المدرسة
الوطنية الأرثوذكسية
الشميساني

The National
Orthodox School
Shmaisani

Stage (9 - 12)
1st Semester | 2023-2024

Subject: Biology

10 IB

Name : .....

Answer Key

3.2 Blood and circulation

Practice paper 1

NOS

Question 1 : Circle the correct answer :

1. Which statement puts the blood vessels into **increasing** order of lumen diameter (interior diameter)?

   A. capillary → artery → arteriole → aorta

   B. arteriole → artery → capillary → aorta

   C. aorta → artery → arteriole → capillary

   (D.) capillary → arteriole → artery → aorta

2. The table gives the features of three blood vessels in the mammalian circulatory system.

Vessel 1	Vessel 2	Vessel 3
Thin layer of smooth muscle with few elastic fibres	Thick layer of elastic fibres and smooth muscle	No elastic fibres or smooth muscle

What are vessels 1, 2 and 3?

	Vein	Capillary	Artery
A	3	2	1
(B)	1	3	2
C	2	3	1
D	1	2	3

3. Which structures are part of the walls of both capillaries and veins?

I. Cells

II. Pores

III. Elastic fibres

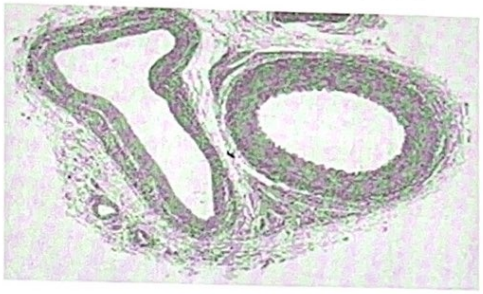
(A.) I only

B. I and II

C. I and III

D. I, II and III

4. The light micrograph shows two blood vessels, an artery and a vein, in transverse section.



What explains the different shapes of these blood vessels?

A. Arteries do not have valves.

B. Muscle cells are found only in the walls of veins.

C. Arteries have a larger lumen-to-wall thickness ratio.

D. There are fewer elastic fibres in the walls of veins.

5. Which feature of capillaries distinguishes them from arteries and veins?

A. Narrow diameter

B. Valves to prevent backflow

C. Thick muscular walls

D. Elastic tissue

6. What is an advantage of capillary walls being one cell thick in the systemic circulation?

A. To allow carbon dioxide to diffuse into tissues

B. To allow oxygen to diffuse out of tissues

C. To allow glucose to diffuse into tissues

D. To allow urea to diffuse into tissues

7. What observation did William Harvey use as evidence for the circulation of blood?

A. The ventricles of the heart pump blood out into arteries.

B. Valves ensure unidirectional flow of blood.

C. Capillaries carry blood from arteries to veins.

D. All organs of the body have a separate blood supply.

8. How are fats and cholesterol transported in the blood?

A. As groups of molecules inside vesicles

B. As individual molecules coated in phospholipids

C. As individual molecules bound to a protein

D. As groups of molecules in lipoprotein complexes

Question 2:

a. The function of red blood cells is to transport oxygen around the body in the blood.

Explain how the shape of a red blood cell is related to its function.

[3 marks]

(1) Biconcave shape

(2) Large surface area to volume ratio

(3) more oxygen can diffuse

(4) Has No nucleus / (5) contains haemoglobin that binds to oxygen

b. As well as its shape, the red blood cell also has internal adaptations to allow it to carry out its function. One of these is that it doesn't have a nucleus.

Explain why this is beneficial for the functioning of the cell.

[2 marks]

① More haemoglobin can be carried

② Can carry more oxygen

③ Increase the surface area to volume ratio.

c. Table 1 shows the number of blood cells per dm^3 of blood of two people.

One of the two people in Table 1 is infected with a pathogen.

Table 1

Type of blood cell	Number of cells per dm^3 of blood	
	Person A	Person B
Red blood cell	5×10^{12}	6×10^{12}
White blood cell	9×10^{9}	7×10^{10}

Identify the infected person and give a reason for your answer.

[4 marks]

Person A = 9000 000 000

B = 70 000 000 000.

(B) Because more white blood cells are involved in defense against diseases

Question 3 :

a. Figure 1 compares the structure of two main blood vessels in the body.

