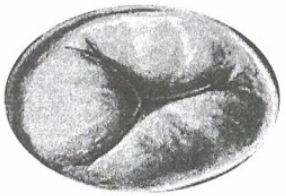
19. Imagine that you were a red blood cell travelling along a blood vessel and had reached the heart. After passing through the 'gate' shown in the diagram below, there was another 'gate' ahead. Which heart chamber were you situated now?

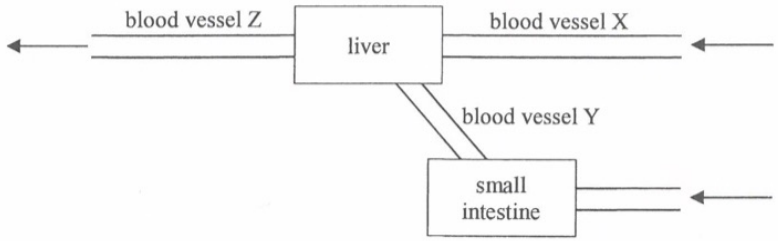


A. left atrium
B. left ventricle
C. right atrium
D. right ventricle

20. Some babies are born with a heart defect which is a hole in the septum separating the left and right ventricles. When the ventricles contract at the same time, some blood flow will deviate from the normal route. Which of the following is most likely the deviated route?

A. left ventricle → right ventricle → aorta
B. left ventricle → right ventricle → pulmonary artery
C. right ventricle → left ventricle → aorta
D. right ventricle → left ventricle → pulmonary artery

Directions: Questions 21 and 22 refer to the diagram below, which shows part of the human circulatory system and the associated organs:



22. Which of the following descriptions about blood vessel Y are correct?

(1) It transports hormones.
(2) It carries deoxygenated blood.
(3) It has capillary networks at both ends.

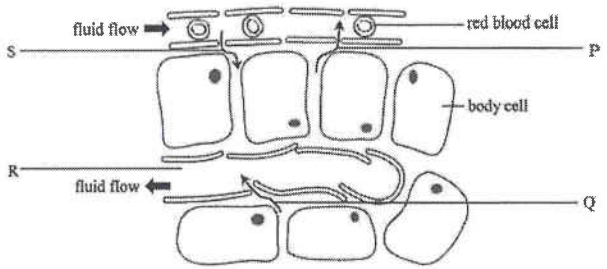
A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

DSE M.C. Questions - Transport in humans
(sort by difficulty)

Challenging

2016 Q.28 (18%)

Directions: Questions 28 and 29 refer to the diagram below, which shows the cells and the associated vessels in a tissue:



Which of the following combinations correctly identifies the major causes of fluid flow represented by P, Q and S?

	P	*Q*	*S*
A.	osmosis	diffusion	hydrostatic pressure
B.	hydrostatic pressure	hydrostatic pressure	diffusion
C.	osmosis	hydrostatic pressure	hydrostatic pressure
D.	diffusion	diffusion	osmosis

2018 Q.34 (38%)

Which of the following contribute to the continuous blood flow in the aorta?

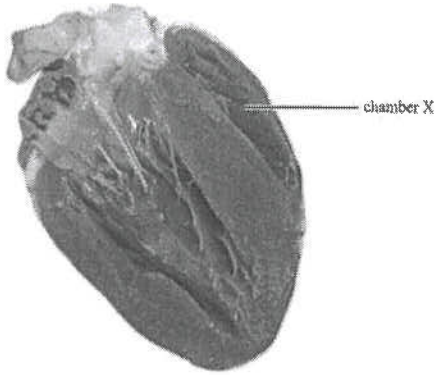
(1) pumping action of the heart
(2) elastic nature of the wall of the aorta
(3) contraction and relaxation of muscle wall of the aorta

A. (1) and (2) only B. (1) and (3) only C. (2) arid (3) only D. (1), (2) and (3)

Challenging

2018 Q.35 (20%)

35. The following photograph shows a dissected pig heart:



Which of the following descriptions about chamber X is correct?

A. It receives blood from the pulmonary vein.
B. It pumps out blood to the aorta.
C. It receives blood from the vena cava.
D. It pumps out blood to the pulmonary artery.

2019 Q.15 (35%)

Which of the following description(s) of human red blood cells is/ are correct?

(1) they cannot synthesise enzymes or proteins for repair because of the absence of the nucleus
(2) they will stop functioning one day because haemoglobin will be used up
(3) they do not have an energy supply because of the absence of mitochondria

A. (1) only B. (2) only C. (1) and (3) only D. (2) and (3) only

Challenging

2019 Q.22 (39%)

When ventricles contract, the valves between ventricles and atria close. Which of the following is the cause of the valve closure?

