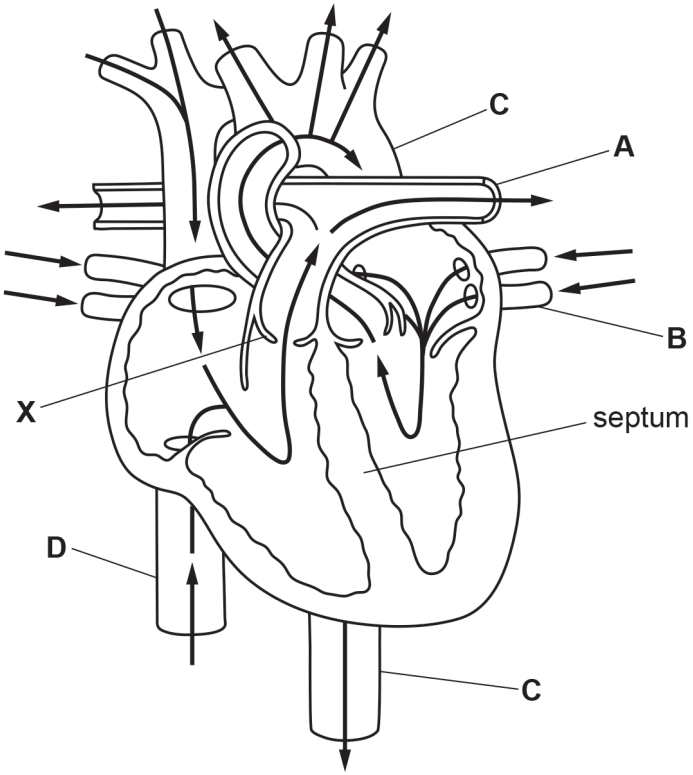
1 Mammals have a double circulation.

The diagram shows a section through the heart of a mammal. The arrows show the direction of blood flow through the heart and blood vessels.



Identify the structure labelled **X** in the diagram **and** state its role in the heart.

.....

.....

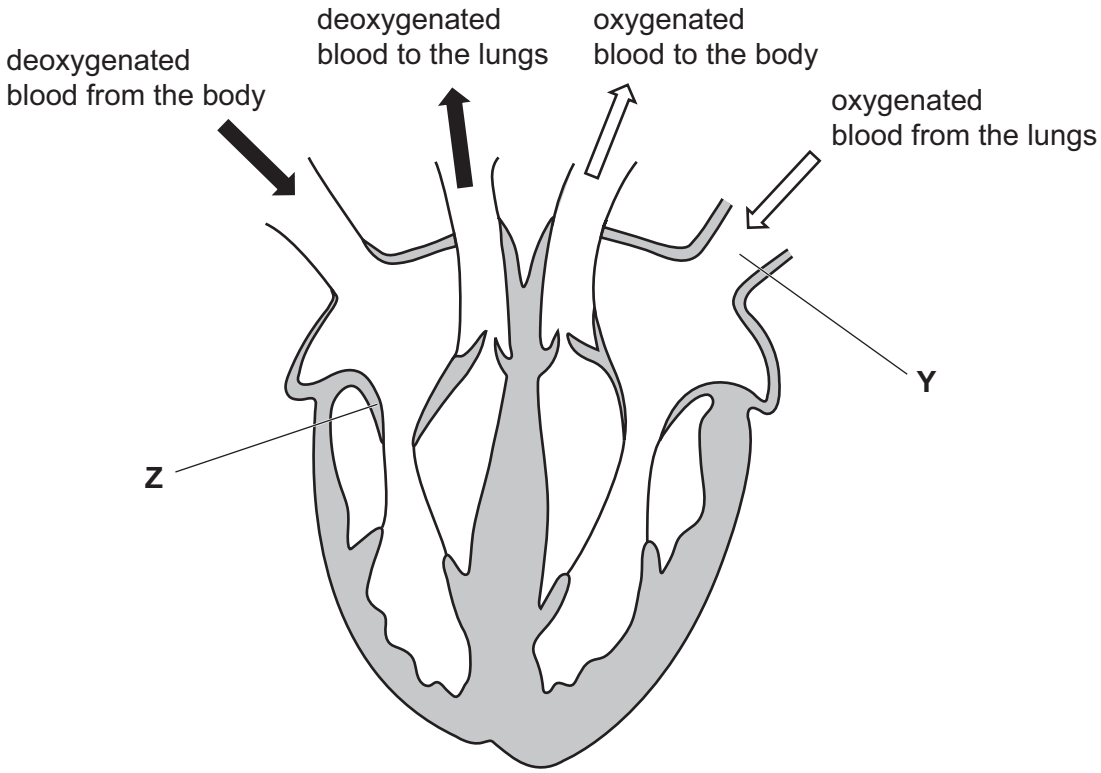
.....

