7. Transport in humans

Content

7.1 Circulatory system

Learning outcomes

Candidates should be able to:

(a) **describe the circulatory system as a system of tubes with a pump and valves to ensure one-way flow of blood**

(b) **describe the double circulation in terms of a low pressure circulation to the lungs and a high pressure circulation to the body tissues and relate these differences to the different functions of the two circuits**

(c) **name the main blood vessels that carry blood to and from the heart, lungs, liver and kidneys**

(d) **describe the structure and function of the heart in terms of muscular contraction and the working of valves**

(e) **compare the structure and function of arteries, veins and capillaries**

(f) **investigate and state the effect of physical activity on pulse rate**

(g) **describe coronary heart disease in terms of the occlusion of coronary arteries and state the possible causes (diet, stress and smoking) and preventive measures**

(h) **identify red and white blood cells as seen under the light microscope on prepared slides, and in diagrams and photomicrographs**

(i) **list the components of blood as red blood cells, white blood cells, platelets and plasma**

(j) **state the functions of blood:**

- **red blood cells – haemoglobin and oxygen transport**
- **white blood cells – phagocytosis, antibody formation and tissue rejection**
- **platelets – fibrinogen to fibrin, causing clotting**
- **plasma – transport of blood cells, ions, soluble food substances, hormones, carbon dioxide, urea, vitamins and plasma proteins**

(k) **describe the transfer of materials between capillaries and tissue fluid.**

O/N18/22/Q1

Fig. 1 and Fig. 2 show transverse sections of two types of blood vessel.

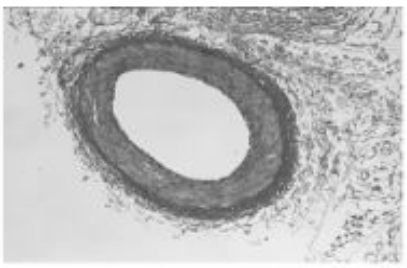

Fig. 1

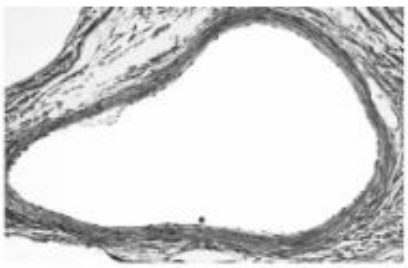

Fig. 2

(a) **(i)** Name the type of blood vessel shown in:

Fig. 1 .....

Fig. 2 ..... [2]

(ii) Describe the differences in the structures shown in Fig. 1 and Fig. 2 that helped you to identify these blood vessels.

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.....

.....[2]

(b) The diagram below is of a simplified, incomplete longitudinal section from the type of blood vessel shown in Fig. 2. The direction of blood flow is shown.

(i) Complete the diagram by drawing **one** set of valves. [2]

(ii) Describe the function of these valves.

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.....[2]

[Total: 8]

Transport in Human P2 questions

M/J18/21/Q4

The diagram shows a human heart and associated blood vessels.

(a) Complete the table to show which of the parts **A** to **F** contain oxygenated blood and which contain deoxygenated blood.

Write **each** of the letters **A** to **F** in either the right or the left side of the table.

contain oxygenated blood	contain deoxygenated blood

[2]

(b) (i) Complete the table below to show which of **A** to **F** are involved in the circulation of blood to or from each of the following locations:

- the lungs,
- the body tissues.

Write **each** of the letters **A** to **F** in either the right or the left side of the table.

blood to or from the lungs	blood to or from the body tissues

[4]

(ii) Compare the pressure of blood in the circulation to the body tissues and the pressure of blood in the circulation to the lungs.

.....

.....[1]

(iii) Explain how the structure of the heart produces this difference in blood pressure.

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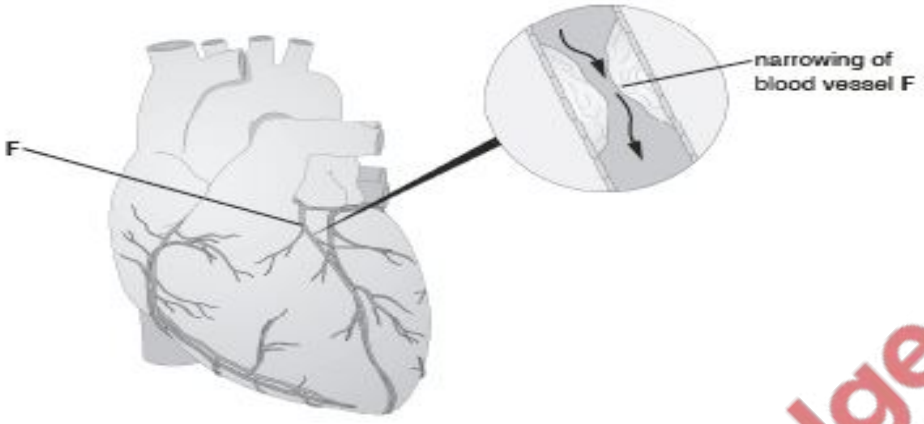
.....[3]

[Total: 10]

M/J18/22/Q2

The diagram shows the human heart.

The blood vessel labelled F may become narrowed as shown.



(a) (i) Name blood vessel F.

.....

[1]

(ii) Name the disease caused by the narrowing of this blood vessel.

.....

[1]

(iii) State three factors that may lead to the narrowing of this blood vessel.

1 .....

2 .....

3 .....

[3]

(iv) Suggest and explain how a person might be affected by the disease caused by the narrowing of blood vessel F.

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.....[5]

(ii) Compare the pressure of blood in the circulation to the body tissues and the pressure of blood in the circulation to the lungs.

.....

.....[1]

(iii) Explain how the structure of the heart produces this difference in blood pressure.

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.....[3]

[Total: 10]

O/N17/21/Q4

Fig. 4.1 shows a human cell.

