



PAYA LEBAR METHODIST GIRLS' SCHOOL (SECONDARY)

Secondary 3/4 Express

Biology

Transport In Humans & Respiration Quiz

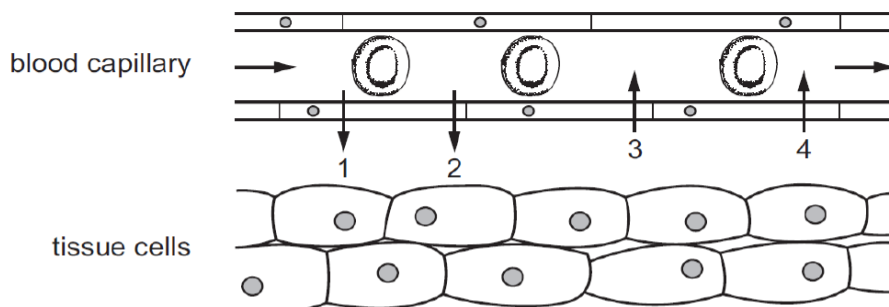
Name		Index no.	
Class		Date	

Answer all the questions.

- 1 How many times does an oxygen molecule pass through the heart from the lungs to the skeletal muscles in the leg?

A 1
B 2
C 3
D 4

- 2 The diagram shows the transfer of materials between a blood capillary and tissue fluid.



What substances do the numbers represent?

	1	2	3	4
A	carbon dioxide	oxygen	urea	glucose
B	carbon dioxide	urea	oxygen	glucose
C	oxygen	glucose	carbon dioxide	urea
D	oxygen	urea	carbon dioxide	glucose

3 Reactions **X**, **Y** and **Z** take place in the human body.

reaction	equation
X	haemoglobin + O ₂ ⇌ oxyhaemoglobin
Y	CO ₂ + H ₂ O ⇌ H ₂ CO ₃
Z	H ₂ CO ₃ ⇌ H ⁺ + HCO ₃ ⁻

Which row correctly matches each reaction to the site where it occurs, and whether it involves an enzyme?

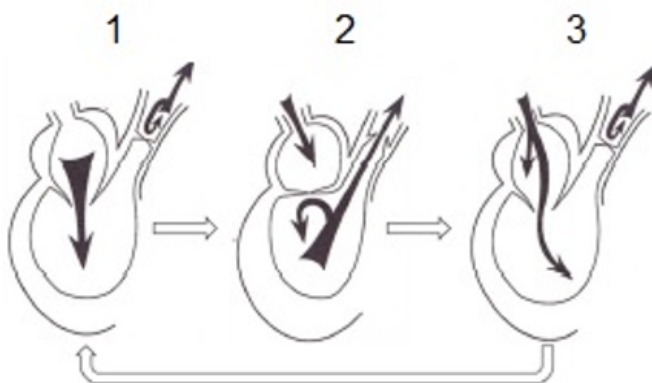
	red blood cell	blood plasma	enzyme needed
A	X	Y and Z	Y and Z
B	X and Y	Z	Y and Z
C	X and Z	Y	Y
D	X, Y and Z	none	Y

4 A pulse can be felt when the thumb presses the wrist of the left hand.

This pulse is produced because

- A** of the alternate stretching and recoiling action of the artery.
- B** the arteries carry oxygenated blood.
- C** the veins have larger lumen than the arteries.
- D** the wall of the arteries is thicker than that of the veins.

- 5 The diagrams show the movement of blood in the right side of the heart in a cardiac cycle.



Which of the following correctly shows what is happening at stages 1, 2 and 3?

	1	2	3
A	atrial systole	ventricular systole	atrial and ventricular diastole
B	atrial systole	atrial and ventricular diastole	ventricular systole
C	atrial and ventricular diastole	ventricular systole	atrial systole
D	ventricular systole	atrial systole	atrial and ventricular diastole