.....

..... [2]

[Total: 2]

2 The diagram shows a section through a human heart.



State how the part labelled **Z** in the diagram can be used to monitor the activity of the heart.

.....

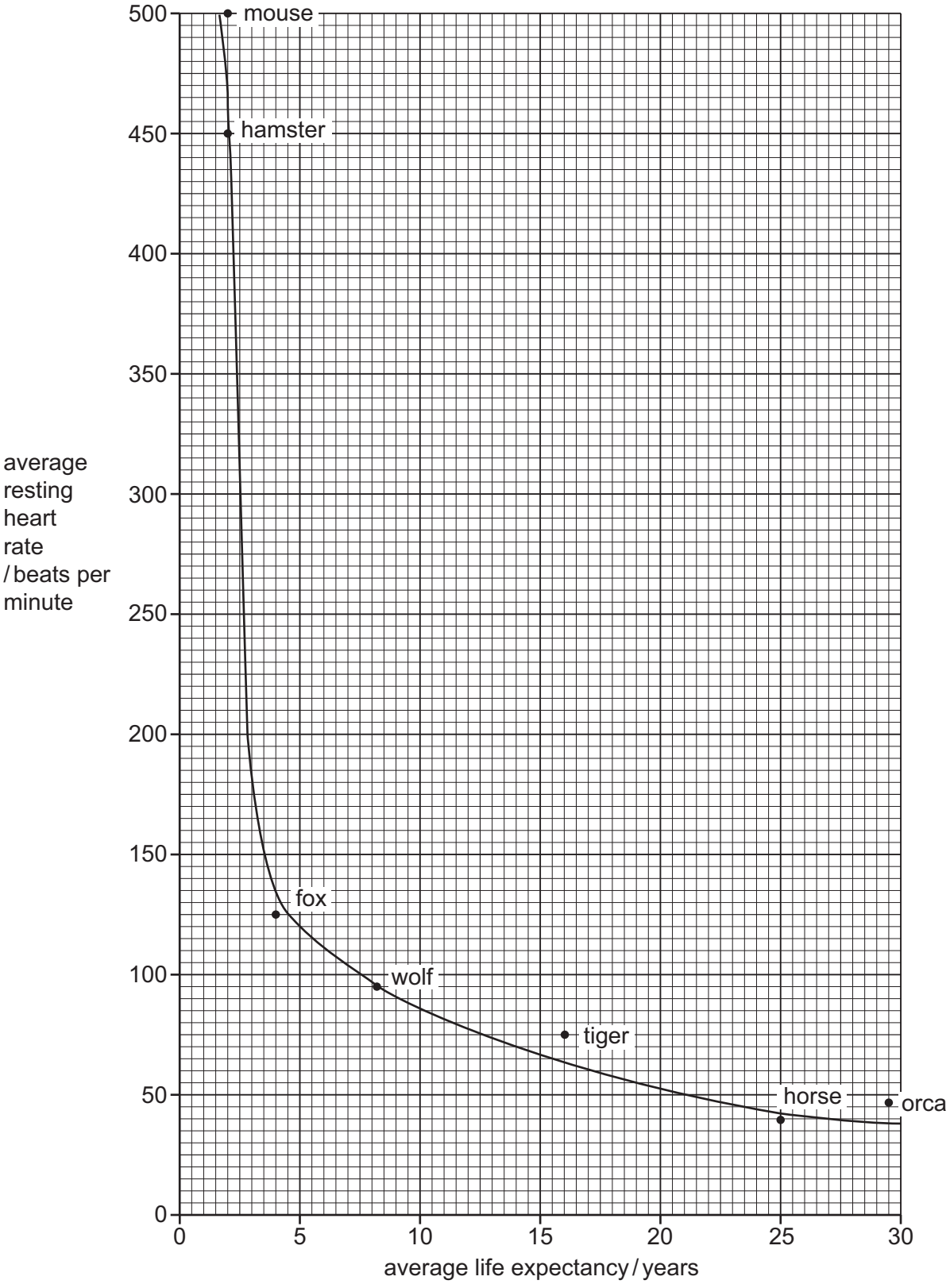
.....