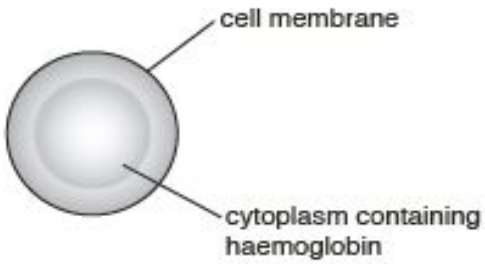

Fig. 4.1

(a) Name and state the main function of the type of cell shown in Fig. 4.1.

name .....

function .....

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[2]

(b) Suggest and explain what symptoms might be experienced by a person with an unusually low number of this type of cell.

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.....[4]

(c) Explain what would happen to the cell shown in Fig. 4.1 if placed in pure water.

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.....[3]

[Total: 9]

Transport in Human P2 questions

M/J17/21/Q3(a and b)

Fig. 3.1 shows an organ, **X**, and its associated blood vessels P, Q and R.

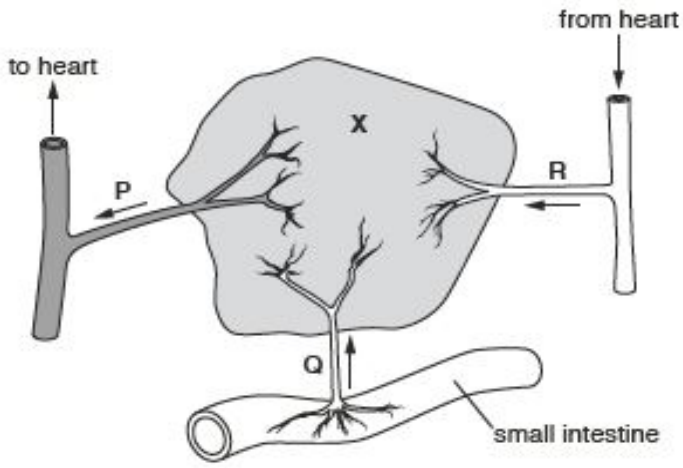

Fig. 3.1

Organ **X** is involved in the following processes:

- the metabolism of amino acids,
- the breakdown of chemical substances, including alcohol.

(a) Name organ **X** and each of its associated blood vessels.

organ **X** .....

blood vessel P .....

blood vessel Q .....

blood vessel R ..... [4]

(b) Compare the structure of the blood vessels P and R in Fig. 3.1.

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.....[3]

O/N16/21/Q8

(a) Describe the double circulation of blood in the human circulatory system and the different functions of the two circuits.

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..... [6]

(b) Describe the structure of a capillary and the transfer of a named material between capillaries and tissue fluid.

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..... [4]

O/N16/22/Q4

Fig. 4.1 shows a section through a heart connected to what is described as an LV Assist Device.

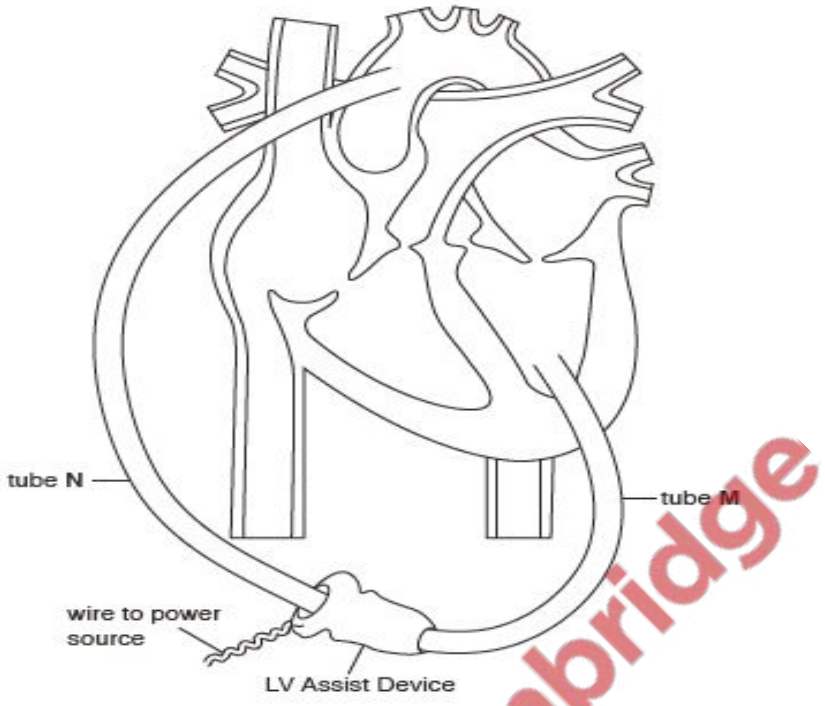

Fig. 4.1

(a) (i) Use Fig. 4.1 to suggest why the device is called an LV Assist Device.

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.....[1]

(ii) Name the type of tissue through which tube **M** passes.

..... [1]

(iii) Name the blood vessel into which tube **N** is inserted.

..... [1]

(b) Draw arrows on Fig. 4.1 to show

(i) the direction of blood flow in the blood vessels that carry blood into the heart. [2]

(ii) the direction of blood flow through the LV Assist Device. [1]

(c) Name the valve that is bypassed by blood flowing through the LV Assist Device.

.....[1]

(d) Sometimes the pulmonary circulation requires artificial assistance. Suggest and describe where, under these circumstances, an Assist Device would be fitted.

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.....[2]

[Total: 9]

Transport in Human P2 questions

O/N15/21/Q2

Fig. 2.1 shows a vertical section through a human heart viewed from the front.
Two chambers, **X** and **Y**, are labelled.

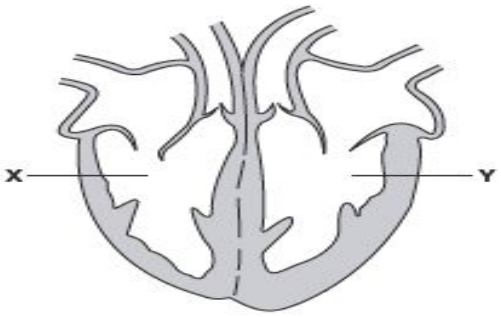

Fig. 2.1

(a) Use Fig. 2.1, and your knowledge of the circulatory system, to complete Table 2.1.

