

- 1 (a) Fig. 1.1 shows the human heart and the main blood vessels. The functions of the parts of the heart and some of the blood vessels are given in Table 1.1.

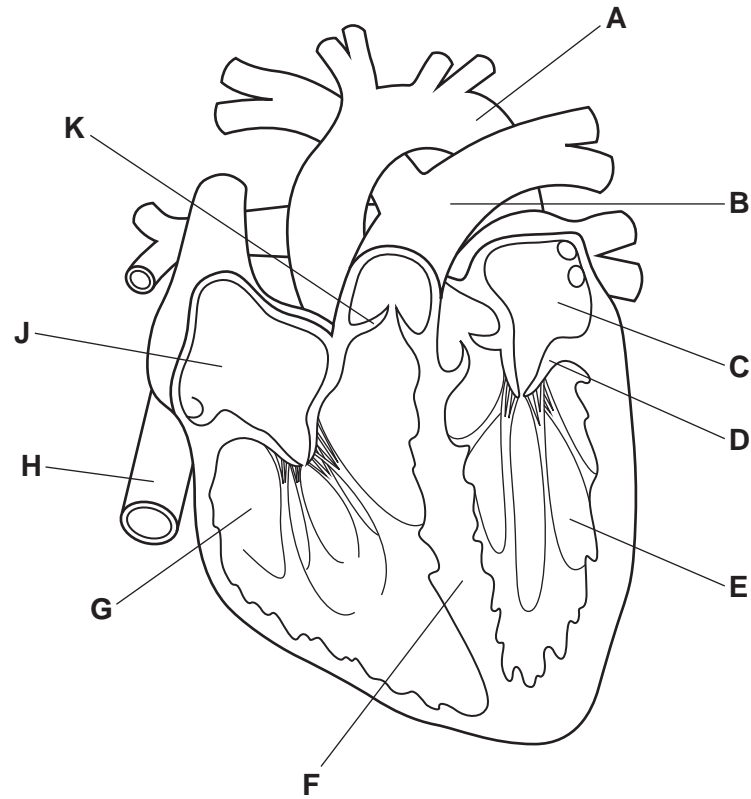


Fig. 1.1

Complete Table 1.1.

One row has been done for you.

Table 1.1

function	letter on Fig. 1.1	name
structure that separates oxygenated and deoxygenated blood		
structure that prevents backflow of blood from ventricle to atrium		
blood vessel that carries oxygenated blood	A	aorta
blood vessel that carries deoxygenated blood		
structure that prevents backflow of blood from pulmonary artery to right ventricle		
chamber of the heart that contains oxygenated blood		
chamber of the heart that contains deoxygenated blood		

[6]

- (b) A group of students used a heart monitor to record the pulse rate of an athlete during a 5000 metre race. The recordings started just before the race began and ended just after it had finished, as shown in Fig. 1.2.