..... [1]

[Total: 1]

3 A scientist measured the average resting heart rate of seven different species of animal. They also estimated the average life expectancy of each species.

This is a graph of the scientist's data.



Another animal species has an average life expectancy of 14 years.

Using the information in the graph, predict the average resting heart rate of this animal species.

..... beats per minute [1]

[Total: 1]

4 Red blood cells contain the protein haemoglobin.

State the role of haemoglobin.

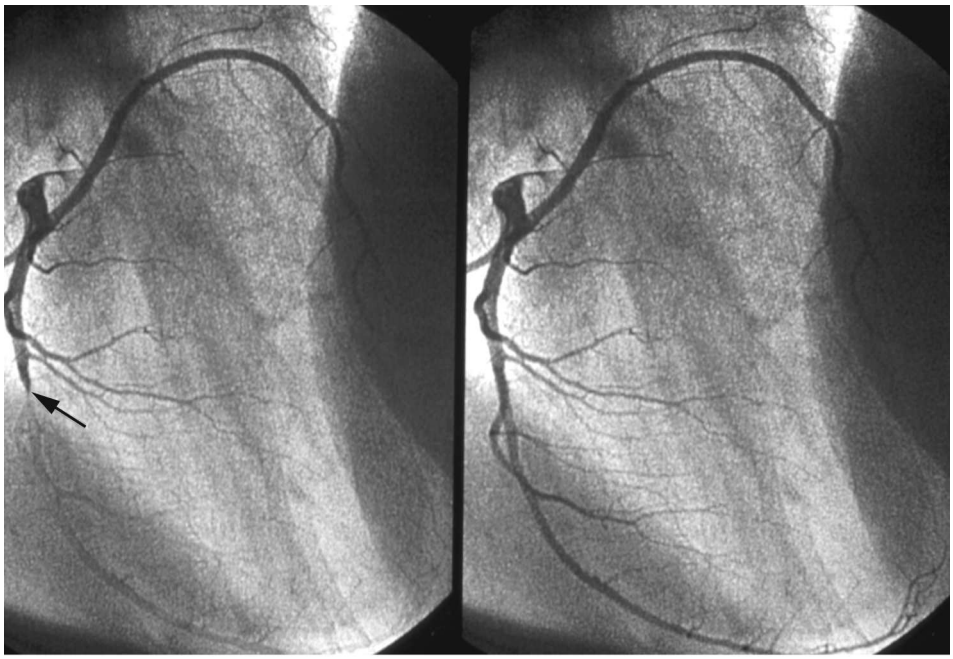
.....

.....

..... [1]

[Total: 1]

5 The photographs show an angiogram of a heart before and after treatment for coronary heart disease (CHD). An angiogram is an image of the blood flow through the blood vessels of the heart.



before treatment after treatment

The arrow on the **before treatment** photograph shows the position of a blockage in a blood vessel.