A. The heart tendons hold the valves in position.
B. The refilling of blood at the atria pushes the valves so that they close.
C. The closure of valves prevents the blood from flowing back to the atria.
D. The higher blood pressure resulting from ventricular contraction pushes the valves so that they close.

Average

2013 Q.31 (64%)

Muscles are found in

(1) arterioles.
(2) capillaries.
(3) veins.

A. (1) and (2) only B. (1) and (3) only C. (2) and (3) only D. (1), (2) and (3)

2016 Q.13 (47%)

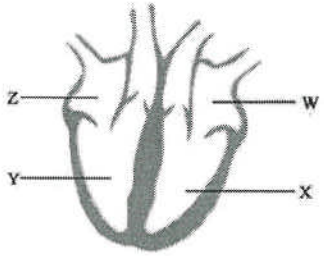
Of the following blood vessels, which one contains blood with the highest urea content?

A. renal vein B. hepatic vein
C. pulmonary vein D. hepatic portal vein

Average

2016 Q.17 (40%)

Directions: Questions 16 and 17 refer to the diagram below, which shows a section of the heart:

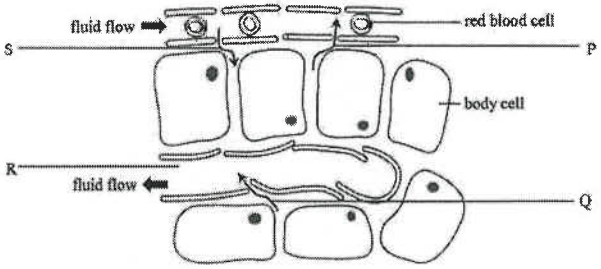


Which of the following statements about the heart is correct?

A. Z receives oxygenated blood from the lungs.
B. Y and Z pump out same volume of blood.
C. Blood in Z has higher glucose content than that of W.
D. Blood pumped out from Y travels a longer distance than that of X before returning to the heart.

2016 Q.29 (73%)

Directions: Questions 28 and 29 refer to the diagram below, which shows the cells and the associated vessels in a tissue:



Fluid in R eventually returns to the heart at the

A. left atrium. B. right atrium. C. left ventricle. D. right ventricle.

Average

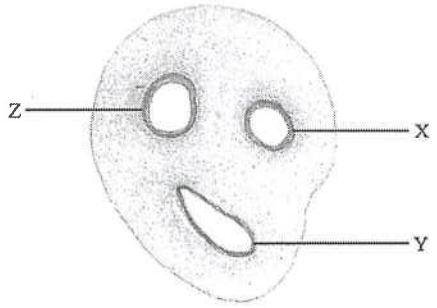
2017 Q.18 (49%)

Which of the following descriptions of the circulatory system is correct?

A. Veins have a large lumen because the blood pressure inside them is low.
B. Arteries have a thick layer of elastic tissue because they have small lumen.
C. The aorta has the highest blood pressure because it supplies blood to the whole body.
D. the capillary network is a suitable site for material exchange because capillaries have the thinnest walls.

2019 Q.27 (50%)

The photomicrograph below shows a section of a human umbilical cord with three blood vessels:



Which of the following comparisons of the content of the blood vessels is correct?

A. The blood in vessel X has a higher oxygen content than that in vessel Y.
B. The blood in vessel Z has a higher glucose content than that in vessel X.
C. The blood in vessel Y has a higher amino acid content than that in vessel X.
D. The blood in vessel Y has a higher carbon dioxide content than that in vessel Z.

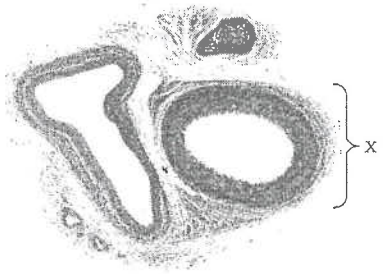
Easy

2012 Q.21 (83%)

A red blood cell leaves the aorta, travels through the body and arrives at the capillaries of the air sacs. The correct sequence of organs through which the red blood cell may have travelled is

A. liver, lungs, small intestine and heart.
B. lungs, heart, small intestine and liver.
C. small intestine, heart, liver and lungs.
D. small intestine, liver, heart and lungs.

Directions: Questions 31 and 32 refer to the photomicrograph below, which shows some blood vessels found in the human body:



2012 Q.31 (90%)

Blood vessel X is an artery because it has a

A. thick muscular wall to withstand high blood pressure.
B. thick muscular wall to generate high blood pressure.
C. large lumen to slow down the blood flow.
D. large lumen to accommodate more blood.

