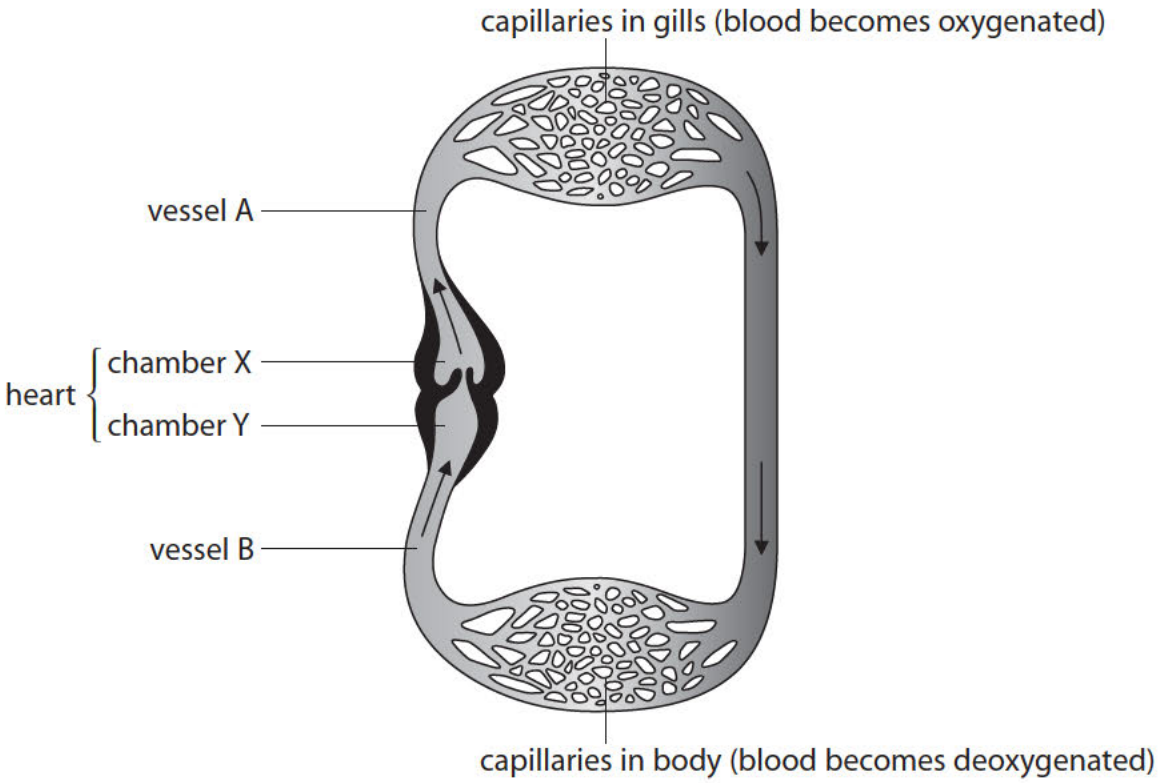
1 The diagram shows the heart and circulation system of a fish.



(a) The circulation system and heart structure of a fish have similarities and differences to those of a human.

Use your knowledge of human circulation and heart structure to answer these questions.

(i) What type of blood vessel is vessel A?

(1)

.....

(ii) What type of heart chamber is chamber Y?

(1)

.....

(iii) Describe how the structure of a fish heart differs from that of a human heart.

(3)

.....

.....

.....

.....

.....

.....

(b) The concentrations of the gases in the blood leaving the fish heart are different from the concentrations of the gases in the blood leaving the human heart in the aorta.

Explain the differences in the concentrations of gases.

(4)

(c) Explain why the pressure of the blood returning to the fish heart is lower than the pressure of the blood returning to the human heart.

(2)

(Total for Question = 11 marks)

2 Arteries and veins are important blood vessels in the circulatory system.

(a) Describe two ways in which the structure of an artery differs from the structure of a vein.

(2)

1 .....