The blockage is caused by a blood clot.

Describe how a blood clot forms.

.....

.....

.....

.....

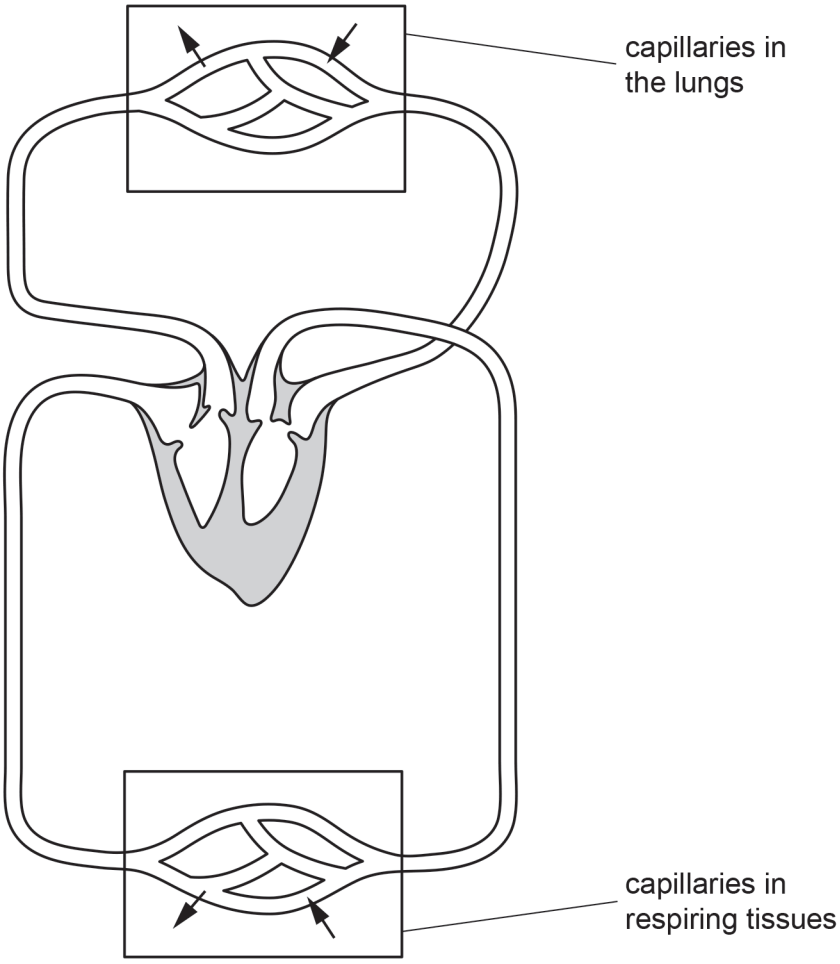
.....

.....

..... [3]

[Total: 3]

6 The diagram shows the double circulation of a mammal. The arrows indicate the movement of oxygen and carbon dioxide in and out of the blood.



Describe the evidence shown in the diagram that the mammal has a double circulatory system.

.....

.....

.....

.....

..... [2]

[Total: 2]

7 A student wrote a sentence about the circulatory system:

"**The circulatory system is a system of alveoli with a pump and valves to ensure two-way flow of blood.**"

Identify **two** incorrect words or phrases in the sentence.

1 .....

2 ..... [2]

[Total: 2]

8 The table shows the concentrations of four solutes:

- in the blood in the renal artery
- in the fluid in the kidney tubule
- in the urine.

solute	solute concentration / g dm^{-3}		
	blood in the renal artery	fluid in the kidney tubule	urine
glucose	0.9	0.9	0.0
protein	83.0	0.0	0.0
salts	8.0	8.0	16.5
urea	0.2	0.2	20.0

(a) Calculate the percentage increase in the concentration of urea between the blood in the renal artery and the urine.

Show your working.

.....% [2]

(b) Describe the results for the concentration of salts shown in the table.

.....

.....

.....

.....

