

Week 12

IGCSE Biology

Homework bundle for this week

本周作业合集

exercises.lol

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IGCSE Biology

Name: _____ Score: _____

1. In a double circulation, blood passes through the heart:
 - ☐ twice per full circuit of the body
 - ☐ once per circuit
 - ☐ three times
 - ☐ never
2. The upper chambers of the heart that receive blood are the:
 - ☐ atria
 - ☐ ventricles
 - ☐ valves
 - ☐ arteries
3. Arteries carry blood:
 - ☐ away from the heart
 - ☐ back to the heart
 - ☐ only to the lungs
 - ☐ in both directions
4. Red blood cells carry oxygen using:
 - ☐ haemoglobin
 - ☐ plasma
 - ☐ platelets
 - ☐ antibodies
5. The pulmonary circulation carries blood between the heart and the:
 - ☐ lungs
 - ☐ liver
 - ☐ legs
 - ☐ brain
6. Fish have a single circulation, while mammals have a double circulation.
 - ☐ True ☐ False

7. The left ventricle has a thicker muscular wall than the right.

☐ True ☐ False

8. The pulmonary artery carries deoxygenated blood, showing "artery = away from heart", not "artery = oxygen-rich".

☐ True ☐ False

9. Red blood cells have no nucleus, leaving more room for haemoglobin.

☐ True ☐ False

10. The circulation that carries blood to the body (not the lungs) is the _____ circulation.

IGCSE Biology

1. **twice per full circuit of the body**

Double circulation means two passes through the heart.

2. **atria**

Atria receive; ventricles pump.

3. **away from the heart**

Arteries carry blood away from the heart.

4. **haemoglobin**

Haemoglobin binds oxygen.

5. **lungs**

Pulmonary = to the lungs for oxygen.

6. **True**

Mammals pump blood twice per circuit.

7. **True**

It pumps blood to the whole body at high pressure.

8. **True**

Arteries are defined by direction, not oxygen content.

9. **True**

No nucleus and a biconcave shape suit oxygen transport.

10. **systemic**

Systemic = to the body; pulmonary = to the lungs.

9.1 Circulatory systems

Name: _____ Class: _____ Date: _____

Total: 8 marks

KEY WORDS circulatory system 循环系统 • heart 心脏 • blood vessels 血管 • oxygen 氧气 • double circulation 双循环

Objective

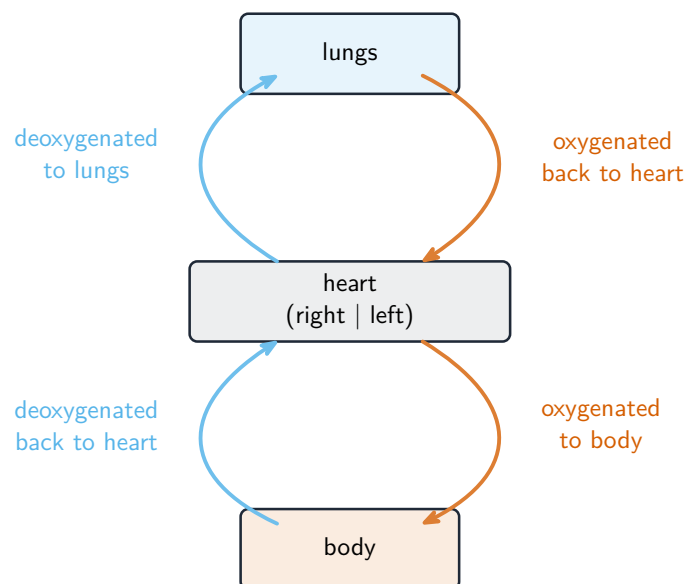
Build the skills to answer exam questions on **circulatory systems** 循环系统 — the parts of the system and **single vs double circulation** 单循环/双循环.

You must be able to:

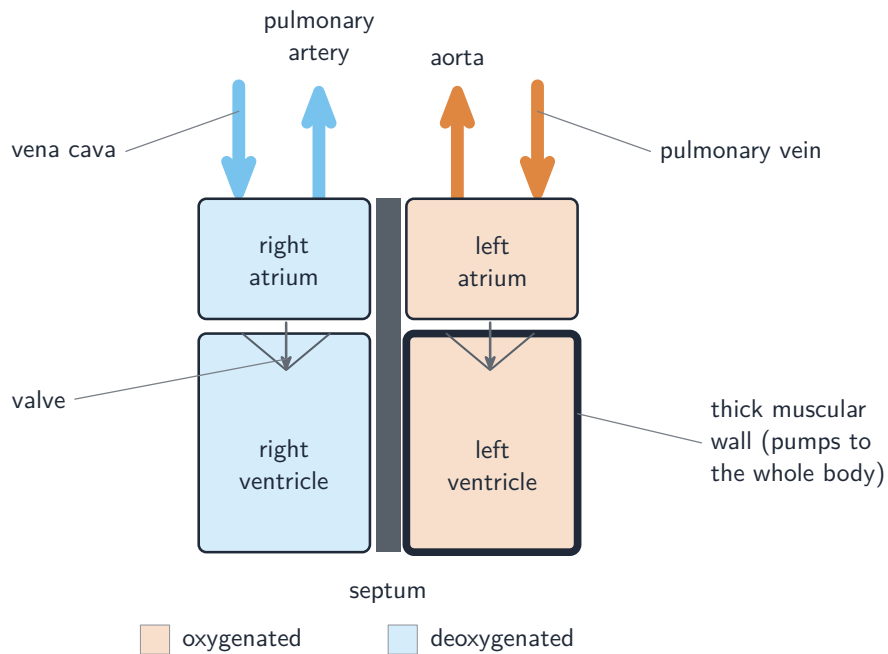
- name the parts of the circulatory system
- compare single and double circulation
- explain the advantage of a double circulation

1 Worked examples

■ Double circulation



Mammals have a double circulation — blood passes through the heart twice each trip



The heart pumps the double circulation

- **system:** a pump (heart), blood vessels, valves (one-way flow).
- **advantage:** blood is re-pumped at high pressure before going to the body → fast oxygen delivery.

2 Practice

2.1 Name the three parts of the circulatory system.

[3]

2.2 State how many times blood passes through the heart in a single circulation.

[1]

3 Exam-style questions

3.1 In a double circulation, blood passes through the heart: [1]

- **A** once per trip
 - **B** twice per trip
 - **C** never
 - **D** four times per trip
-

3.2 Mammals have a double circulation.

(a) State the advantage of a double circulation. [2]

(b) State the job of the valves in the circulatory system. [1]

Solutions

2.1 a pump (heart); blood vessels; valves.

2.2 once.

3.1 B. In a double circulation blood passes through the heart twice per trip.

3.2 (a) blood can be pumped again at high pressure before going to the body; so it travels faster and delivers oxygen quickly.

(b) they keep the blood flowing one way only.

15 Which statement describes a double circulatory system?

- A** Blood goes through the lungs twice every time it goes round the body.
- B** Blood goes through the kidneys twice every time it goes round the body.
- C** Blood goes through the heart twice every time it goes round the body.
- D** Blood goes through the brain twice every time it goes round the body.

2 (a) Fig. 2.1 is a diagram of part of the human circulatory system.

The arrows show the direction of blood flow.

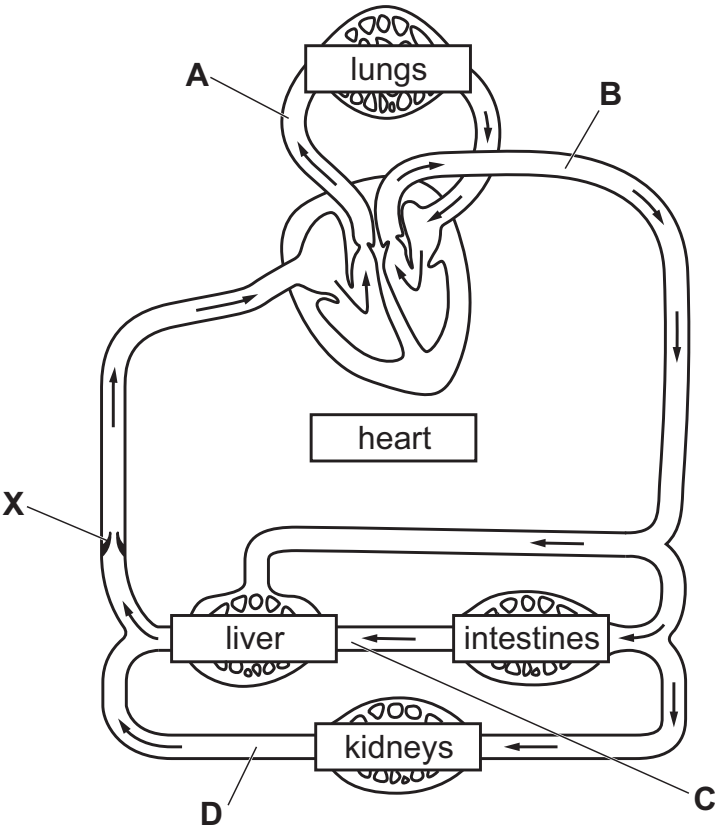


Fig. 2.1

(i) Complete Table 2.1 by naming the blood vessels in Fig. 2.1 and stating whether the blood in each vessel is oxygenated.

