxyl group	PAH	defective PAH
A	W	Y	X	Z
B	X	Y	W	Z
C	Y	X	Z	W
D	Z	X	Y	W

9 Which graph shows how phenylalanine hydroxylase (PAH) is affected by temperature?

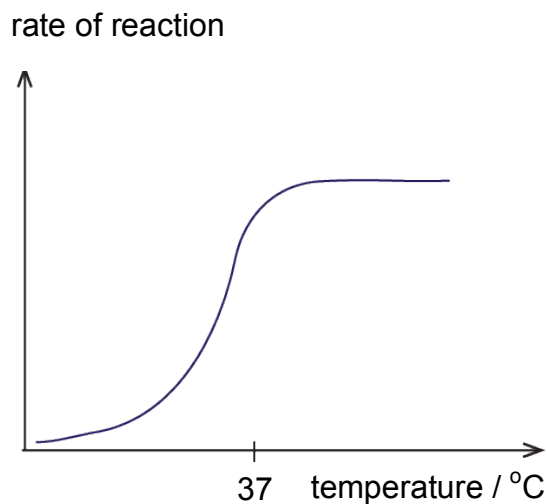
A



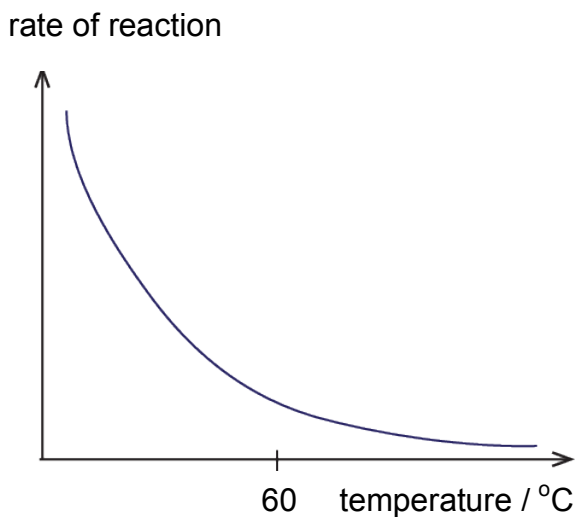
C



B



D

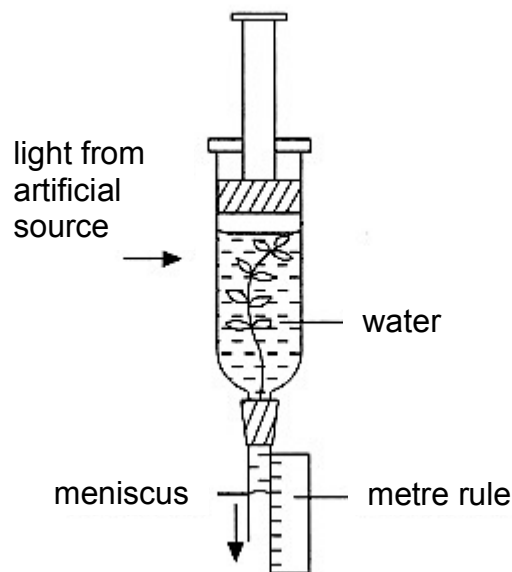


10 What is the role of light energy in photosynthesis?

- A to maintain an optimum temperature for photosynthetic enzymes to work
- B to split carbon dioxide molecules into carbon and oxygen
- C to split water molecules into protons and oxygen
- D to synthesise proteins from amino acids

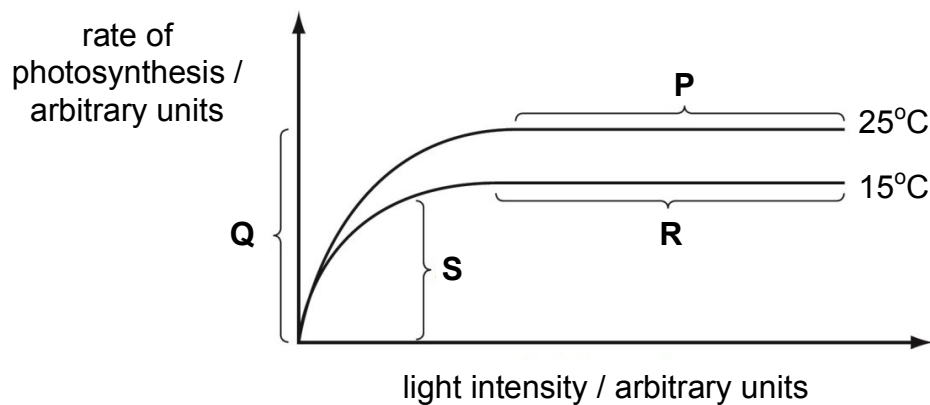
- 11** During the day, a plant gives out oxygen and takes in carbon dioxide. How can this phenomenon be explained in terms of respiration and photosynthesis?
- A** The plant is photosynthesising but not respiring.
 - B** The plant is photosynthesising faster than it is respiring.
 - C** The plant is respiring but not photosynthesising.
 - D** The plant is respiring faster than it is photosynthesising.