2012 Q.32 (75%)

If blood vessel X is connected with the lung, it carries

A. oxygenated blood towards the heart.
B. oxygenated blood towards the lungs.
C. deoxygenated blood towards the heart.
D. deoxygenated blood towards the lungs.

Easy

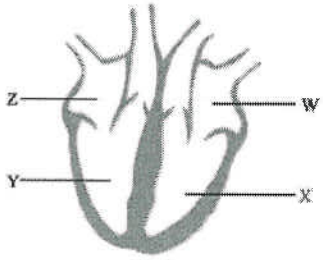
2012 Q.33 (76%)

In the circulatory system, the highest blood pressure is developed in the

A. left atrium.
B. right atrium.
C. left ventricle.
D. right ventricle.

2016 Q.16 (76%)

Directions: Questions 16 and 17 refer to the diagram below, which shows a section of the heart:



When W contracts, which of the following combinations about the conditions of the valves is correct?

	Semi-lunar valve	*Bicuspid valve*
A.	open	open
B.	open	closed
C.	closed	open
D.	closed	closed

2020 Q.12

12. Which of the following descriptions of the hepatic portal vein is correct?

A. It carries blood away from the liver.
B. It carries blood with lower oxygen content than that in the hepatic vein.
C. It carries blood with lower amino acid content than that in the hepatic artery after meals.
D. It carries blood with lower glucose content than that in the hepatic vein when one is hungry.

2021 Q.20

20. Carbon dioxide produced in the small intestine is passed to the lungs for gas exchange. Which of the following correctly shows the transport route of the carbon dioxide?

A. small intestine → lungs
B. small intestine → liver → lungs
C. small intestine → heart → lungs
D. small intestine → liver → heart → lungs

Answers

Challenging

2016	2018	2019
28 [C]	34 [A]	15 [A]
	35 [D]	22 [D]

Average

2013	2016	2017	2019
31 [B]	13 [B]	18 [D]	27 [C]
	17 [C]		
	29 [B]		

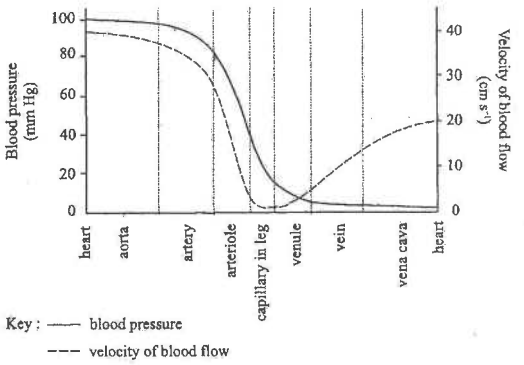
Easy

2012	2016
21 [D]	16 [C]
31 [A]	
32 [D]	
33 [C]	

2020
12[D]

CE - 2002

4. (b) The graph below shows the changes in blood pressure and velocity of blood flow as the blood travels from the heart to the leg and returns to the heart:



(i) Compare the blood pressure in the artery with that in the vein. Suggest two reasons for the difference. (3)

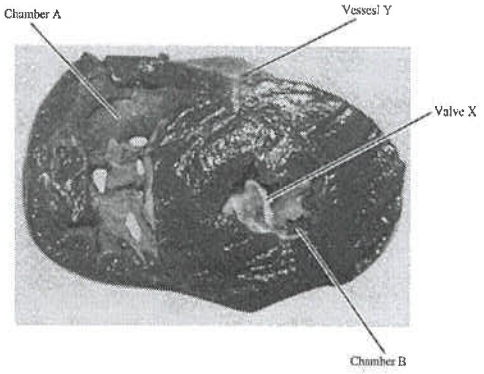
(ii) Explain the importance of the low velocity of blood flow in the capillary. (2)

(iii) In the vein of the leg, the blood pressure is very low while the velocity of blood flow is quite high. Describe how such a high velocity of blood flow in the vein is maintained. (2)

(iv) Using the same x-axis given above, sketch a graph to show the change in the oxygen content of the blood as it passes through the blood vessels. (3)

CE - 2003

4. (b) The photograph below shows the transverse section of a pig's heart, which has a structure similar to that of the human heart.