Table 2.1

chamber	name of chamber	name of blood vessel carrying blood from chamber
X		
Y		

[4]

(b) Fig. 2.2(a) shows how the mean blood pressure changes as blood flows through different types of blood vessel after leaving the heart.

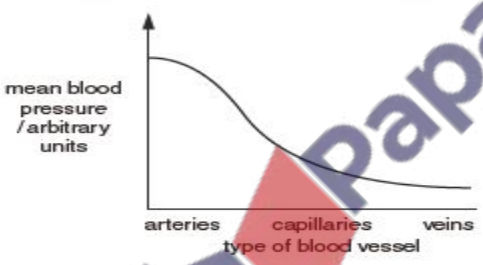

Fig. 2.2(a)

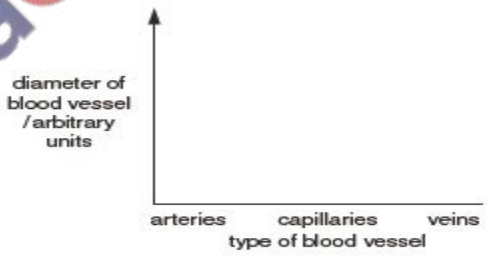

Fig. 2.2(b)

(i) Draw a line on Fig. 2.2(b) to show how the diameters of the vessels that blood flows through vary.

[2]

(ii) Use the line you have drawn on Fig. 2.2(b), and your biological knowledge, to explain why the mean blood pressure is higher in an artery than in a vein.

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..... [4]

(c) Fig. 2.3 shows blood returning to the heart at low pressure through a vein in a leg.

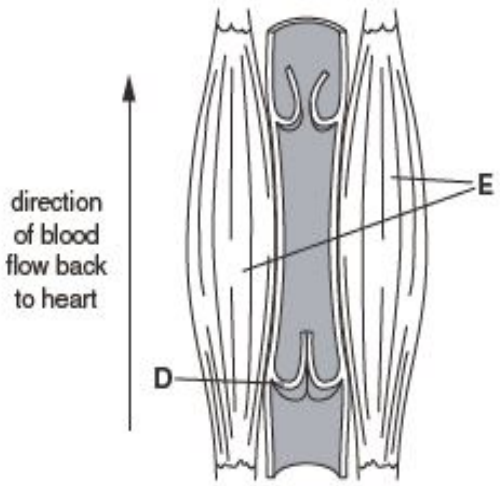

Fig. 2.3

Name part **D** in Fig. 2.3.

Explain how this part enables blood to return to the heart.

(i) name of part **D** .....

function .....

.....

..... [2]

(ii) Suggest how the parts labelled **E** in Fig. 2.3 help blood to return to the heart.

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..... [2]

[Total: 14]

Transport in Human P2 questions

O/N15/21/Q8

Name the components of human blood and explain how each component carries out its function.

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[Total: 10]

O/N15/22/Q3

Fig. 3.1 shows blood pressure changes as blood flows through part of the circulatory system, beginning at the right atrium, travelling to the lungs, and ending in the pulmonary vein.

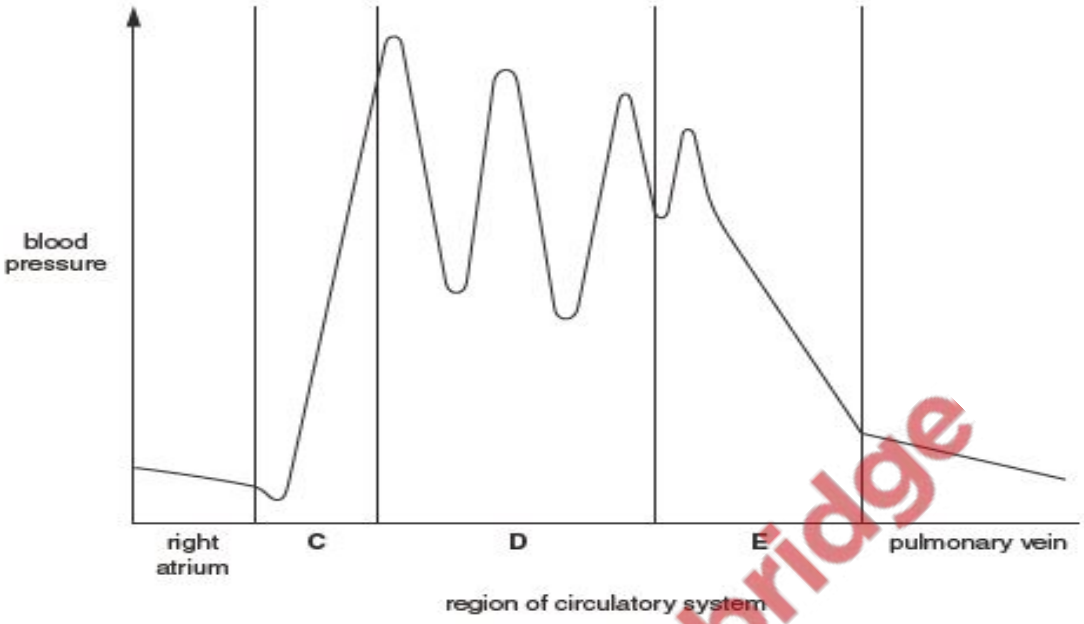

Fig. 3.1

(a) State which chamber of the heart is represented by **C**. Explain your answer.

chamber **C** .....

explanation .....

.....[2]

(b) Explain the reasons for the regular changes in blood pressure in region **D**.

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.....[2]

(c) Important chemical changes occur in the blood as it passes through region **E**.

(i) Identify region **E**.

.....[1]

(ii) Describe and explain the chemical changes that occur.

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.....[3]

(d) Describe and explain how the shape of a graph drawn to show blood pressure changes as blood flows from the heart to the rest of the body and back again would differ from Fig. 3.1.