Table 2.1

letter in Fig. 2.1	name of the blood vessel	carries oxygenated blood (yes/no)
A		
B		
C		
D		

[4]

(ii) State the name of structure X in Fig. 2.1 and outline its function.

name

function

- The arrows show the direction of blood flow.

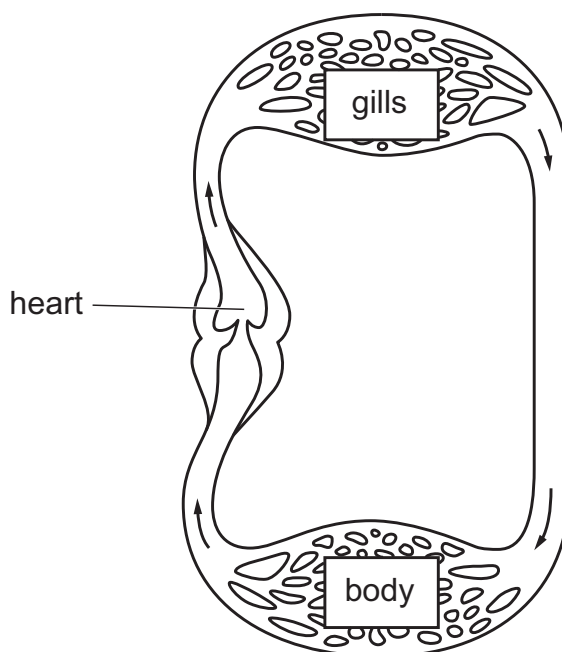
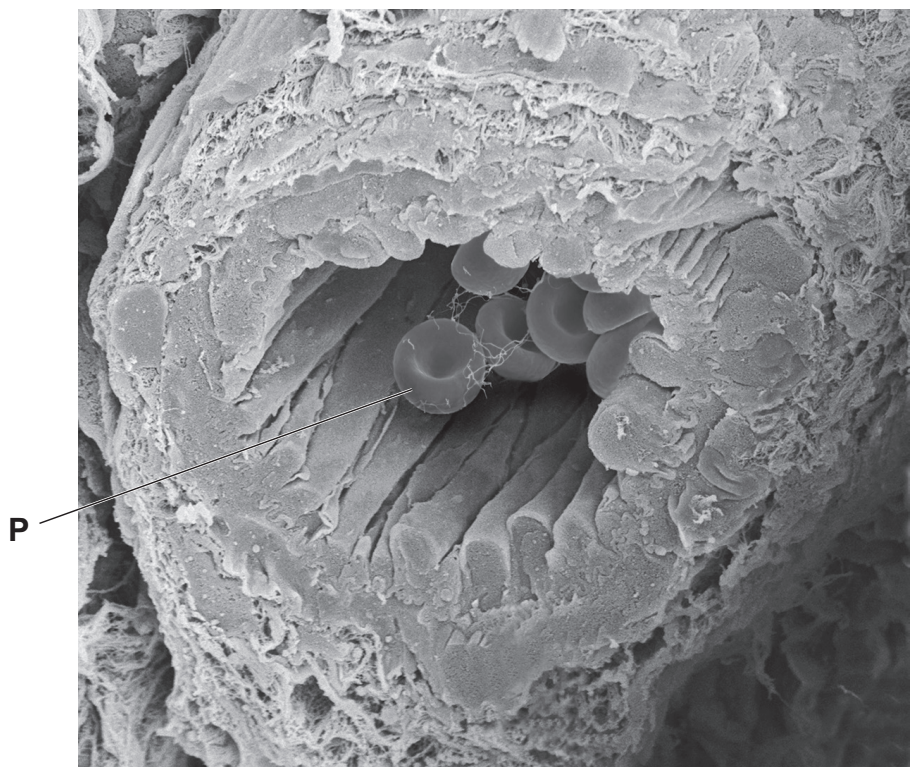


Fig. 2.2

- [2]

- [4]

(c) Fig. 2.3 is a photomicrograph of an arteriole.



magnification $\times 1430$

Fig. 2.3

(i) Identify the structure labelled **P** in Fig. 2.3.

..... [1]

(ii) The magnification of the image is provided. Write the formula that would be used to calculate the actual diameter of the lumen of the arteriole in Fig. 2.3.

..... [1]

(iii) The actual diameter of the lumen of the arteriole shown in Fig. 2.3 is 0.0315 mm.

Convert 0.0315 mm to micrometres (μm).