(i) Which chamber of the heart, A or B, is responsible for sending out blood to all parts of the body except the lung? Explain your choice. (1)

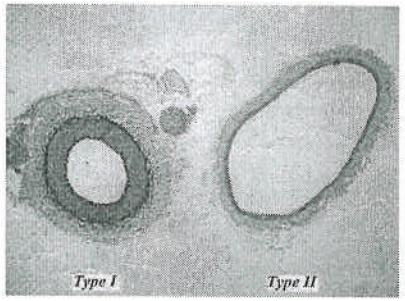
(ii) (1) Name valve X. (1)

(2) In a type of heart disorder, valve X cannot close properly. A man suffering from this disorder may faint easily when he performs vigorous exercise. How would you explain this? (4)

(iii) Vessel Y is an artery found in the heart wall. Explain why the risk of heart attack would be higher if fatty substances are deposited on the inner wall of vessel Y. (2)

CE - 2004

3. (c) The photomicrograph below shows the sections of two types of blood vessels in the human body :



(i) State two functions of the thick muscular wall of vessel type I. (2)

(ii) Vessel type II has a larger lumen than vessel type I. Explain the importance of this. (2)

The table below shows the gas content of the blood in the two types of vessels transporting blood between the heart and an organ A :

	Gas content (arbitrary unit)	
	Vessel type I	Vessel type II
Carbon dioxide	44	40
Oxygen	40	100

(iii) Identify organ A. (1)

(iv) With reference to organ A,

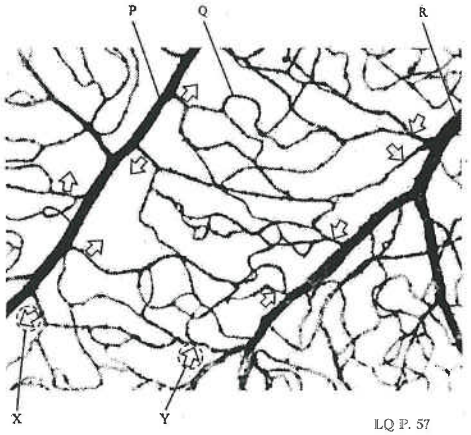
(1) account for the difference in carbon dioxide content between the blood in vessel types I and II. (3)

(2) explain the low oxygen content of the blood in vessel type I. (3)

CE - 2005

8. (a) The photomicrograph below shows three types of blood vessels, P, Q and R, in a tissue. The cells of the tissue are not shown.

Key : ⇨ direction of fluid movement between the blood and the tissue cells



(i) (1) Judging from the direction of fluid movement shown above, which blood vessel, P or R, would have a more muscular wall? (1)

(2) Explain the importance of the muscular tissue in the wall of the blood vessel. (3)

(ii) Q forms a highly branched network. What is the significance of this? (2)

(iii) Explain how the fluid movement as indicated by the arrows is brought about at

(1) site X (2)

(2) site Y (2)

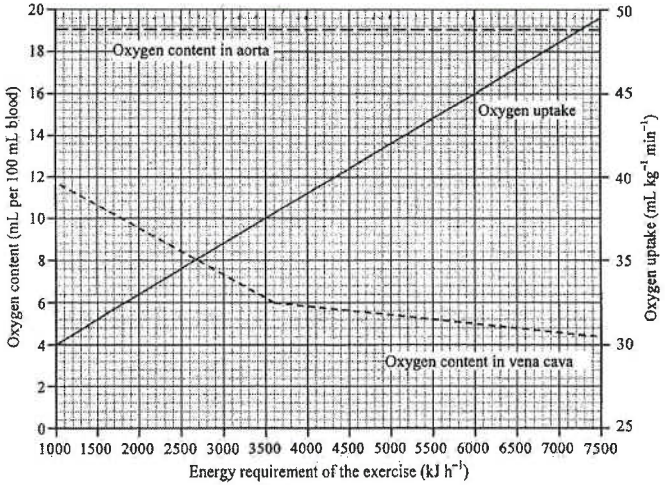
CE - 2006

1. The following paragraph describes the blood flow and a defective condition in the veins of the legs. Complete the paragraph with suitable words. (5)

Blood flow in veins is usually under .....(a)..... pressure. In the legs, blood in veins flows upwards against .....(b)..... to return to the heart. The upward flow is assisted by the contraction of .....(c)..... lying next to the veins. The .....(d)..... in the veins help to ensure that blood flows in one direction only. If they cannot .....(e)..... properly in performing its function, it may result in the accumulation of blood and hence a higher blood pressure in the veins of the legs. Consequently, veins located near the surface of the skin tend to bulge and become visible, forming varicose veins.

CE - 2006

10. (b) The graph below shows the oxygen content of blood in the aorta and that in the vena cava, and the oxygen uptake of a person performing exercise of different intensities. The intensity of exercise is expressed as the energy requirement of the exercise.