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.....[3]

[Total: 11]

Transport in Human P2 questions

O/N14/22/Q1

Fig. 1.1 shows a kidney and its associated structures. The arrows show the direction of flow of fluids in these structures.

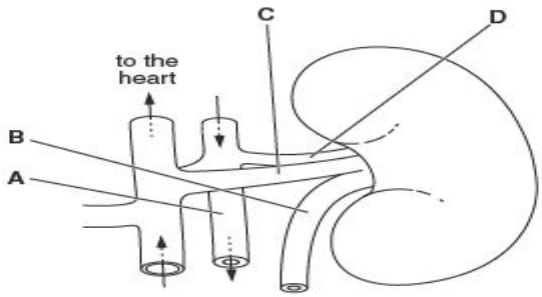

Fig. 1.1

(a) (i) Name the structure labelled **A** in Fig. 1.1. ..... [1]

(ii) Name the chamber of the heart through which blood in structure **A** last passed.

..... [1]

(b) Table 1.1 shows the relative concentrations of various substances in structures **B** and **C**. Complete the table to show the possible concentrations of these substances in structure **D**.

Table 1.1

substance	relative concentration in structure		
	B	C	D
amino acids	0.00	0.05	
glucose	0.00	0.10	
mineral ions	1.50	0.72	
proteins	0.00	8.00	
urea	2.00	0.03	

[5]

(c) Explain how the relative concentrations of glucose might change in structures **B**, **C** and **D** in a person with diabetes.

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..... [3]

[Total: 10]

O/N14/22/Q9

(a) Explain what is meant by the term *double circulation*.

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..... [4]

(b) Explain how the heart is adapted to keep blood flowing in a double circulation.

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..... [6]

[Total: 10]

Transport in Human P2 questions

M/J14/21/Q1

Fig. 1.1 shows a sample of human blood seen using a microscope.

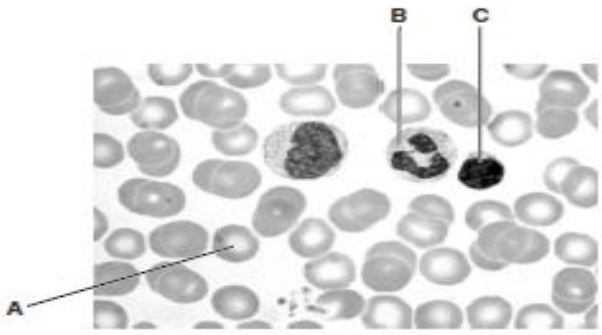

Fig. 1.1

(a) (I) Name the type of cell labelled **A** in Fig. 1.1. State the function of this type of cell.

type of cell .....

function

.....

[2]

(II) Use your knowledge of the structure of this type of cell to suggest why the cell labelled **A** in Fig. 1.1 appears to be more lightly coloured at its centre than at its edge.

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.....[3]

(b) (I) Name the type of cells labelled **B** and **C** in Fig. 1.1.

B ..... **C** ..... [1]

(II) Some diseases can cause a person to have fewer of cells **B** and **C** in the blood. Use your knowledge of how cells **B** and **C** carry out their functions to suggest a problem this may cause for a person. Give an explanation for your answer.

problem

.....

explanation

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.....

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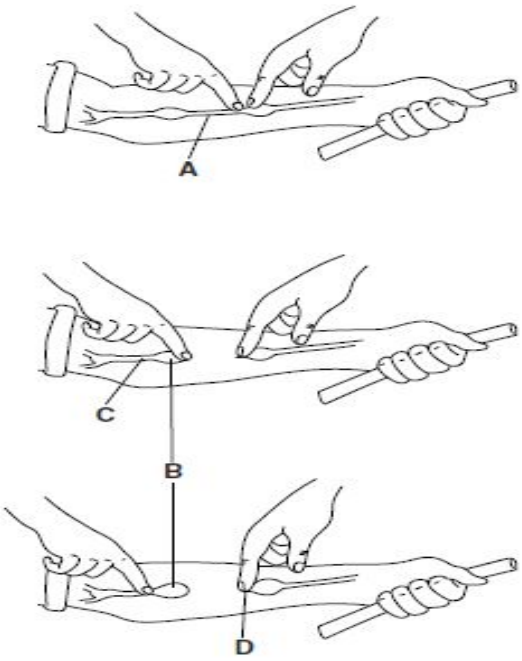
[4]

[Total: 10]

Transport in Human P2 questions

O/N13/22/Q1

Fig. 1.1 shows a demonstration related to blood circulation.



Both fingers are pressed firmly on blood vessel **A**.

Both fingers remain pressing on the blood vessel. The finger on the left is then drawn along the blood vessel and stops when it reaches **B**. It is then removed and replaced at **C**.

The finger on the right continues to press firmly on the blood vessel. The finger on the left is then pushed gently but firmly towards **B** which increases in size.

Fig. 1.1

(a) (i) Name the type of blood vessel labelled **A** in Fig. 1.1.

.....

[1]

(ii) Name the structure leading to the effect shown in this blood vessel at position **B**.

.....

[1]

(b) In the space below, draw a longitudinal section (cut along its length) through the blood vessel as it appears at position **B**.

[2]

(c) Suggest why, at the end of the demonstration, the blood vessel is no longer visible between positions **B** and **D**.

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.....[4]

(d) Suggest why a rod was repeatedly gripped tightly before carrying out this demonstration.

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.....[2]

[Total: 10]

M/J13/22/Q4

Fig. 4.1 shows part of the circulatory system, and **some** of the structures associated with organ **B**.