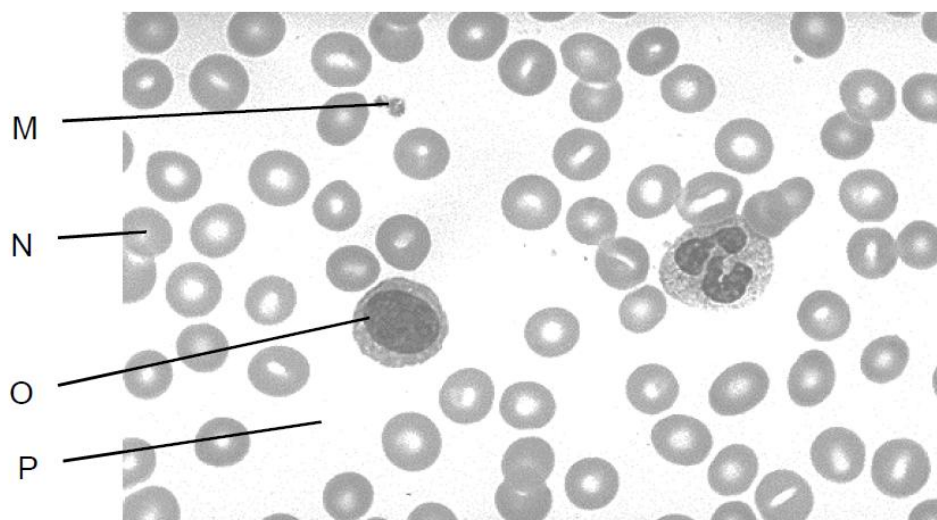
6

The active ingredient in brand A pesticide inhibits the synthesis of the plasma protein prothrombin in the liver. This pesticide most likely kills pests by

- A** causing the accumulation of amino acids in the blood.
- B** preventing the clotting process when bleeding.
- C** preventing the maintenance of glucose level in the blood.
- D** stimulating the breakdown of red blood cells.

7

The photomicrograph shows a human blood smear.



Which of the following statements that describes the blood components is **incorrect**?

- A** M and components of P are required for blood clotting.
- B** N contains carbonic anhydrase.
- C** O is responsible for producing hormones.
- D** P contains proteins, carbohydrates and fats.

8

Which of the following characteristics best describe the conditions found in the hepatic vein?

	oxygen concentration	carbon dioxide concentration	hydrostatic pressure
A	high	high	high
B	high	low	high
C	low	high	low
D	low	low	low

9

The following table shows the results of blood transfusions between four individuals P, Q, R and S.

		recipients			
		P	Q	R	S
donors	P		✓	✓	✓
	Q	X		✓	✓
	R	X	X		X
	S	X	✓	✓	

✓	successful transfusion
X	unsuccessful transfusion

What are the possible blood types of the four individuals?

	P	Q	R	S
A	AB	A or B	O	A or B
B	AB	A	O	B
C	O	A or B	AB	A or B
D	O	B	AB	A

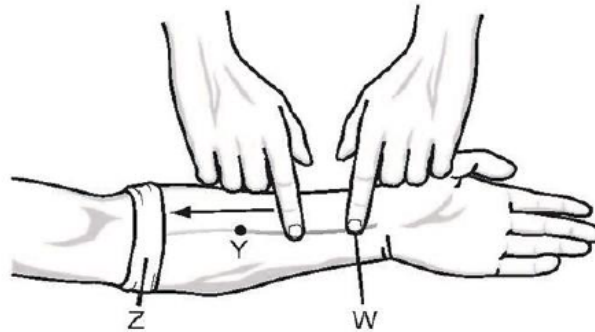
10

Which row describes the heart valves during atrial systole?

	bicuspid valve	aortic valve	tricuspid valve	pulmonary valve
A	close	open	close	open
B	open	close	open	close
C	close	close	open	open
D	open	open	close	close

11

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:

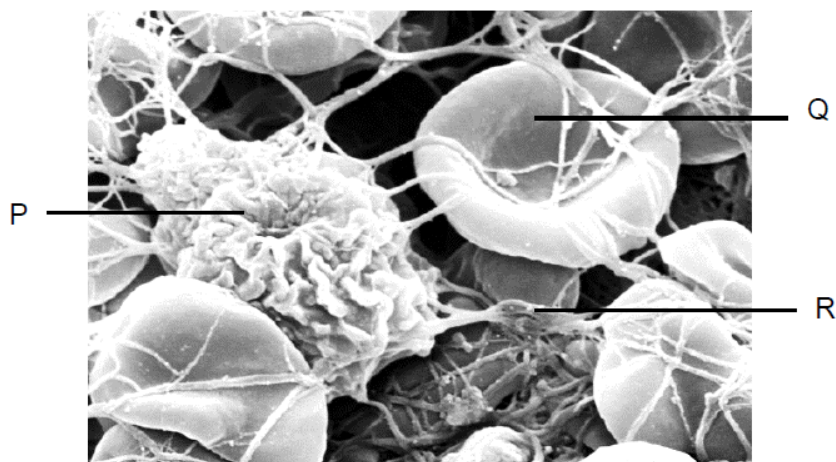
- 1 The bandage at Z prevents backflow of blood.
- 2 The finger pressed at W prevents more blood entering the vein
- 3 A valve at Y prevents backflow.
- 4 A valve at Z prevents more blood from entering the vein.

Which explanations of the vein lying flat are correct?

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

12

The diagram is an electron micrograph of a blood clot.

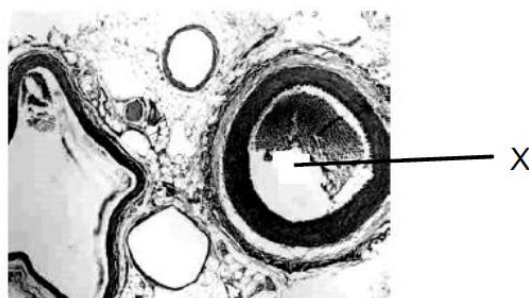


(source: <https://wellcomecollection.org/works/zwnarh4m/items?canvas=1>)

Which row about structures P, Q and R are correct?

	function of P	adaptation of Q	how R is formed
A	produce antibodies	contains haemoglobin	from fibrinogen to fibrin
B	produce antibodies	contains haemoglobin	from fibrin to fibrinogen
C	phagocytosis	present in large numbers	from fibrinogen to fibrin
D	phagocytosis	does not contain nucleus	from fibrin to fibrinogen

13 The diagram below shows two blood vessels in the human body.



If blood vessel X is connected with the lung, which of the following is true?

- A** It carries oxygenated blood towards the heart.
- B** It carries deoxygenated blood towards the heart.
- C** It carries oxygenated blood towards the lung.
- D** It carries deoxygenated blood towards the lung.

- 14 The table shows the full blood count of a child suffering from Thalassemia, a type of blood disorder.

	Thalassemia	Normal range
number of red blood cell per litre of blood	2.77×10^{12}	$3.9 - 5.3 \times 10^{12}$
number of white blood cell per litre of blood	8.4×10^9	$5.0 - 17.0 \times 10^9$
number of platelet per litre of blood	192×10^9	$150 - 450 \times 10^9$
concentration of of haemoglobin (g/dl)	7.5	11.5 – 13.5

Which statement describes the effect Thalassemia may have on the child's health?

- A He is often pale and breathless.
- B He is unable to fight against bacterial infections. His blood does not clot.
- C His blood does not clot.
- D His red blood cells are not able to carry oxygen.

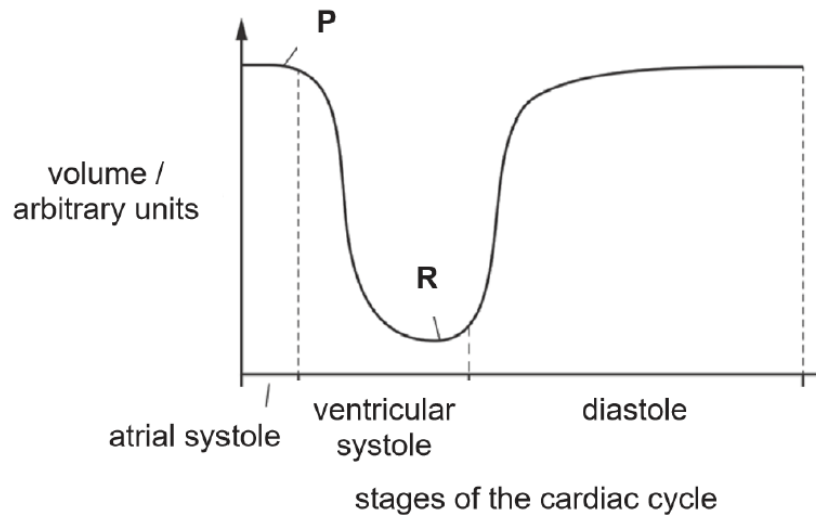
- 15 These statements compare the blood and tissue fluid.