(i) How does the oxygen uptake change with exercise of different energy requirements?(1)

(ii) From the graph, find out the blood oxygen content in the aorta and the vena cava for boxing, which has an energy requirement of 4500 kJ h^{-1}. (1)

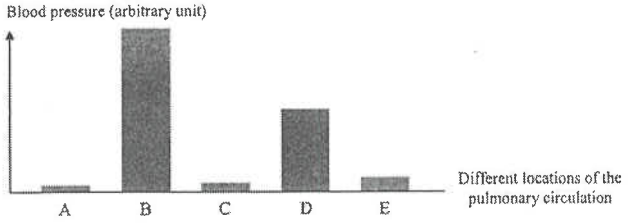
(iii) The energy requirements for running and cycling leisurely are 3600 kJ h^{-1} and 1800 kJ h^{-1}. Calculate the difference in the blood oxygen content between the aorta and the vena cava for each type of exercise. (2)

(iv) How does the difference in blood oxygen content between the two blood vessels change with the intensity of exercise? Explain the significance of this change. (3)

(v) As exercise intensity increases, there is a great change in the blood oxygen content in the vena cava, but that in the aorta remains constant and high. Explain how the constant and high blood oxygen content in the aorta can be achieved. (3)

CE - 2008

9. (b) The graph below shows the blood pressure of blood vessels at different locations of the pulmonary circulation.



(i) (1) Using the letters A to E in the graph, construct a flowchart to show the direction of blood flow from the heart along the pulmonary circulation. (1)

(2) State the criterion you should use in constructing the flowchart in (1). (1)

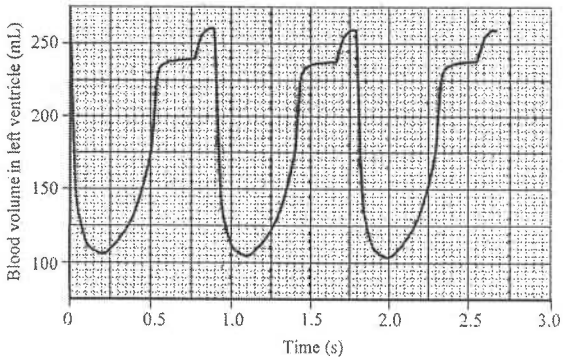
(ii) The blood vessels of two of the above locations show rhythmic changes in blood pressure. Explain how these blood pressure changes are related to the heart activity. (2)

(iii) State two blood components responsible for killing specific pathogens in the human body. (2)

(iv) Immunity can be acquired by vaccination. Vaccine may be injected into the tissue under the skin. Describe how the vaccine can be transported to the heart after injection. (3)

CE - 2009

2. The following graph shows the change in blood volume in the left ventricle of a man over time.



(a) With reference to the graph, calculate his heartbeat rate. (2 marks)

(b) State the conditions of the following heart valves at 1.0 s. (2 marks)
bicuspid valve:_____semi-lunar valve: _____

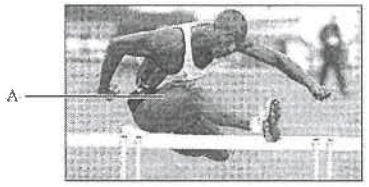
(c) Explain the increase in blood volume in the left ventricle from 1.1 s to 1.5 s (3 marks)

CE - 2009

3. (b) Aged red blood cells are destroyed in the liver. What is the fate of haemoglobin after the red blood cells are destroyed? (2 marks)

CE - 2009

7. The photograph below shows an athlete leaping a hurdle.



(c) After the race, athletes would apply some ointment which enhances local blood circulation to relieve muscle fatigue. Explain how the enhanced blood circulation could help the recovery of the muscle from fatigue. (1 mark)

AL - 2005 2B

5. (b) Explain how fluid is interchanged between blood and tissue fluid. (4)

AL - 2006 2C

7. In mammals, structures responsible for gas exchange between the body and the atmosphere are closely related to the circulatory system. In terrestrial flowering plants, the corresponding structures for gas exchange are also closely related to the system for water transport. Write separate accounts of this relationship in mammals and in terrestrial flowering plants. Comment on the significance of this relationship in each type of organisms. (15)