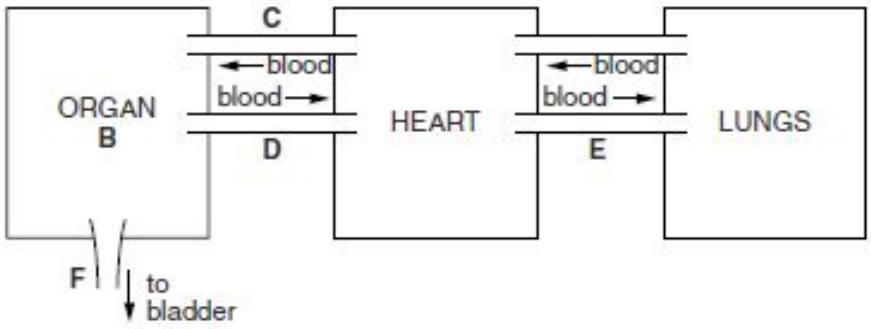

Fig. 4.1

(a) Name organ **B** in Fig. 4.1 ..... [1]

(b) **(i)** Name blood vessels **C** and **E** in Fig. 4.1.

C .....

E ..... [2]

(ii) Name the chambers of the heart, in the order in which blood passes through them from **D** to **E** in Fig. 4.1.

..... [2]

(c) Complete Table 4.1 to show **four** differences between the contents of **F** and the blood vessel, **C**, in a healthy person.

Table 4.1

difference	C	F
1		
2		
3		
4		

[4]

[Total: 9]

M/J13/22/Q9

(a) Describe the structure and functions of capillaries in the circulatory system.

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.....[5]

(b) Describe the functions of each of the following:

(i) white blood cells

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.....[3]

(ii) platelets.

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.....[2]

[Total: 10]

O/N12/21/Q8

(a) Explain what is meant by *double circulation*.

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..... [3]

(b) Describe the composition and the importance of plasma in the circulatory system.

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..... [7]

[Total: 10]

O/N12/22/Q4

Fig. 4.1 shows a person sitting on a chair with his legs crossed, watching the television. A friend notices that the person's foot is making very slight regular kicking movements as indicated by the arrow on Fig. 4.1.

Fig. 4.1

The friend times the movements with her watch and announces that the person's heart is beating 70 times per minute.

(a) (i) Explain how the friend was able to make this deduction.

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.....[4]

(ii) Explain why the person's leg kicks at a faster rate when there is an exciting programme on the television.

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.....[1]

Fig. 4.2(a) shows a chair leaning against a wall, carefully balanced and with a scale pan hanging from the front of the seat. Fig. 4.2(b) shows what happens when a mass is then added to the scale.

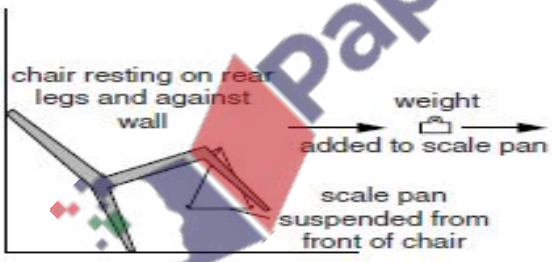

Fig. 4.2(a)

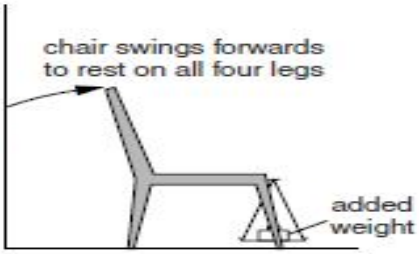

Fig. 4.2(b)

A student sits in a chair, leaning against a wall as shown in Fig. 4.2(a), and **remains perfectly still**.

(b) Use your knowledge of how blood moves through the circulatory system to suggest an explanation for why, after a few minutes, the chair falls forwards similar to the chair in Fig. 4.2(b).

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.....[4]

[Total: 9]

Transport in Human P2 questions

O/N11/22/Q7

Describe how blood is made to flow in a continuous circulation around the body with reference to

(a) the heart

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.....[4]

(b) the arteries

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.....[3]

(c) the veins

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.....[3]

[Total: 10]

M/J11/21/Q6

(a) With reference to the blood vessels involved, describe

- how the liver is supplied with the requirements for its functions
- how its products are taken away.

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.....[8]

(b) Explain the importance of capillaries in excretory organs.

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.....[2]

[Total: 10]

O/N11/22/Q1

Fig. 1.1 shows a vertical section through a human heart. The valves have not been shown.

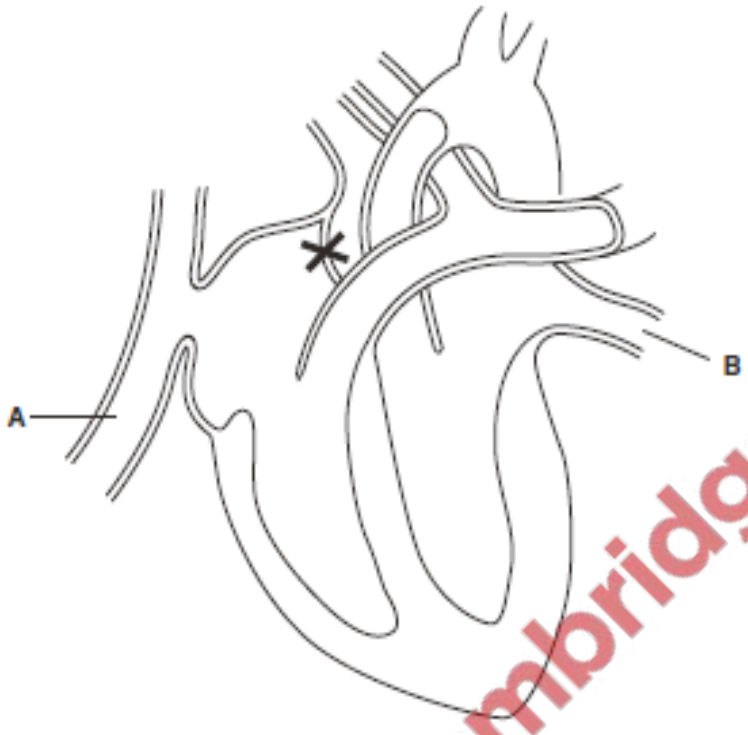

Fig. 1.1

(a) Identify structures **A** and **B** in Fig. 1.1.