- **W** lacks plasma proteins and red blood cells.
- **X** is at a lower pressure than **Y** and contains red blood cells and plasma proteins.
- **Y** is at a higher pressure than **W** and contains red blood cells and plasma proteins.

Which correctly identifies **W**, **X**, and **Y**?

	W	X	Y
A	blood entering capillary	tissue fluid	blood leaving capillary
B	blood leaving capillary	blood entering capillary	tissue fluid
C	tissue fluid	blood entering capillary	blood leaving capillary
D	tissue fluid	blood leaving capillary	blood entering capillary

- 16 The graph shows changes in the volume of the ventricles during the cardiac cycle.



What is the state of the valve at **P** and **R**?

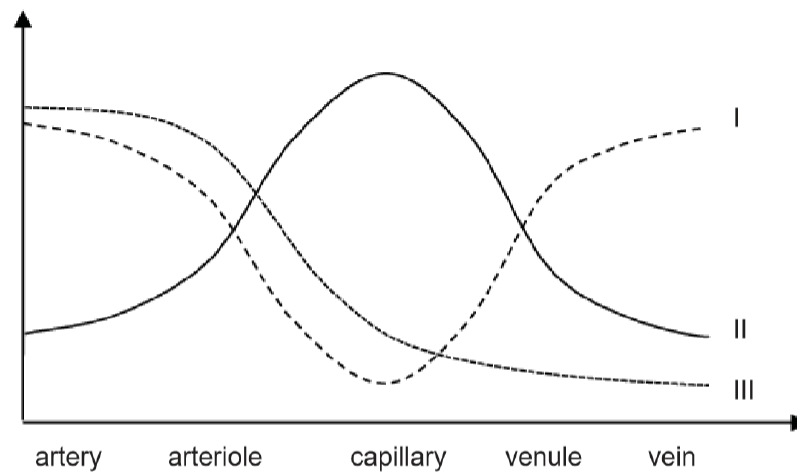
	atrioventricular valve at P	semilunar valve at R
A	closes	closes
B	closes	opens
C	opens	closes
D	opens	opens

- 17

Which row of the table shows the difference between the pulmonary artery and the aorta?

	Pulmonary artery	Aorta
A	Carries blood with a lot of oxygen	Carries blood with little oxygen
B	Carries a lot of carbon dioxide	Carries little carbon dioxide
C	Takes blood away from the heart	Takes blood to the heart
D	Transports cool blood	Transports warm blood

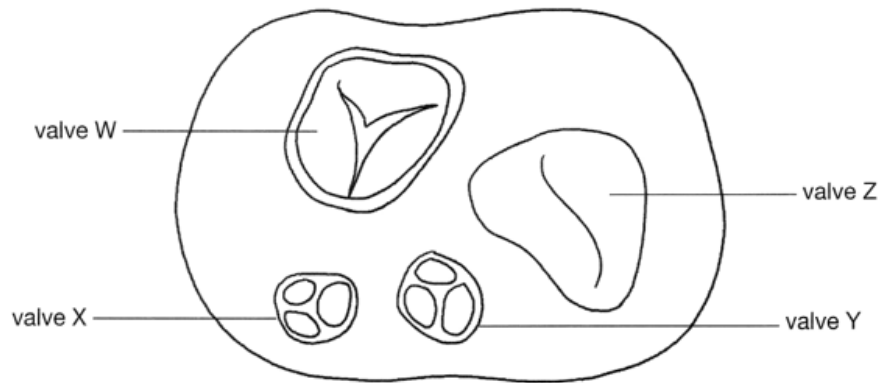
- 18 The graph represents the cross-sectional area, velocity and blood pressure of five different blood vessels.



Which option represents lines I, II and III?

	line I	line II	line III
A	blood pressure	cross-sectional area	velocity
B	cross-sectional area	velocity	blood pressure
C	velocity	blood pressure	cross-sectional area
D	velocity	cross-sectional area	blood pressure

The diagram below shows the transverse section of a mammalian heart.