For questions **12** and **13**, refer to the diagram which shows an experimental set-up used to study the rate of photosynthesis.



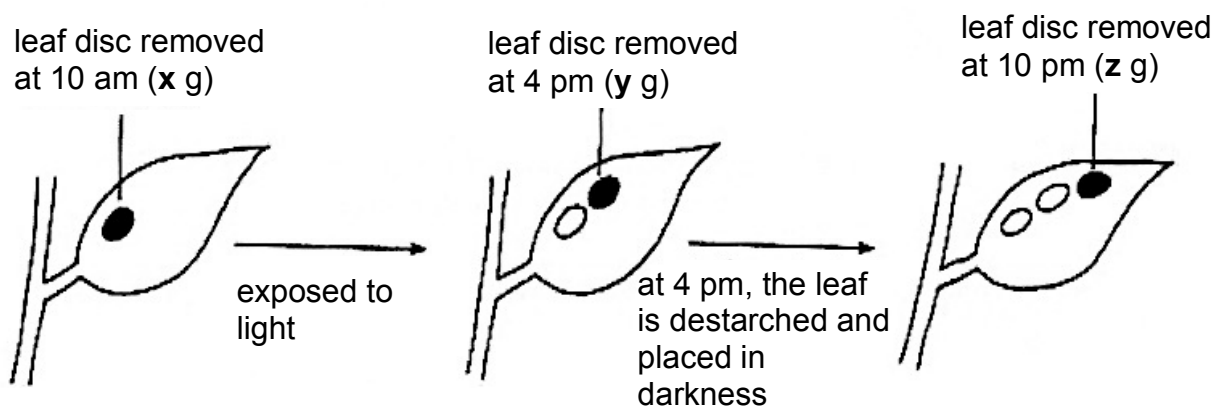
- 12** Why does the meniscus of the water in the syringe move downwards after the artificial light source is switched on?
- A** As the plant respire, the carbon dioxide produced pushes the water down.
 - B** Capillary action occurs, causing the meniscus to move down.
 - C** Oxygen produced by the plant displaces the water.
 - D** The water is pulled downwards by gravity.
- 13** A student decides to replace the water with dilute sodium bicarbonate solution. What is the likely observation?
- A** The meniscus moves downwards at a faster rate.
 - B** The meniscus moves downwards at a slower rate.
 - C** The meniscus moves upwards at a faster rate.
 - D** The meniscus moves upwards at a slower rate.

- 14** The graph shows how the rate of photosynthesis varies with light intensity at two different temperatures. All other variables are kept the same.



In which sections of the graph is light intensity limiting the rate of photosynthesis?

- A** P and R
B Q and S
C R and Q
D S and P
- 15** The diagram shows an experiment in which discs of equal area are removed from the same leaf of a destarched plant. The plant had been treated as shown and the dry weight of the leaf discs was measured in grams (g).



Which row is correct?

	value of $(y - x)$ g represents	value of $(y - z)$ g/ 6h represents the rate of
A	food produced by photosynthesis	respiration
B	water lost in transpiration	transpiration
C	food used in respiration	photosynthesis
D	water gained during photosynthesis	translocation

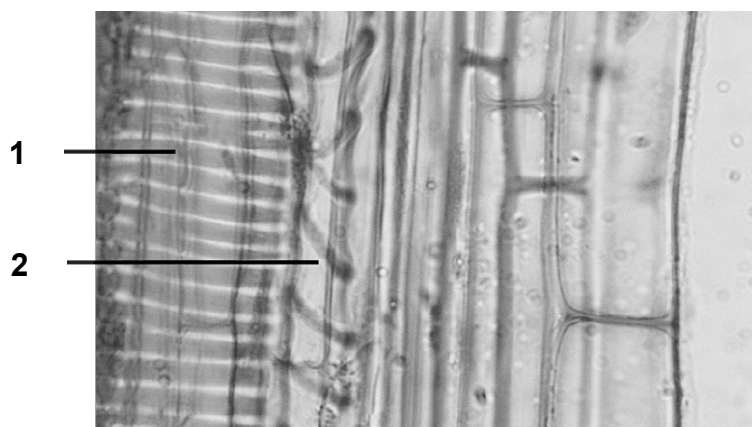
16 Polar molecules form hydrogen bonds with each other.