A .....

B ..... [2]

(b) Complete Fig. 1.1 by drawing the valves to show how they control the direction of blood flow through the heart. [4]

(c) On Fig. 1.1, draw arrows to show the direction of blood flow into, through and out of the heart. [2]

Some people have a condition known as 'a hole in the heart'. This allows a connection between the left and right atrium at point **X** in Fig. 1.1.

(d) Suggest two problems this might cause.

1. .....

2. .....[2]

[Total: 10]

M/J11/22/Q8E

A person cuts their hand on a piece of glass that they are picking up from the ground.

(a) Describe how the body's defence mechanisms protect the person from infection.

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..... [8]

(b) Explain how the person would know if the cut had damaged an artery.

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..... [2]

[Total: 10]

Transport in Human P2 questions

Mark schemes will use these abbreviations:
; separates marking points
/ alternatives
() contents of brackets are not required but should be implied
R reject
A accept (for answers correctly cued by the question, or guidance for examiners)
AW alternative wording (where responses vary more than usual)
AVP alternative valid point (where a greater than usual variety of responses is expected)
ORA or reverse argument
underline actual word underlined must be used by candidate (grammatical variants excepted)
max indicates the maximum number of marks that can be given
+ statements on both sides of the + are needed for that mark

Transport in Human P2 questions

Mark Scheme

O/N18/22/Q1

1(a)(i) (Fig. 1) artery / arteriole / named artery ;

(Fig. 2) vein / venule / named vein ;

1(a)(ii) reference to size / shape

+ lumen AW ;

reference to size of wall / muscle / elastic ;

1(b)(i) two structures drawn toward lumen from similar height on opposite walls ;

all structures drawn point upwards ;

1(b)(ii) open / close OR action of valve flaps described ;

prevent back-flow of blood OR blood in one direction ;

from lower regions of body ;

low pressure ;

M/J18/21/Q4

4(a)
contain oxygenated blood contain deoxygenated blood
A + B + C ; D + E + F ;
2 A one or two correct letters in both boxes
for 1 mark in total
4(b)(i)
blood to or from the lungs blood to or from the body tissues
any two of **F + B + C ;**
three correct **F + B + C ;;**
any two of **A + D + E ;**
three correct **A + D + E ;;**
4
4(b)(ii) higher (to the body tissues) **AW ; 1**
4(b)(iii) left ventricle **;**
thicker **AW ;**
muscle **;**
greater **+** contraction / force (applied to blood) **AW ;**

Transport in Human P2 questions

M/J18/22/Q2

2(a)(i) coronary artery **; 1**
2(a)(ii) coronary heart disease / heart disease / CHD / atherosclerosis / cardiac disease / arteriosclerosis / angina **;**
1
2(a)(iii) **1** fat / oil / cholesterol **+** diet **AW ;**
2 stress **AW ;**
3 smoking **;**
4 genetics / inheritance **AW ;**
5 lack of exercise **;**
6 old age **;**
7 obesity **;**
3
A 'anxiety' / 'depression' for point **2**
2(a)(iv) **1** heart attack **AW** / heart stops / angina **AW** / breathlessness **;**
2 less blood **+** to body / tissues / organs or any named **;**
3 less oxygen/ glucose **+** to body / tissues / organs or any named **;**
4 less aerobic respiration **or** more anaerobic respiration **;**
5 production of lactic acid **;**
6 less ability **AW +** of heart to contract / pump blood **;**
7 less ability **AW +** to carry out physical activity **;**

2(b) *(inflating the balloon)*
1 opens metal mesh **AW ;**
2 push / compress **+** blockage / fat **;**
3 widen **AW +** blood vessel / lumen **AW ;**
(leaving the hollow metal mesh in the blood vessel)
4 maintain **AW +** wider lumen **AW ;**
5 increase **AW +** blood flow **;**

O/N17/21/Q4

4(a) red blood (cell) / erythrocyte **;**
oxygen **+** carriage / transport / absorption **AW ;**
2
4(b) tiredness / fatigue / weak / dizzy / faint **;**
inability to exercise / exert / inactive **;**
breathing problems **;**
reduced oxygen transport **;**
reduced respiration **;**
reduced energy (release) **;**
irregular menstruation **AW ;**
4
4(c) low water potential / concentration inside cell **;**
water enters **;**
by osmosis / diffusion **;**
cell expands **;**
cell bursts **;**
reference to no cell wall **;**

Transport in Human P2 questions

M/J17/21/Q3(a and b)

3(a) (**X**) liver **;**
(**P**) hepatic vein **;**
(**Q**) hepatic portal vein **;**
(**R**) hepatic artery **;**
4
3(b) (**P** / vein has) wide(r) **+** lumen **AW ;**
thin(ner) wall **;**
less **AW +** muscle / elastic (tissue) **;**

O/N16/21/Q8

8(a) through heart twice (during one circuit) **AW ;**
circuit **+** to lungs / pulmonary **;**
blood to become oxygenated / pick up oxygen **;**
blood to lose carbon dioxide **;**
circuit **+** to body tissues / systemic **;**
to deliver oxygen / glucose (to body tissues) **;**
collect carbon dioxide **;**
reference to part of heart **+** named vessel **;**
low pressure lungs / high pressure body **;**

8(b) one cell thick / thin / 1µm + wall **;**
small diameter of lumen / RBC single file / width of RBC **AW ;**
no muscle / no elastic tissue (compared with artery / vein) **;**
leaky walls **AW ;**
diffusion **;**
reference to named material **;**

O/N16/22/Q4

4(a)(i) Left Ventricle / helps blood flow or pressure **; 1**
4(a)(ii) muscle **; 1**
4(a)(iii) aorta **; 1**
4(b)(i) arrow in or towards heart in vena(e) cava(e) **;**
arrow towards heart in pulmonary vein(s) **;**
2 A only one vena cava / pulmonary vein annotated
R if arrows in these vessels contradict
4(b)(ii) arrow right to left through LVAssist Device / in tube M / N **; 1 R** if arrows contradict
4(c) aortic / semi-lunar **; 1**