HKDSE – 2015 1B

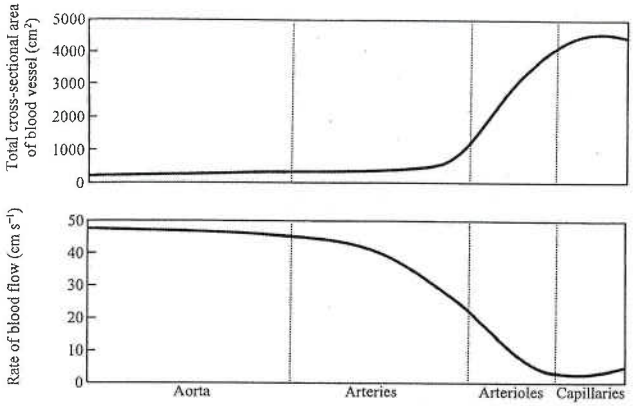
11. Although both arteries and veins are blood vessels, they are very different in their structure. Discuss how their structural differences are related to the different ways of maintaining blood flow inside the blood vessels. (11 marks)

HKDSE - 2017 1B

11. Some natural therapists claim that applying pressure along one's limbs toward the body trunk can improve the circulation of lymph and result in reduced body weight. However, the effects of this treatment are controversial. Briefly describe how lymph is formed from the blood and returned to the blood circulatory system. For each of the claims above, discuss whether it is scientifically valid. (11 marks)

HKDSE - 2021 1B

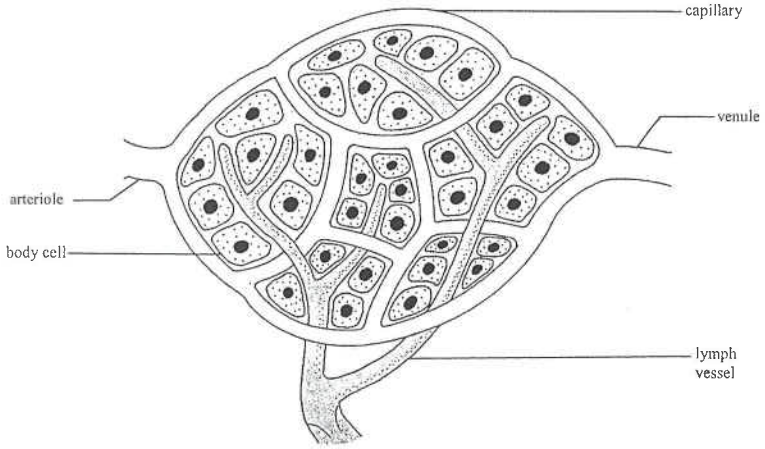
3. (a) The graph below shows the total cross-sectional area and the rate of blood flow of different types of blood vessels:



(i) Describe the overall relationship between the total cross-sectional area of blood vessels and the rate of blood flow. (1 mark)

(ii) Explain how the relationship described in (i) can facilitate the material exchange that takes place in the capillaries. (2 marks)

(b) The following schematic diagram illustrates a capillary network and the associated structures:



With reference to *two* features of the capillary network illustrated in the above diagram, explain the importance of these features to the material exchange in the capillary network. (4 marks)

Features illustrated in the diagram	*Importance to the material exchange*

Past Papers Marking Scheme – Transport in humans

CE - 2002 Q.4 (b)

(i) The blood pressure in the vein is much lower than that in the artery 1
Reasons :
- the blood in the artery is directly under the pumping action of the heart, while that the vein is not
- the blood in the vein has overcome great friction / resistance after traveling over a long distance
- there is a loss of fluid from the blood during the formation of tissue fluid
any two 1,1

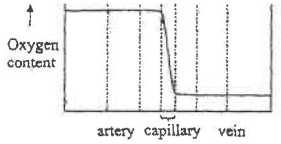
(ii) To allow more time 1
for the exchange of materials between the blood and the tissue cells 1

(iii) The volume of blood flow through each section of the circulation per unit time is the same 1
From the capillary to the vein, the total cross-sectional area decreases, so the velocity of blood flow increases 1

OR

Contraction of skeletal muscle adjacent to the vein helps to force the blood to flow / inspiration helps to draw blood toward the thorax 1
At the same time, valves are present in the veins to prevent the backflow of blood 1

(iv) Title (T) ½
Shape of the curve showing the drop in oxygen content at the capillary 1½
Correct axis labels : oxygen content, heart-heart / artery-vein / aorta-vena cava
arteriole – venule 2 x ½



Change in oxygen content of the blood in its circulation between the heart and the leg

CE - 2003 Q.4 (b)

(i) Chamber B 1
The wall of B is thicker / more muscular than that of A 1
showing that it is the left ventricle / it can generate a greater force for pumping blood 1

(ii) (1) bicuspid valve 1
(2) If X does not close properly, oxygenated blood in the left ventricle will flow back to the left atrium when the ventricle contracts 1
This reduces the amount of oxygenated blood pumped out of the heart in each beat 1
During vigorous exercise, the oxygen consumption of the skeletal muscle is very high 1
This increases the risk of insufficient oxygen supply to the brain 1
thus the person would faint easily