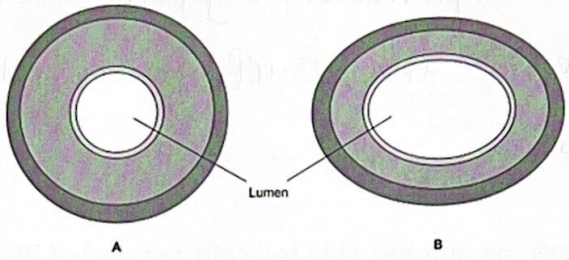


Figure 1

(i) Identify blood vessel A.....artery.....

(ii)State a reason for your answer in part (i).

① Thicker layer of muscle and elastic fibre.....

② Narrow lumen. [2 marks]

b. Blood vessel B has a very large lumen.

(i) Identify blood vessel B.....vein.....

(ii) State one reason for the presence of a large lumen in blood vessel B.

.....Can carry a large volume of blood to compensate for the slow flow rate. [2 marks]

c. The flow of blood in veins is not assisted by the pressure generated by the beating of the heart. List two structures that assist with the flow of blood in veins.

① They have valves.....

② Contraction of skeletal muscles.

.....

Question 4 :

a. Figure 1 shows a cross-section of the three different types of blood vessel.

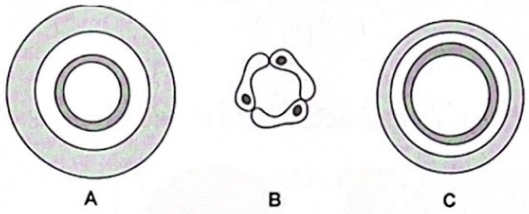


Figure 1

	Blood Vessel		
	A	B	C
Has the highest pressure	✓		
Allows diffusion through its walls		✓	
Contains valves			✓
Could be the aorta	✓		
Has the largest lumen			✓
(mostly) Carries deoxygenated blood			✓
Walls do not contain muscle tissue		✓	

[7 marks]

b. The student found that the artery tissue could stretch significantly more than the vein. Explain why this is an important feature for this type of blood vessel.

[3 marks]

More elastic fibres to help arteries to withstand high blood pressure without bursting.

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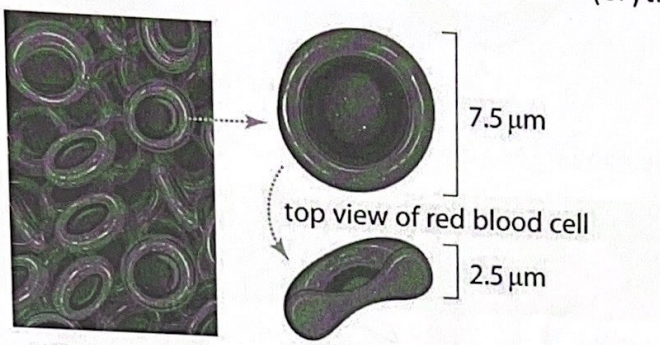
Question 5:

Figure 1 shows the structure and actual size of red blood cells (erythrocytes).



(i) Calculate the image size of the top view of this red blood cell if this cell is magnified 400×.

Give your answer in mm.

$M = \frac{I}{A} \Rightarrow I = 3000\ \mu m.$

$400 = \frac{I}{7.5}$ $\quad \frac{3000}{1000} = 3\ mm$

(2)

(ii) Explain how the shape of a red blood cell is related to its function.

.....

.....

.....

(3)

(iii) State the role of haemoglobin inside the red blood cell.

(1)

To bind with oxygen.

b. Some blood transfusions contain red blood cells.

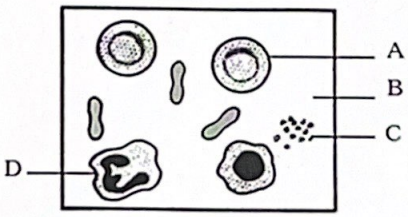
Red blood cells are stored in a solution containing 5.0% glucose and 0.9% salt. Explain why red blood cells cannot be stored in pure water.

[3 marks]

By osmosis water will move into the red blood cells causing it to burst

Question 6 :

The diagram shows a sample of blood.



(a) Name the cells labelled A, C and D.

A. Red blood cell. [1]

C. Platelets [1]

D. white blood cells [1]

(b) Which of the structures

(i) represents the plasma?

B [1]

(ii) can ingest bacteria?

D [1]

(iii) carries glucose?

B [1]

(iv) contains haemoglobin?

A [1]

(v) is involved in blood clotting?

C [1]