4(d) right ventricle **;**
pulmonary artery **;**

O/N15/21/Q2

2 (a) X
right ventricle ;
pulmonary artery ;
Y
left ventricle ;
aorta ;
[4]
(b) (i) line decreases (lowest at capillaries) followed by increase ;
vein diameter drawn to be higher than artery ;
[2]
(ii) ref. heart / ventricle + pump / source of pressure ;
pressure relates to distance from heart / pump ;
resistance / friction ;
narrow lumen (in artery) ;
thick / muscular / elastic walls (in artery) ;
generation of tissue fluid in capillaries ;
[max. 4]
A arteries take blood from / are
close to heart
ORA for vein
(c) (i) valve ;
prevents backflow of blood / allows flow in one direction only ;
[2]

(ii) muscle(s) ;

contract ;

put pressure + wall of vein / blood in vein ;

[max. 2]

Transport in Human P2 questions

O/N15/21/Q8

8 1 red blood cells + transport / absorb / carry oxygen AW ;
2 no nucleus / biconcave / 'doughnut' shape AW + increased surface area ;
3 (oxy)haemoglobin ;
4 ref. (oxygen) diffusion into tissues / red blood cells ;
5 white blood cells / named + immunity / immune system / destroy pathogens / bacteria / viruses / named pathogen ;
6 phagocytes / phagocytosis ;
7 antibodies / anti-toxins ;
8 ref. tissue rejection ;
9 plasma + transport / carry ;
10 dissolved / in solution ;
11 two named chemicals transported ;
12 heat transported ;
13 platelets + blood clotting / plug hole ;
14 fibrinogen + to fibrin ;
[max 10]
A any three components named for 1 mark max. if no marks awarded for lack of accompanying explanations
I germs / foreign bodies
A urea, CO_2, vitamins, etc.

O/N15/22/Q3

3 (a) right ventricle ;
blood flows from right atrium to right ventricle / pressure increases ; [2]
A pressure increases with incorrect chamber for 1 mark
(b) increases when heart / ventricle + contracts / pumps ;
decreases when heart / ventricle + relaxes / doesn't pump ; [2]
A for 1 mark : ref. heart beat / pulse
(c) (i) capillaries / lung /alveoli / air sac / venule ; [1]
(ii) CO_2 lost * ;
O_2 gained / oxygenated * ;
haemoglobin / oxyhaemoglobin ;
change in pH / less acidic ;
ref. to diffusion gradient / concentration gradient ; [max 3]
*OR A gas exchange for 1 mark
(d) wider variations in pressure AW ;
pressure high(er) AW ;
left ventricle wall large / thick / more muscular ;
blood has further to travel / takes longer ;
more or many fluctuations / undulations AW ; [max 3]
I increasing pressure
[Total: 11]

Transport in Human P2 questions

O/N14/22/Q1

(a) (i) (dorsal) aorta ; [1]
(ii) left ventricle ; [1]
(b) (amino acids) 0.05 ;
(glucose) 0.10 to 0.15 ;
(mineral ions) 0.72 to 2.22 ;
(proteins) 8.00 ;
(urea) 0.03 to 2.03 ;
[5]
(c) B would contain some / more / high (glucose) / C would contain more / high (glucose) / D would contain more / high (glucose) ;
lack of Insulin ;
glucose would not be converted into glycogen ;
kidney unable to/doesn't reabsorb all glucose ;

O/N14/22/Q9

9 (a) blood goes through heart twice (in one complete circuit of the body) ;
circulation to / from lungs / pulmonary ;
circulation to / from (rest of) body / systemic ;
lungs + low pressure ;
body + high pressure ;
[max. 4]
(b) two sides to the heart / heart completely divided ;
four chambers / two atria + two ventricles / all 4 named chambers ;
beats continually ;
right side / atrium + receives blood from body ;
right side / ventricles + pumps blood to lungs ;
left side / atrium receives blood from lungs ;
left side / ventricle + pumps blood to (rest of) body ;
left ventricle thicker-walled / more muscular + than right ventricle ;
ventricles thicker-walled / more muscular + than atria ;
further to pump blood / generate higher pressure ;
ref. valves + one-way flow / prevent backflow ;
[max. 6]
[Total: 10]

M/J14/21/Q1

1 (a) (i) red (blood cell) ;
absorb / carry / transport oxygen / transport CO_2 ;
[2]
R carry substances
Ig contain haemoglobin
(ii) thinner in middle / ref. biconcave ;
ref. haemoglobin ;
more (haemoglobin) at edges than at centre ;
light more easily able to pass through centre ;
lack of nucleus ;
[3]
(b) (i) B – white blood cell (phagocyte)
C – white blood cell (lymphocyte) ;
[1]

(b) (ii) problem:
reduced immunity / immune response / less able to fight infection / kill microorganisms or pathogens / more likely to suffer (infectious) disease* ;
explanation:
ref. phagocytosis ;
ref. antibody production ;
microorganisms / pathogens/bacteria/viruses / remain in blood / body / not destroyed ;
more likely to succumb to (infectious) disease* AW ;
[1]
[3]
A named diseases R leukaemia
A bacteria / virus / fungi Ig germs
Max. 3 for explanations.
* accept once only in either place
Total [10]

O/N13/22/Q1

1 (a) (i) vein; [1]
(ii) valve; [1]
(b) a valve shown with flaps touching;
vessel widest at correct side of valve + walls shown both before and after valve; [2]
(c) (vein) empty / no blood flowing through;
blood has been pushed out of (vein);
* blood cannot flow back (due to valve / from B);
* finger on the right / at D + prevents blood flowing;
walls of vein thin thus not visible beneath skin AW; [max 4]
(d) muscle + contraction(s);
increase blood pressure;
increases circulation / blood flow / helps fill (vein) with blood; [2]