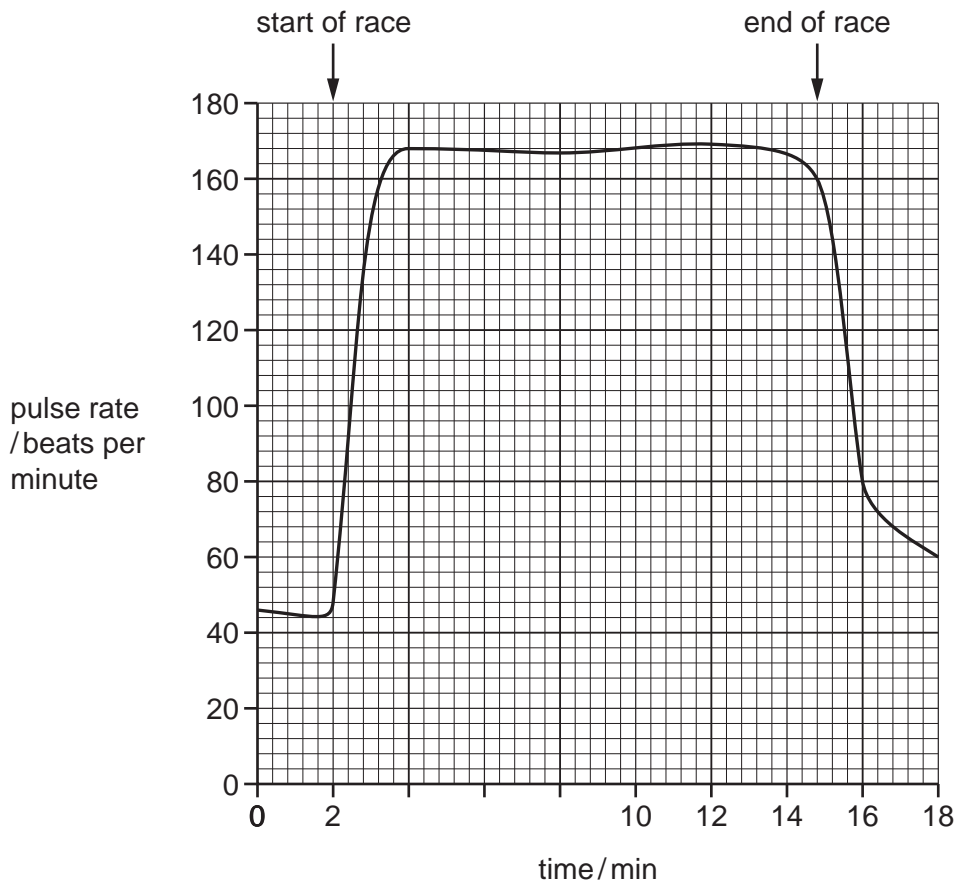


Fig. 1.2

- (i) Use data from Fig. 1.2 to describe the effect of exercise on the pulse rate of the athlete.

.....

.....

.....

.....

.....

.....

.....

[3]

(ii) Explain the change in pulse rate between 2 minutes and 3 minutes after the recordings started.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 13]

- 2 All mammals have a double circulatory system. Fig. 1.1 shows part of the human double circulatory system.

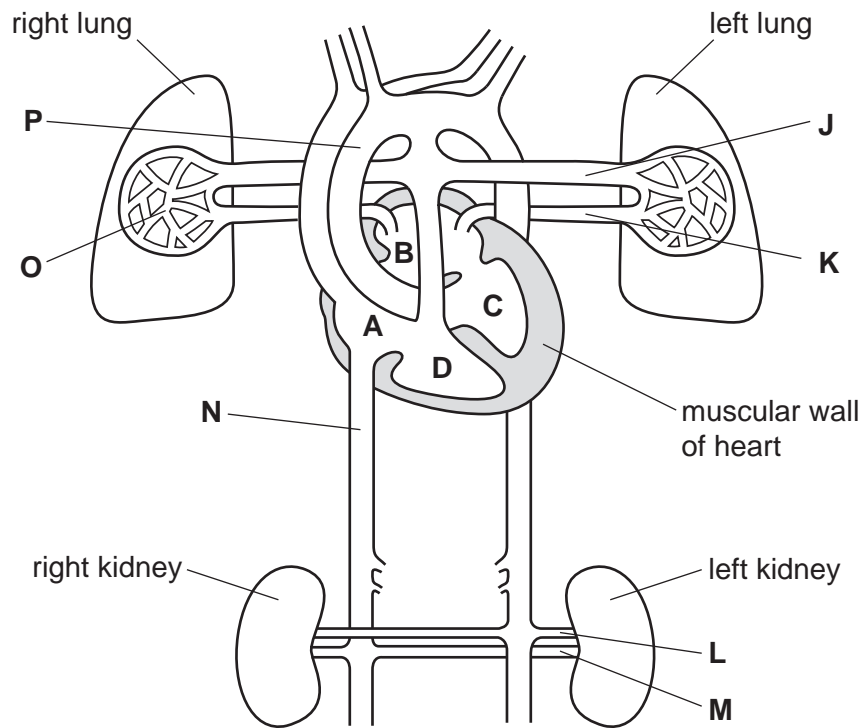


Fig. 1.1

- (a) Name the muscular wall that separates the left and right sides of the human heart.

..... [1]

- (b) (i) Describe what is meant by the term *double circulation*.

.....

 [1]

- (ii) State **one** advantage of a double circulation.