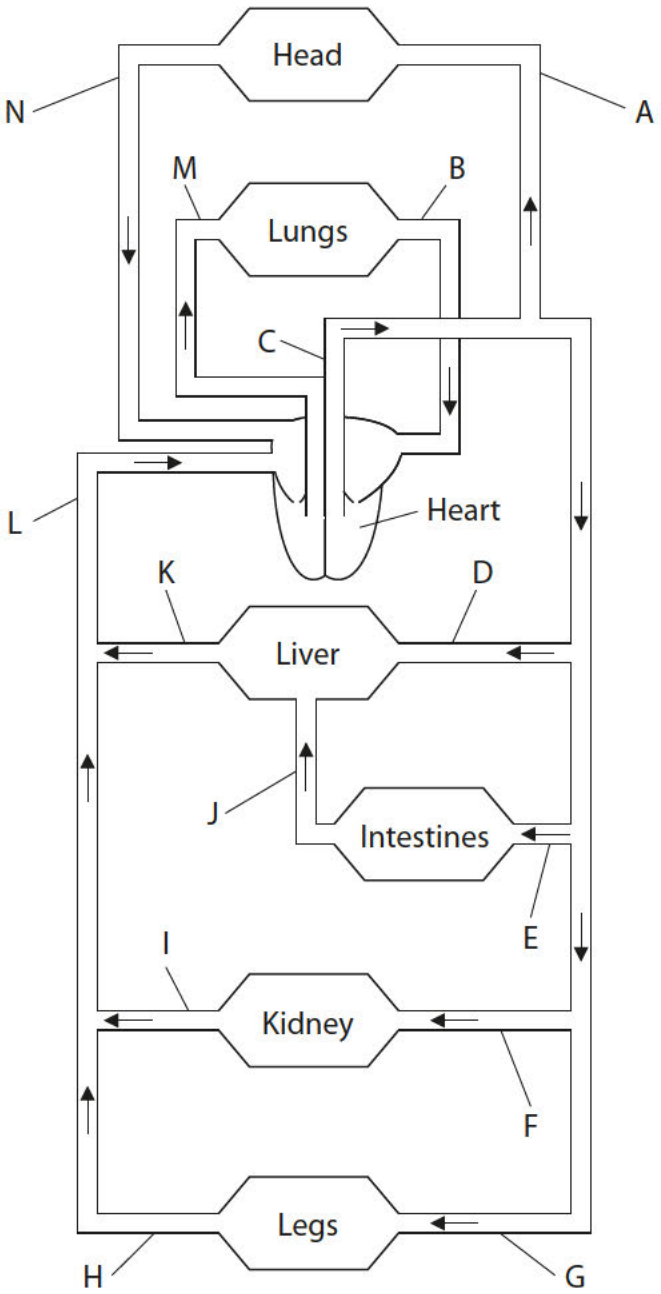
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2 .....

.....

(b) The diagram shows the human circulatory system.

The blood vessels are labelled with letters.



(i) The table names some of the blood vessels in this circulatory system.

Complete the table by giving the letter for each blood vessel.

The first one has been done for you.

(4)

Name of blood vessel	Letter
vena cava	L or N
aorta	
pulmonary vein	
hepatic artery	
renal vein	

(ii) The plasma in the blood vessels can contain different concentrations of substances.

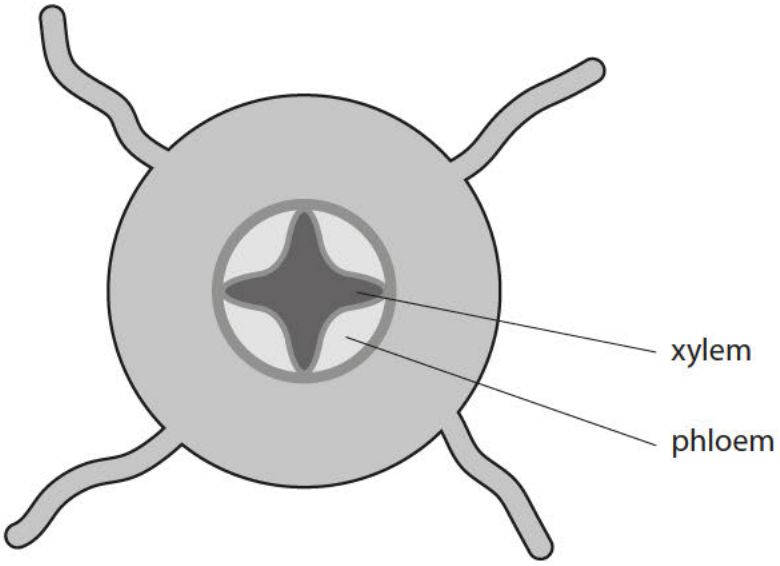
Complete the table by giving the letter for the blood vessel that matches the contents.

(3)

Contents of blood vessel	Letter of blood vessel
contains the most glucose after a meal	
contains the least urea	
contains the least oxygen	

(Total for Question = 9 marks)

3 The diagram shows a section through the root of a plant.



(a) Name two substances that are transported in the xylem.

(2)

1 .....