Which properties of water result from its molecules being polar?

- 1 able to adhere to xylem wall
- 2 cohesiveness
- 3 does not pass through phospholipid bilayer easily
- 4 low molecular mass

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

17 The photomicrograph shows a part of a longitudinal section of a plant stem.

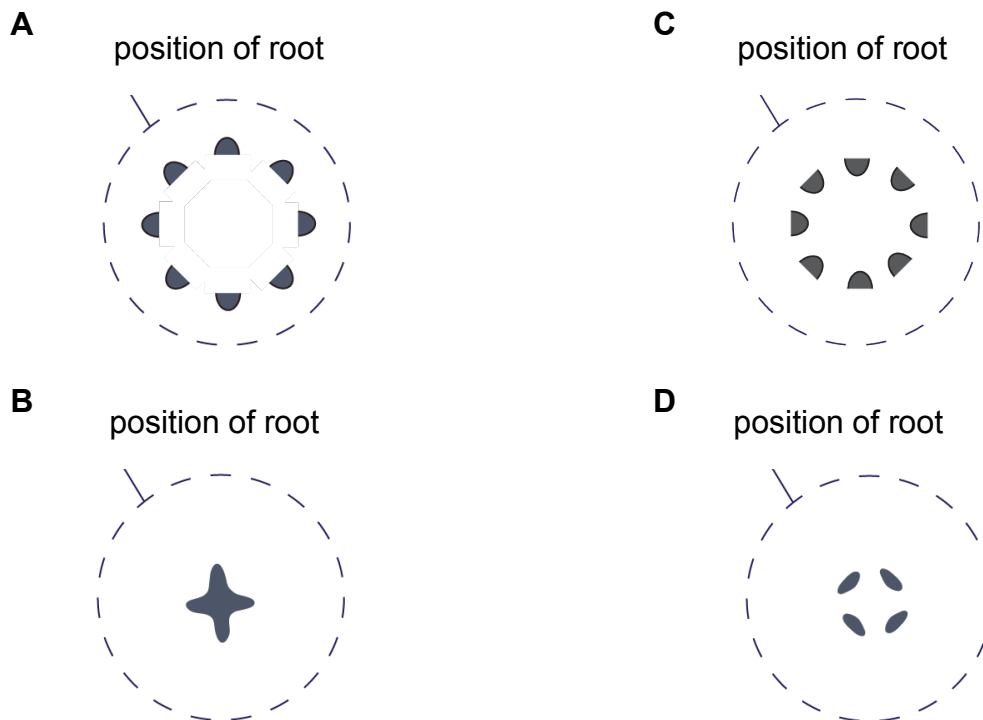


What substances do structures **1** and **2** transport?

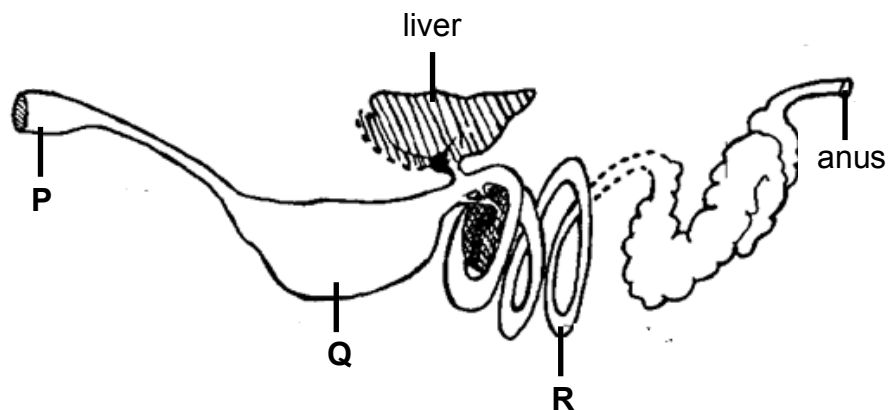
	structure 1	structure 2
A	amino acids	water
B	sucrose	mineral ions
C	mineral ions	sucrose
D	water	mineral ions

- 18** The leaves of a plant were exposed to radioactive carbon dioxide in the presence of light. After several hours, a cross-sectional slice of the root was made and exposed to an X-ray film. The outline of the cross-sectional slice of the root was traced.