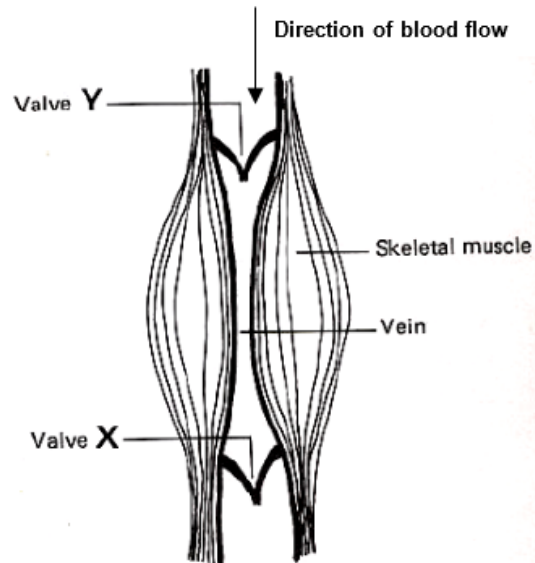


Which of the following combinations represent the conditions of the valves W, X, Y and Z during **ventricular systole**?

	W	X	Y	Z
A	Closed	Open	Open	Closed
B	Closed	Closed	Open	Open
C	Open	Open	Closed	Closed
D	Open	Closed	Closed	Open

20

The diagram below illustrates a small portion of a vein and its neighboring skeletal muscles.

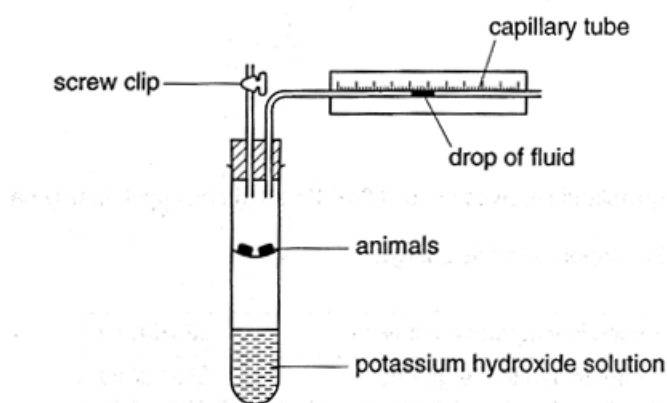


Which of the following shows the correct combination of the state of the muscle with the corresponding situations of valves **X** and **Y**?

	Skeletal muscle	Valve X	Valve Y
A	Contraction	Open	Closed
B	Contraction	Closed	Open
C	Contraction	Open	Open
D	Relaxation	Open	Closed

21

The diagram shows the apparatus used to measure the respiration rate of small animals.



Should the screw clip be left open or closed, and why?

	Screw clip	Why?
A	Open	To allow the entry of air
B	Open	To allow for temperature fluctuations
C	Closed	To measure output of carbon dioxide
D	Closed	To measure uptake of oxygen

22.

Tar and carbon monoxide are present in tobacco smoke

What are their effects on health?

	Tar	Carbon monoxide
A	Causes high blood pressure	Damages <u>haemoglobin</u>
B	Causes high blood pressure	Is addictive
C	Causes lung cancer	Damages <u>haemoglobin</u>
D	Causes lung cancer	Is addictive

23.

What describes the role of carbonic anhydrase in the removal of carbon dioxide from respiring tissues?

- A** It causes red blood cells to absorb carbon dioxide.
- B** It causes the formation of hydrogencarbonate ions in the red blood cells.
- C** It decreases the diffusion of carbon dioxide through the alveolar membrane.
- D** It decreases the release of carbon dioxide from mitochondria.

24.

What happens during the process of breathing in?

	external intercostal muscles	internal intercostal muscles	diaphragm
A	contract	relax	contracts
B	contract	relax	relaxes
C	relax	contract	contracts
D	relax	contract	relaxes

25.