..... [2]

(c) State the reason for the difference in the concentration of protein between the blood in the renal artery and the fluid in the kidney tubule.

.....

..... [1]

(d) State the reason for the difference in the concentration of glucose between the fluid in the kidney tubule and the urine.

.....

..... [1]

[Total: 6]

9 Mammals have a double circulation.

State what is meant by the term *double circulatio*n.

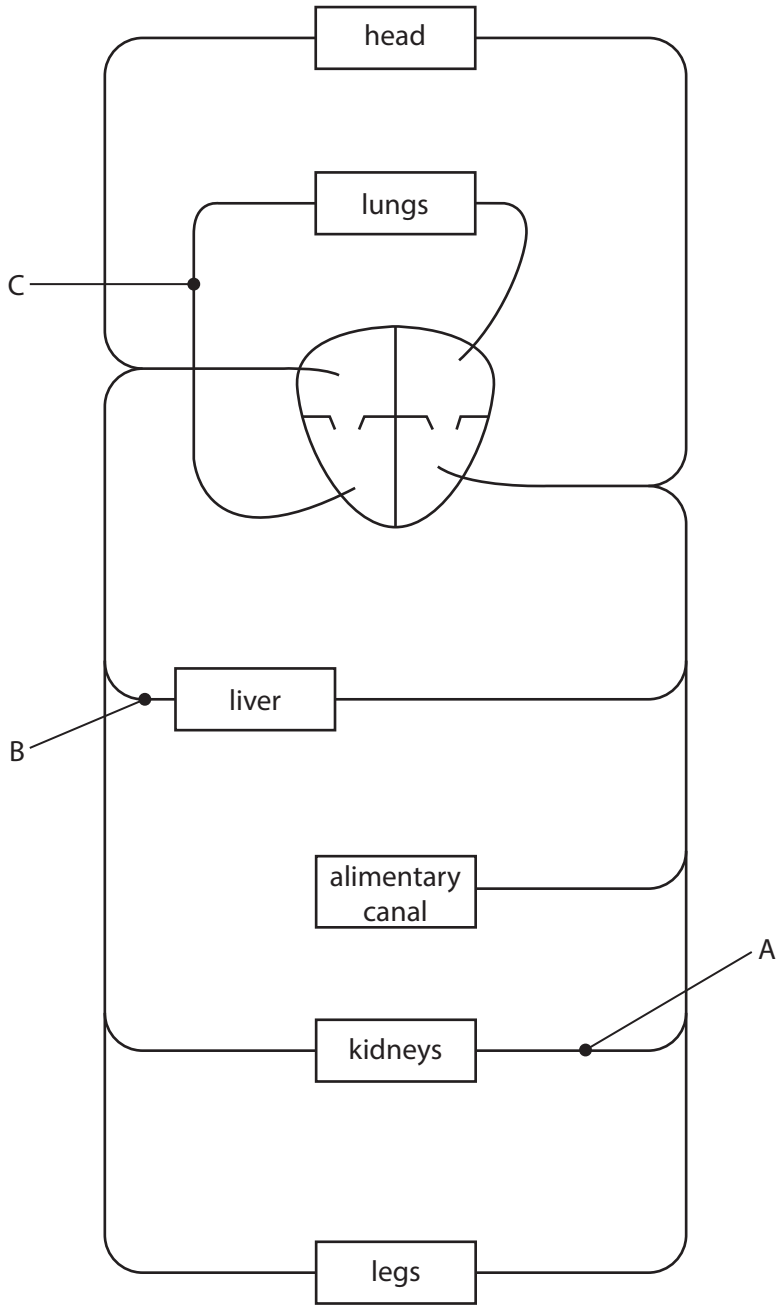
.....

.....

..... [1]

[Total: 1]

10 The diagram below represents the heart, part of the circulatory system and some of the organs supplied by this system.



On the diagram, draw an arrow on blood vessel **C** to show the direction of blood flow. [1]

[Total: 1]