(iii) The deposition of fatty substances on the inner wall of vessel Y would block the vessel 1
This would reduce the oxygen supply to the heart muscle 1
hence increase the risk of heart attack

CE - 2004 Q.3 (c)

(i) To withstand the high blood pressure 1
To regulate the blood flow to the organ / control the diameter of the vessel lumen 1

(ii) The blood pressure in vessel type II is lower 1
The larger lumen would have a smaller resistance, thus facilitating the blood flow1

(iii) Lung 1

(iv) (1) Vessel type II of organ A has a lower carbon dioxide content than vessel type I 1
As blood flows from vessel type I to the lung, then to vessel type II 1
carbon dioxide diffuses out of the blood to the air sac in the lungs 1

(2) Blood in vessel type I of organ A comes from the veins / the right side of the heart 1
which collect blood from the body tissues 1
where oxygen is consumed in respiration 1

CE - 2005 Q.8 (a)

(i) (1) P 1

(2) The muscular tissue can contract and relax 1
to change the diameter of vessel P 1
so as to regulate the blood flow to the tissue cells 1

(ii) To provide a large surface area 1
for the exchange of materials between the blood and the tissue cells 1

(iii) (1) Due to a high blood pressure in the capillary at X 1
some plasma is forced out through the wall of the capillary 1

(2) Due to the retention of plasma proteins / low blood pressure at the venule end of the capillary 1
the water potential of the tissue fluid around Y is higher than that of the blood / water in the tissue fluid is drawn into the capillary by osmosis 1

CE - 2006 Q.1

(a) low 1
(b) gravity 1
(c) (skeletal) muscle 1
(d) valves 1
(e) close 1

CE - 2006 Q.10 (b)

(i) Oxygen uptake increases with exercise of increasing energy requirement 1

(ii) Oxygen content in aorta : 19 mL per 100 mL blood
Oxygen content in vena cava : 5.6 mL per 100 mL blood (1 or 0)

(iii) Difference in oxygen content for running = 19 - 6 = 13 mL per 100 mL blood 1
Difference in oxygen content for cycling = 19 - 10 = 9 mL per 100 mL blood 1

(iv) The difference in blood oxygen content between the aorta and the vena cava increases with increased exercise intensity 1
This shows that more oxygen is consumed by tissue 1
for respiration to release more energy for increased exercise intensity 1

(v) During vigorous exercise, there is an increase in ventilation rate / rate and depth of breathing 1

The oxygen content in air sac increases 1
The diffusion gradient across alveolar wall increases / this increases the diffusion of oxygen into the blood 1
thus maintaining the blood oxygen content of the aorta at a constant and high level 1

CE - 2008 Q.9 (b)

(i) (1) (Heart) → B → D → E → C → A 1
(2) Blood flows from a high pressure region to a low pressure region 1

(ii) When the ventricle of the heart contracts, blood is forced into the artery B, resulting in the increase of blood pressure 1
Blood in the artery flows forward along the blood vessels while the ventricle of the heart relaxes, as a result the blood pressure drops... 1

(iii) Any *two* of the following:
Lymphocyte / B- or T- lymphocyte } White blood cell
Phagocyte
Antibodies ... 1, 1

(iv) Vaccine injected reaches the tissue fluid 1
which drains back to lymph capillary / blood capillary 1
and returns to the heart via a vein 1

CE- 2009 Q.2

(a) Calculation (60 s / 0.9 s) 1
Accurate result with unit (67 beats min^{-1}) 1

(b) bicuspid valve: closed 1
semi-lunar valve: open 1

(c) From 1.1 s to 1.5 s, the left ventricle is relaxing 1
causing a drop in blood pressure inside the left ventricle to become lower than that of the left atrium 1
Blood flows from the left atrium to the left ventricle 1

CE - 2009 Q.3 (b)

(b) The haemoglobin will be broken down and converted into bile pigment
Iron and } any 2
protein / amino acid will be released 1,1

CE - 2009 Q.7 (c)

(c) Enhanced blood circulation helps to transport lactic acid away from muscle cells more quickly 1

AL - 2005 2B

5. (b)

Concept for mark award:	
• interchange of fluid occurs in the capillaries (1) • movement of fluid from blood to interstitial spaces (2) • return of fluid from interstitial spaces to blood (3)	max. 4

e.g. • interchange of fluid between blood and tissue fluid occurs in the capillaries (1) 1

- some components of the plasma (1) are forced from blood into interstitial spaces by blood pressure (1) at the arterial end of the capillary } 2
- some of the tissue fluid is collected back into blood at the venule end of the capillary network by osmosis (1), as the retention of plasma proteins in the blood results in a lower solute potential (1) } 3
- some tissue fluid is collected by the lymphatic vessels (1) and subsequently returned to the blood circulation

(max. 4)

AL - 2006 2C

7.