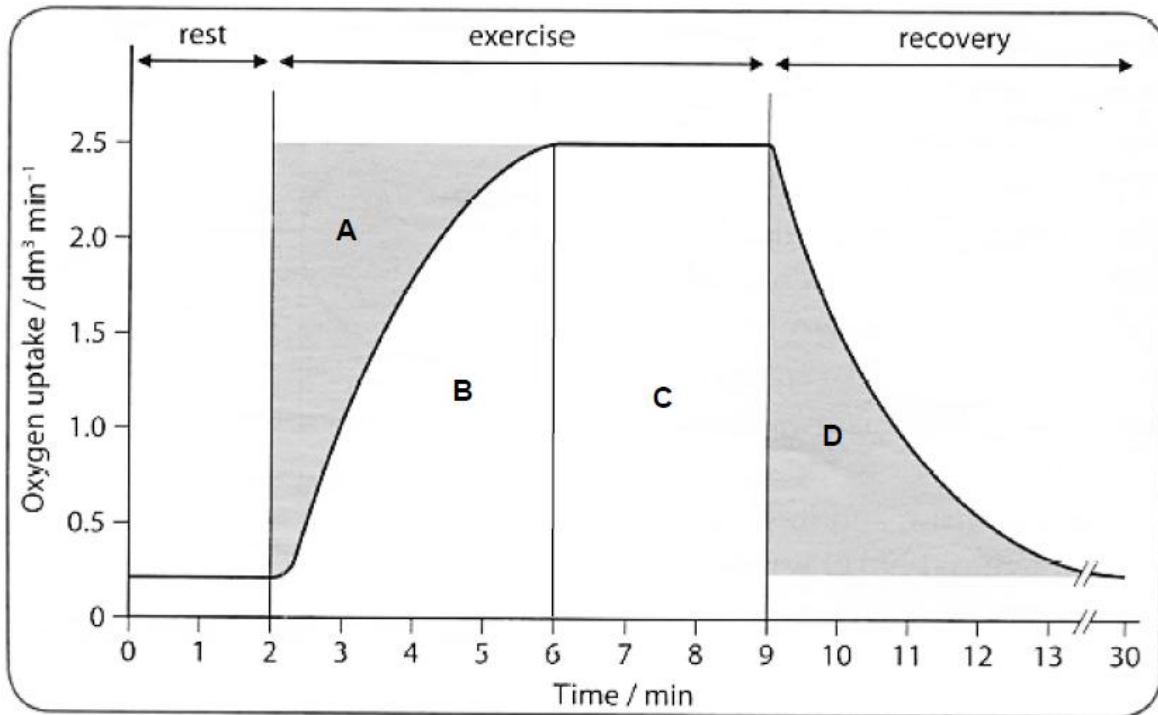
What is correct about the transport of carbon dioxide by blood?

- I** The enzyme carbonic anhydrase catalyses the formation of carbonic acid in red blood cells.
 - II** Carbon dioxide diffuses from respiring cells to red blood cells and reacts with water.
 - III** Carbonic acid dissociates to form hydrogen ions which combine with haemoglobin to form carbaminoglobin.
- A** I, II and III
 - B** I and II only
 - C** II and III only
 - D** III only

26.

The diagram shows the oxygen uptake of a man before, during and after strenuous exercise.

Which region represents the repayment of oxygen debt?



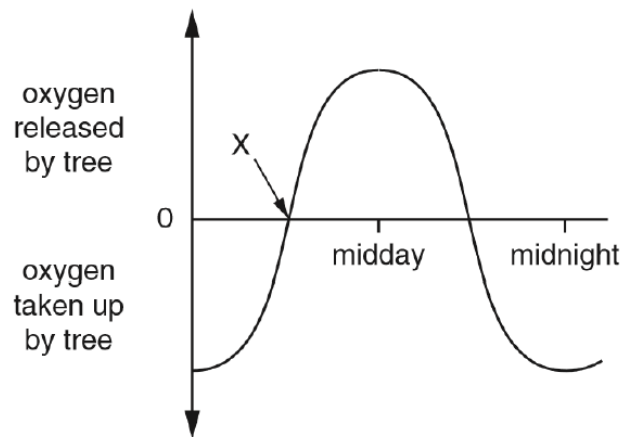
27.

When is air first sucked in?

- A** when the diaphragm is raised
- B** when the ribs and sternum are lowered
- C** when the pressure in the thoracic cavity decreases below atmospheric level
- D** when the pressure in the thoracic cavity increases above atmospheric level

28.

The graph shows the oxygen released and taken up by a tree during a 24 hour period.



Which statement describes the situation at point X?