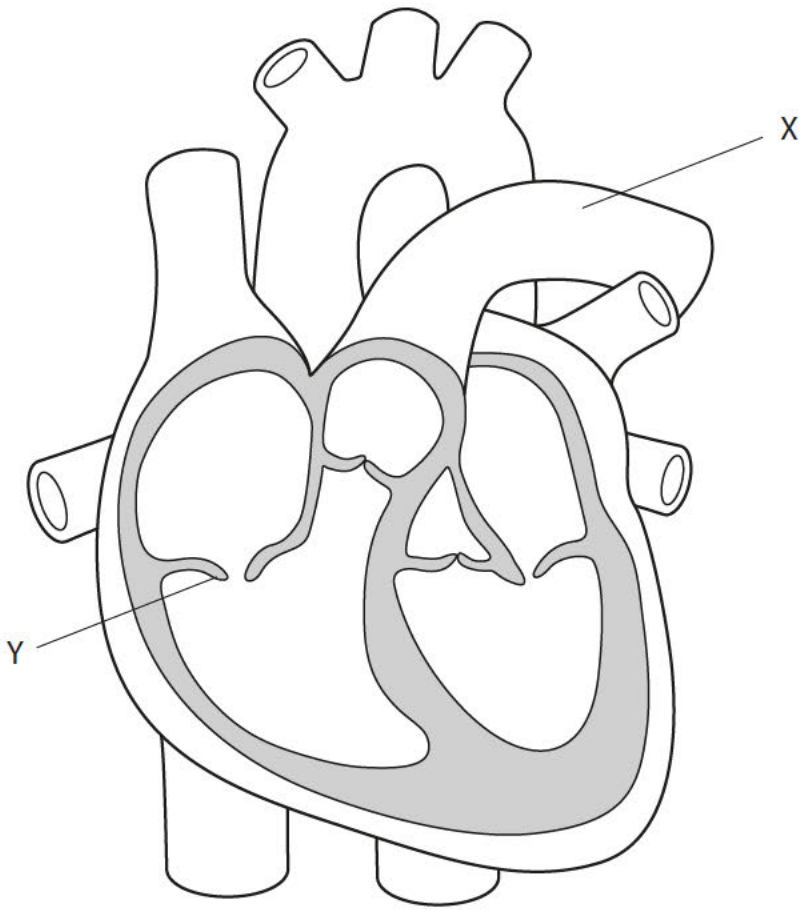
2 .....

(b) Draw and label a root hair cell in the following space.

(5)

(Total for Question = 7 marks)

4 The diagram shows a section through a human heart.



(a) The blood in vessel X is transported to an organ.

(i) Name the organ.

(1)

.....

(ii) State two changes to the blood in this organ.

(2)

1 .....

.....

2 .....

.....

(b) What is the function of the part labelled Y?

(1)

.....

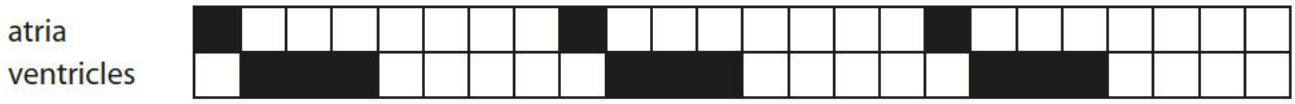
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(c) The diagram shows the contraction and relaxation of the atria and ventricles during several heartbeats.

Each square represents a time of 0.1 second.

■ = contraction

□ = relaxation



(i) For how long do the ventricles contract during one heartbeat?

(1)

Answer ..... second

(ii) How many heartbeats does the diagram show?

(1)

Answer .....

(iii) Use the diagram to calculate the heart rate of this person in beats per minute. Show your working.

(2)

Answer ..... beats per minute

(Total for Question = 8 marks)

5 The table gives statements about blood cells. Some apply to red blood cells and some to white blood cells.

(a) Complete the table by using a tick (✓) or a cross (×) to show if each statement applies to red blood cells or to white blood cells. The first statement has been done for you.

(5)

Statement	Red blood cells	White blood cells
transport oxygen	✓	×
contain a nucleus		
produce antibodies		
biconcave shape		
ingest pathogens		
numbers may increase following infection		

(b) Some athletes preparing for a long distance race train at high altitude for several weeks. The availability of oxygen at high altitude is lower so the body responds by increasing the number of red blood cells. The number of red blood cells remains high when the athletes return to lower altitude to compete.

Explain how having more red blood cells is an advantage to athletes who take part in long distance races.

(4)

(c) A 100 m sprint race takes less than 10 seconds to complete.

Suggest why sprint athletes gain no advantage from training at altitude.

(2)

.....

.....

.....

.....

.....

(Total for Question = 11 marks)