	Relationship	Significance
Mammal	• structure for gas exchange with atmosphere: alveoli of lungs (1) • alveoli are in close contact (1) with numerous capillaries (1) • alveoli and circulatory system are closely coupled in function / rate of breathing and rate of blood flow is closely coupled (1) and controlled by medulla / ANS (1) **1 + max. 3**	• the close contact shortens the distance of diffusion of gases (1) • the rich blood supply helps to transport oxygen away rapidly (1), thus assisting to maintain a steep concentration gradient between blood and alveoli (1); the same applies to the removal of carbon dioxide (1) • haemoglobin with high affinity of oxygen (1) allows efficient oxygen uptake (1) • all the above allows efficient oxygen uptake (1) and transport to body tissues (1), and efficient removal of carbon dioxide from tissues (1) • so that oxygen supply and carbon dioxide removal are kept at a rate that suits the physiological needs of the body (1) **max. 6**

max. 9

	Relationship	Significance
Flowering plant	• structure for gas exchange with atmosphere: stomata in leaves (1) • opening of stomata leads to inevitable water loss (1) • results in transpiration pull (1) for water transport in xylem (1) **1 + max. 2**	• assist in water absorption (1) in roots • conditions (i.e. light intensity) (1) affecting stomatal opening also influence the rate of water transport (1) • when the rate of water transport is lower than the rate of water loss (1), the plant becomes deficient in water, this induces the closure of stomata (1), and results in slowing down gas exchange (1), thus limiting the rate of photosynthesis and respiration (1) **max. 5**

max. 8

max. 15

HKDSE – 2015 1B

11.

Structural differences (S: max. 3)	Ways of maintaining blood flow (F: max. 5)
• wall of arteries is thicker than that of veins (1)	• pumping of heart (created a high blood pressure) to drive the blood flow in arteries (1), the thick wall can withstand the high blood pressure (1)
• wall of arteries contains more elastic tissue than that of veins (1)	• elastic nature of the arterial wall allows recoil of the wall (1) which maintains the blood flow along the arteries
• valves are present in veins but not in arteries (1)	• blood flow in veins is maintained by the contraction of adjacent skeletal muscle (1), which squeeze the blood along, presence of valves can prevent the back flow of blood (1)
• lumen of veins is larger than that of arteries (1)	• blood pressure inside veins is relatively low (1), having a larger lumen reduces the resistance to blood flow / to increase the rate / amount of blood flow (1)

(The exceptional examples: pulmonary artery and vein are not accepted as correct alternative answers)

C=max. 3

11

HKDSE – 2017 1B

11. Formation of tissue fluid and its return (max. 5) — F=max.5

- (high) blood pressure / hydrostatic pressure at the arteriole end of the capillary bed forces some of the plasma /blood components out (1) to form tissue fluid
- the remaining blood cells / proteins are left in the blood and drain to the venous end (1)
- due to the presence of plasma proteins, the blood inside the capillary at the venous end has a lower water potential / higher osmotic potential or pressure than the tissue fluid (1)
- water moves into the capillary bed at the venous end by osmosis (1)
- (excess) tissue fluid will enter the lymph vessels to form the lymph (due to hydrostatic pressure) (1) in the tissue spaces — max. 5
- with the assistance of the contraction of (skeletal) muscles to squeeze the lymph vessels (1)
- and the presence of valves in lymph vessels to prevent the back flow (of lymph)(1)
- the lymph will (flow along the lymph vessels and) eventually return to the heart / veins or vena cava near the heart (1)

whether the claims are scientifically valid (max. 3)

Improvement of Circulation — S=max.1

Can:

- pressing along the lymph vessels / due to the neighbouring muscles / or the presence of valves especially in limbs does help the return of lymph (back to heart) (1) — (1)

Cannot:

Lymph vessels are usually found deep inside the body (1) — (1)

Reduction in Body weight — N=max.2

Cannot:

- this may reduce the accumulation of tissue fluid / lymph at the limbs, (giving a slimmer appearance temporarily) (1) — max. 2
- the lymph only returns to the circulatory system but is not eliminated (1), i.e. no change in body weight

OR

- this does not affect the energy input / energy output / food consumption of the body (1)
- therefore, there should be no effect on body weight

Effective communication (0-3) — max.3

11 marks