Which diagram correctly shows the X-ray film exposed to the slice of root?



- 19** The diagram shows some structures in an animal.



Which row correctly identifies the processes that will occur at **P**, **Q** and **R** respectively after food intake?

	P	Q	R
A	chewing	excretion	egestion
B	egestion	absorption	assimilation
C	ingestion	digestion	absorption
D	digestion	absorption	excretion

20 Due to an infection, a person had his gall bladder surgically removed. Which of the following is/are the expected consequences?

- 1 impaired fat digestion
- 2 light-colored faeces
- 3 reduced absorption of amino acids
- 4 reduced production of bile

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

21 A few hours after a person ate a meal of protein, fat and carbohydrate, the contents of the blood in the hepatic portal vein and the hepatic vein were compared.

Which row shows the correct comparison?

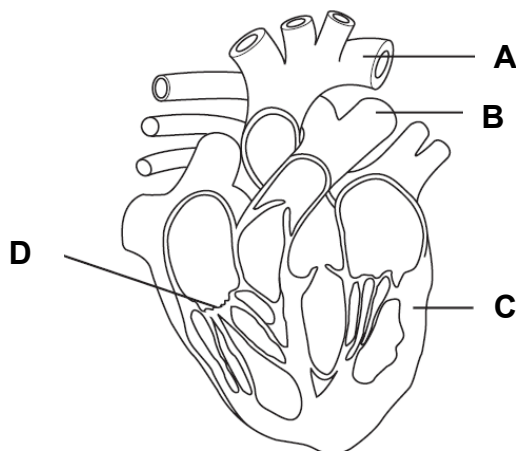
	blood in the hepatic portal vein	blood in the hepatic vein
A	less amino acids	more amino acids
B	less red blood cells	more red blood cells
C	more glucose	less glucose
D	more urea	less urea

22 Which substances can be absorbed in the human alimentary canal without being digested?

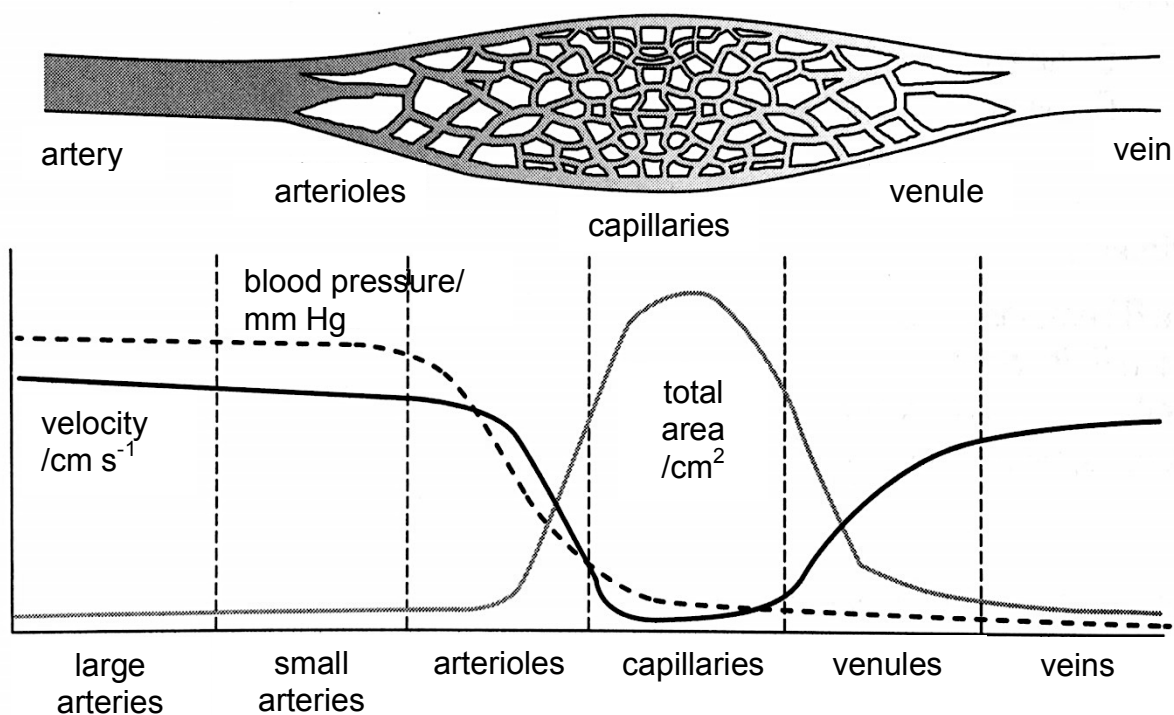
- A** glucose, vitamins, starch and amino acids
- B** water, glucose, enzymes and amino acids
- C** water, glucose, fats and minerals
- D** water, glucose, minerals and vitamins