- A Respiration begins.
- B Photosynthesis stops.
- C The rate of respiration is equal to the rate of photosynthesis.
- D The rate of respiration is greater than the rate of photosynthesis.

29.

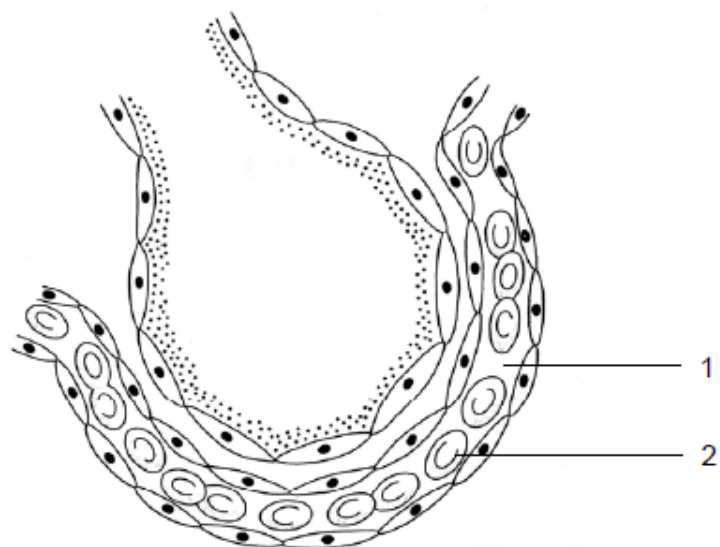
A person has been smoking heavily for many years. A lot of dust and micro-organisms were found in his lungs.

Which statement explains why this occurs?

- A His arteries are blocked with tar.
- B The cilia in his trachea have been destroyed.
- C He is addicted to nicotine.
- D The surface area of his lungs is reduced.

30.

The diagram below shows the cross section of an alveolus and surrounding blood capillary.

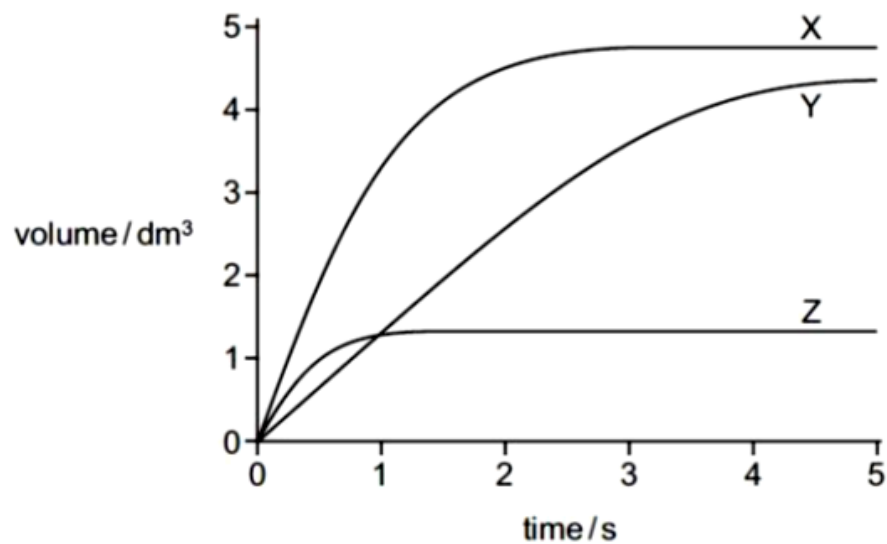


Which row correctly shows the site and reaction catalysed by carbonic anhydrase in the lungs?

	site	reaction catalysed by carbonic anhydrase
A	1	$\text{HCO}_3^- + \text{H}^+ \rightarrow \text{H}_2\text{CO}_3$
B	2	$\text{HCO}_3^- + \text{H}^+ \rightarrow \text{H}_2\text{CO}_3$
C	1	$\text{H}_2\text{CO}_3 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
D	2	$\text{H}_2\text{CO}_3 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$