.....

 [1]

(c) Table 1.1 describes some of the structures of the human circulatory system shown in Fig.1.1.

Complete the table.

One row has been done for you.

Table 1.1

description	name of structure	letter on Fig. 1.1
heart chamber with the thickest muscular wall		
blood vessel that carries oxygenated blood to the heart		
blood vessel that carries oxygenated blood away from the heart		
blood vessel that carries blood away from the kidneys		
blood vessel with the largest lumen	vena cava	N

[4]

(d) Describe how blood is transported from the vena cava to the lungs. You may use the letters on Fig. 1.1 in your description.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

[4]

(e) (i) Doctors recommend that a healthy diet can reduce the risk of coronary heart disease.

Give **one** other lifestyle improvement patients can make that can reduce the risk of coronary heart disease.

.....

..... [1]

(ii) Sometimes surgery is required to treat coronary heart disease.

Describe **one** named example of surgery that can treat coronary heart disease.

.....

.....

.....

.....

..... [2]

[Total: 14]

3 Mammals have a double circulation system.

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

.....

.....

.....[1]

(b) Table 5.1 shows some of the main organs in a mammal and the vessels that deliver blood and take it away.

Complete the table.

Table 5.1

organ	blood vessel	
	delivers blood	takes blood away
heart	1	1 aorta
	2 vein	2 artery
lungs	pulmonary artery
liver	1 hepatic artery	hepatic vein
	2	
kidney artery vein

[5]

- (c) Table 5.2 shows the blood pressure in the different blood vessels that supply and drain a muscle in the leg.

Table 5.2

blood vessel	mean blood pressure/kPa
aorta	13
femoral artery	12
distributing/muscular artery	9
arteriole in muscle	6
capillary in muscle	4–1.3
venule in muscle	1.1
femoral vein	< 1.0

- (i) The table shows that the mean blood pressure decreases from 13kPa in the aorta to 6kPa in the arterioles.

Explain why blood pressure must decrease in the arterioles before entering the capillaries.

.....
.....
.....
.....
.....[2]

- (ii) Explain how blood returns to the heart in the femoral vein against the pull of gravity.

.....
.....
.....
.....
.....
.....[3]

4 Table 4.1 shows the composition of blood plasma.

Table 4.1

component	concentration in the plasma
adrenaline / ng dm^{-3}	10 – 100
fibrinogen / g dm^{-3}	1.7 – 4.0
glucose / mg dm^{-3}	700 – 1000
hydrogencarbonate ions / g dm^{-3}	1.1 – 1.4
insulin / $\mu\text{g dm}^{-3}$	0.33 – 0.40
lactic acid / mg dm^{-3}	50 – 200
sodium ions / g dm^{-3}	3.1 – 3.4
urea / mg dm^{-3}	70 – 200

(a) From Table 4.1, name:

(i) an excretory product

..... [1]

(ii) a plasma protein.

..... [1]

(b) (i) State what could cause the lactic acid concentration in the blood to increase to 200 mg dm^{-3} .

..... [1]

(ii) State the function of fibrinogen.

..... [1]

(iii) State **two** effects that a concentration of adrenaline of 100 ng dm^{-3} might have on the body.

.....

..... [2]

(c) Table 4.1 shows that the glucose concentration varies between 700 and 1000 mg dm^{-3} . Describe the role of the liver in regulating the concentration of glucose in the body.

.....

.....

.....

.....

(d) Lymphocytes and phagocytes are white blood cells.

A woman had some blood tests taken before and during a bacterial infection.

Table 4.2 shows the number of white blood cells in the two blood samples.

Table 4.2

white blood cells	mean number of cells per mm ³ of blood	
	before infection	during infection
lymphocytes	1300	3500
phagocytes	2000	7500

(i) Calculate the percentage increase in lymphocytes that occurred during the bacterial infection.

Show your working and give your answer to the **nearest whole number**.

answer% [2]

(ii) Describe the role of phagocytes in defence against disease.

.....
.....
.....
.....
.....
.....
..... [3]

(iii) Describe the roles of white blood cells in tissue rejection.

.....
.....
.....
.....
.....
..... [3]

[Total: 17]