M/J13/22/Q4

4 (a) kidney; 1
(b) (i) C – renal artery / aorta;
E – pulmonary artery; 2
No e.c.f. in this instance
(ii) right atrium/auricle; right ventricle; 2
(c)
C F
blood + urine;
(a named) cells / platelets /
plasma
+ no cells / platelets / plasma;
protein/antibodies
/ amino acids / fats
+ none;
lower urea concentration / higher urea concentration;
glucose + no glucose;
fewer salts / ions / less water / more / salts or ions / water;
more hormones / vitamins / fewer hormones / vitamins;
Max 4
Ignore refs. to O_2 / CO_2 waste products
Ignore minerals

Transport in Human P2 questions

M/J13/22/Q9

9 (a) 1. join arteries to veins;
2. walls + thin / one-cell thick / elastic;
3. allow passage of (tissue) fluid / plasma / permeable;
4. microscopic / pass easily between cells / large surface area / narrow lumen;
5. pressure reduction (along capillary);
6. ref. diffusion;
7. to / from + cells / tissues;
8. any 2 of the following:
(may be carried, passed in / out)
glucose,
amino acids,
oxygen,
CO_2 ,
hormones,
urea,
ions / salts, Max 5
(Ignore 'They are one cell thick')
(b) (i) (WBCs) phagocytes / phagocytosis or described ;
antibodies / antitoxins;
ref. bacteria / viruses / dead cells / pathogens / microorganisms / microbes;
immune response / rejection AW; Max 3
Ignore germs
A ref. immune system / immunity
(ii) (platelets) plug damaged vessels;
fibrinogen;
to fibrin;
clotting;
ref. antithrombin / prothrombin / thrombin / thromboplastin / thrombokinase; Max 2
R fibres

O/N12/21/Q8

8 (a) blood passes through heart twice;
lungs + to rest of body;
lower pressure in pulmonary circulation ORA;
correct ref oxygenated blood / deoxygenated blood; [max 3]
(b) water;
solvent / carries dissolved / in solution;
any two from:
for salts or ions / glucose /amino acids / vitamins / fat or fatty acids + glycerol;;
urea;
plasma or blood proteins or named;
hormones;
transport of blood cells / platelets;
heat;
carbon dioxide;
to service body cells / target organs; [max 7]
[Total:

O/N12/22/Q4

4 (a) (i) pulse (beat);
in artery in leg;
increased pressure;
ref. one pulse beat/kick for every heart beat; [Max 4]
(ii) adrenaline/heart beats faster; [1]
(b) blood + legs/feet;
in veins;
no use of leg muscles ;
blood not pushed from one set of valves to the next;
increases mass/weight of the (lower) leg; [Max 4]
[Total: 9]

O/N11/22/Q7

7 (a) valves;
prevent backflow;
muscular + contraction;
ventricles + thick walls / thick muscles / powerful contraction (A if there is ref. only to left ventricle);
pump / push / squeeze;
(creates) pressure in blood system;
never tires or suffers from cramp / rhythmic; [max 4]

(b) always carrying blood away from heart / under pressure;
thick walled;
muscular;
narrow lumen AW;
allows recoil / maintains pulse beat (A elasticity);
link to capillaries / veins; [max 3]
(c) return to heart / low pressure / large lumen;
have valves;
at intervals along their length;
prevent backflow;
thin-walled;
allows (skeletal) muscular contraction to 'knead' the blood AW (R ref. to muscular walls); [max 3]
[Total: 10]

Transport in Human P2 questions

M/J11/21/Q6

6 (a) hepatic artery;
carries oxygen;
hormones/insulin/adrenalin;
hepatic portal vein;
from gut/villi/small intestine;
glucose (A with ref to artery) R refs glucose – glycogen;
amino acids (A with ref to artery);
hepatic vein;
removes carbon dioxide;
urea;
any named other product of the liver; [max 8]
(b) thin walls/one cell thick;
allow diffusion;
short distance (to diffuse)/close to cells;
of urea/salts etc. into kidneys;
of carbon dioxide into alveoli/lungs;
oxygen to excretory tissues; [max 2]
[Total: 10]
7 (a) carbon dioxide A on equation;
combines with water A on equation;
during photosynthesis;
to make named carbohydrate/protein;
eaten by/passed to consumers/animals;
respiration;
in any 2 named groups of different types of organism;
releases carbon dioxide A with ref to combustion;
leaves decomposed/decay/ refs to methane/fossil fuels
A refs to decomposition in animals/faeces etc if phs mark scored; [max 7]
(b) another named requirement (CO_2/temperature);
in short supply AW;
use of syllabus term limiting factor; [3]
[Total:

O/N11/22/Q1

1 (a) A vena cava (/ anterior / superior);
B pulmonary vein; [2]
(b) 2 sets of aortic valves shown;
2 sets of atrio-ventricular valves shown in correct places;
unattached end(s) of aortic valve(s) pointing upwards;
unattached end(s) of a-v valve(s) pointing downwards; [4]
(c) arrow(s) correctly into, through and out of right side of heart;
(i.e. look for evidence of all three sites)
arrow(s) correctly into, through and out of left side of the heart; [2]
(d) Any two (**mark the first, one per line unless a line is left blank) from:
mixing of blood, ref. possible effect on pressures of blood (but if stated, must be lower), ref. possible effect on volume of blood (leaving heart or one chamber), reduced oxygen carriage round the body, heart has to work harder, feeling tired AW, shortness of breath, fluid build-up, ;; [2]
(In fact, blood passes from left to right atrium – but do NOT penalise if wrong.)
[Total: 10]

M/J10/22/Q8E

8E (a) capillaries / blood vessels damaged ;
bleeding / blood flow ;
platelets / thrombokinase / prothrombin / thrombin ;
fibrinogen ;
fibrin ;
clotting ;
scab (or described) ;
new cell growth ;
re-establishment of bacteria-proofing / skin re-seals ;
white blood cells or named ;
antibodies / antitoxin ;
phagocytosis or described ; [8 max]
(b) bright red in colour / oxygenated blood ;
blood leaves in spurts / ref pulse in arteries ; [2]
(Ignore references to pressure)