31

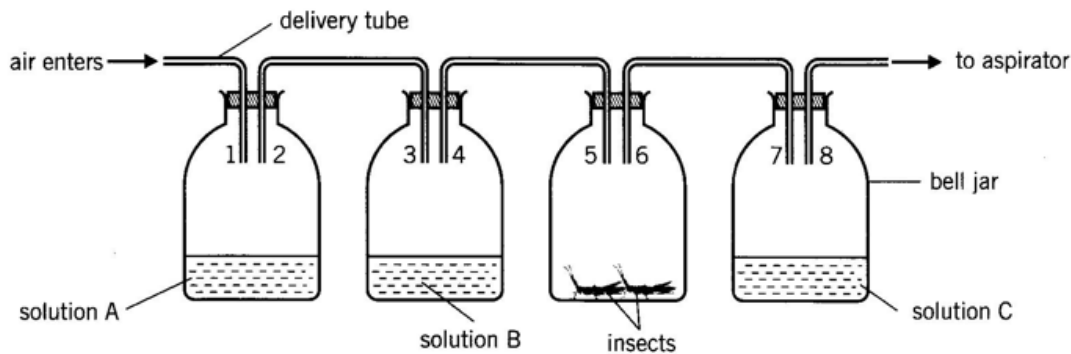
The graph shows the volume of air deeply inhaled by three different people, X, Y and Z immediately after breathing out quickly and with force.



What is an explanation for the differences?

	chronic bronchitis	emphysema	healthy lung function
A	X	Y	Z
B	X	Z	Y
C	Y	Z	X
D	Z	Y	X

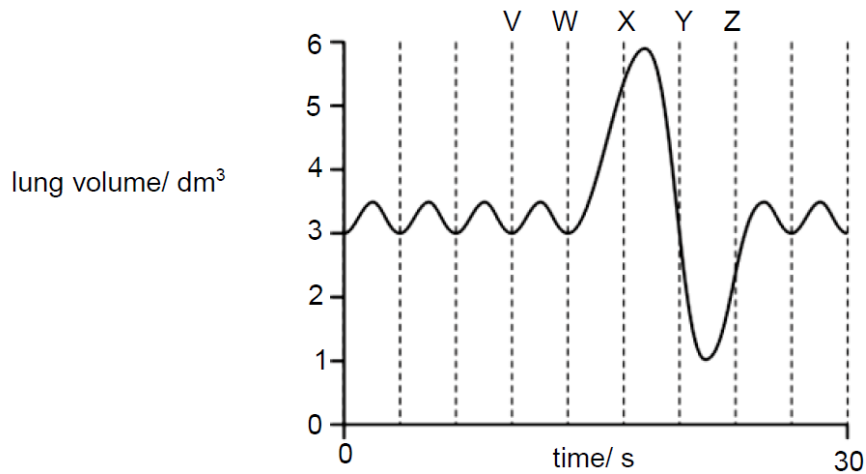
For the next two questions, refer to the experimental set-up below. The set-up investigates respiration using living insects. Positions 1 to 8 indicate the end part of the delivery tube.



- 32 Which is the best suggestion to rectify the mistake in the experimental set-up?
- A** Air should enter from tube 8 instead of tube 1.
 - B** The insects should be replaced with freshwater fish as it is a more effective organism to study respiration.
 - C** The end part of delivery tubes at 2 and 4 should be dipped into the solution to let the air flow through solutions A, B and C.
 - D** The end part of delivery tubes at 1, 3 and 7 should be dipped into the solution to let the air flow through solutions A, B and C.
- 33 Assuming that the experimental setup has been rectified, which correctly identifies solution A and its purpose?
- A** Bicarbonate solution. To detect carbon dioxide released by living organism during respiration.
 - B** Sodium hydroxide solution. To remove atmospheric carbon dioxide.
 - C** Potassium hydroxide solution. To detect carbon dioxide released by living organism during respiration.
 - D** Bicarbonate solution. To remove atmospheric carbon dioxide.

34

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



During which period is the rate of breathing the highest?

- A V to W
- B W to X
- C X to Y
- D Y to Z

35

Space shuttles have a closed ventilation system. One particular space shuttle was provided with 100% oxygen and it was found that many of the astronauts blacked out.

Which of the following would best explain this?

- A The lungs are unable to expand completely due to the lack of gravity.
- B Too much oxygen can damage haemoglobin.
- C The high level of oxygen caused oxidative damage to their brain tissues.
- D There is insufficient carbon dioxide gas.