23 The diagram shows a longitudinal section of the heart.

Which structure is the first to be damaged by a heart attack?



For questions **24** and **25**, refer to the following diagram which shows how blood pressure, velocity and total cross-sectional area varies through the various blood vessels in the human body.



24 Which of the following is/are advantage(s) of the low blood pressure and velocity at the capillaries?

- 1 They allow more time for efficient diffusion of substances.
- 2 They cause the blood cells to move through the vessel in a single file.
- 3 They prevent the one-cell thick wall from bursting.

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

25 Which conclusion can be made from the graph?

- A** The blood velocity is the lowest in the veins.
B The higher the blood velocity, the higher the blood pressure.
C The reduction in the cross-sectional area of blood vessels results in an increase in blood velocity.
D There is no relationship between the cross-sectional area of vessels and blood velocity.

26 How is the constant high pressure in human arteries maintained?

- 1 the contraction of the skeletal muscles around the blood vessels
- 2 the elastic recoil of the vessel wall
- 3 the gravitational pull of the blood
- 4 the pumping action of the heart

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

27 The following structures are found in the human respiratory system:

- 1 alveolus
- 2 bronchiole
- 3 bronchus
- 4 larynx
- 5 trachea

Which route describes the path taken by a carbon dioxide molecule when it leaves the body?

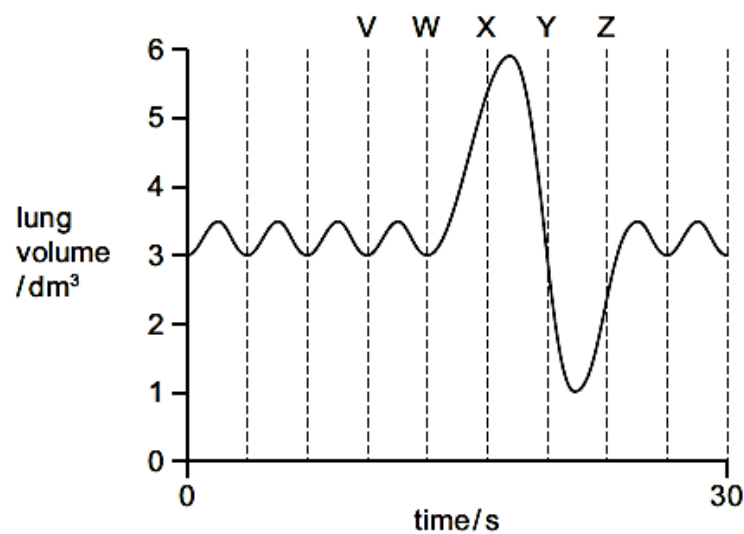
- A** 1 → 2 → 3 → 4 → 5
B 1 → 2 → 3 → 5 → 4
C 2 → 1 → 3 → 4 → 5
D 2 → 1 → 3 → 5 → 4

- 28** A man smoked 40 sticks of cigarettes daily for 20 years. During his recent health check, his doctor told him that there were very few healthy alveoli present in his lungs.

What is the effect of having only a few healthy alveoli present in his lungs?

- A** He needs to exercise less regularly.
- B** He takes fewer breaths each minute.
- C** Less oxygen is absorbed into his blood.
- D** There are fewer red blood cells present in his blood.

- 29** The graph shows changes in the amount of air in a person's lungs over a period of 30 seconds.



Which time period shows the fastest rate of breathing?

- A** V to W
 - B** W to X
 - C** X to Y
 - D** Y to Z
- 30** Some ciliated cells in the trachea may be mutated and have no mitochondria. Which of the following would be a likely consequence of this condition?
- A** accumulation of dust and mucus in the trachea
 - B** increased temperature of inhaled air
 - C** increased water content in exhaled air
 - D** reduced rate of inhalation

End of paper