..... μm [1]

[Total:15]

15 In a fish, what is the sequence of structures that blood passes through after it leaves the heart?

- A** gills → muscles → heart
- B** gills → heart → muscles → heart
- C** muscles → gills → heart
- D** muscles → heart

16 What is an advantage of a double circulatory system?

- A** It allows the mixing of oxygenated and deoxygenated blood.
- B** It can keep blood pressure high in the lungs.
- C** Less carbon dioxide is removed from the body cells.
- D** Oxygen is supplied to body cells by blood at high pressure.

9.2 Heart

Name: _____ Class: _____ Date: _____

Total: 8 marks

KEY WORDS heart 心脏 • coronary heart disease 冠心病 • heart rate 心率 • ventricle 心室 • septum 隔膜

Objective

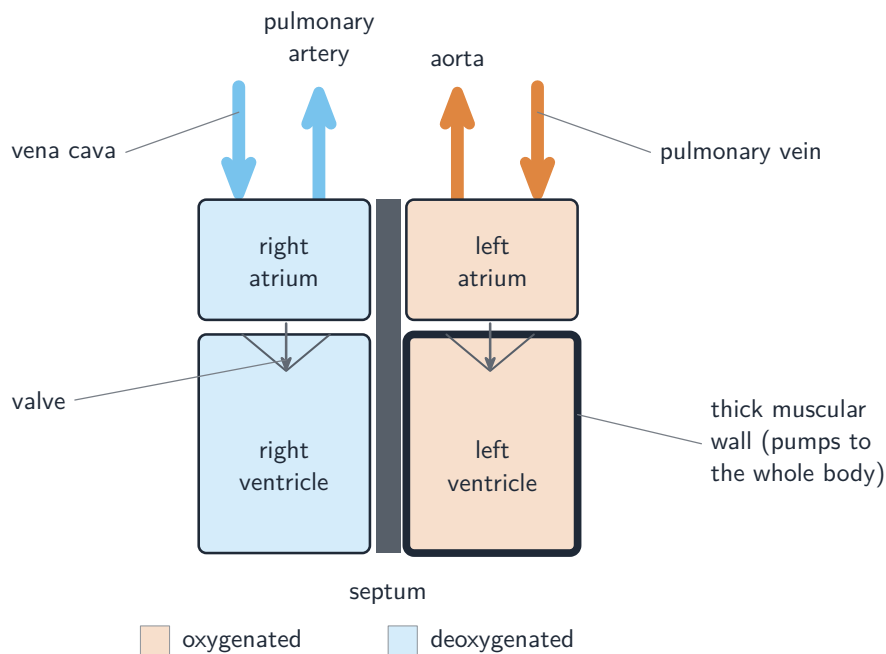
Build the skills to answer exam questions on the **heart** 心脏 — its chambers, why the left ventricle wall is thicker, heart rate, and **coronary heart disease** 冠心病.

You must be able to:

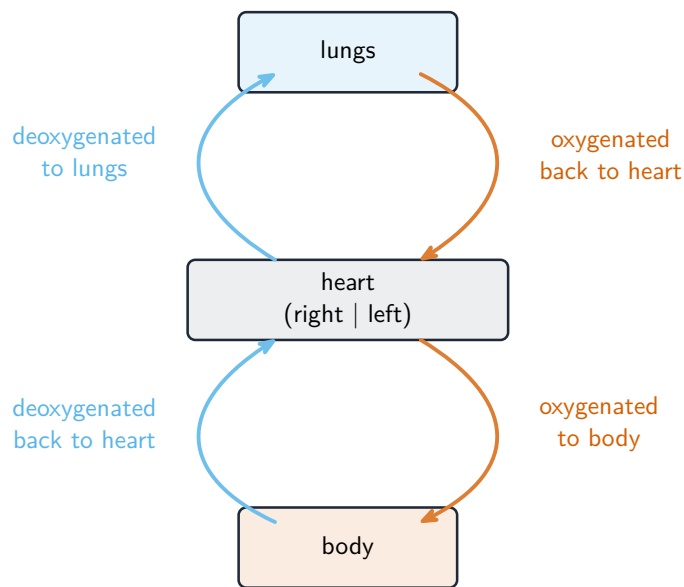
- name the chambers and the role of the septum and valves
- explain why the left ventricle wall is thickest
- give the risk factors for coronary heart disease

1 Worked examples

■ Heart structure



Left ventricle wall is thickest — it pumps blood to the whole body



The heart drives two circuits of blood

- **atria** (upper, thin) push blood to the **ventricles** (lower); the **septum** keeps the two sides apart.
- valves stop blood flowing backwards; coronary arteries feed the heart muscle.

2 Practice

2.1 Name the upper and lower chambers of the heart.

[2]

2.2 State the role of the septum.

[1]

3 Exam-style questions

3.1 The wall of the left ventricle is thicker than the right because it: [1]

- **A** pumps blood only to the lungs
 - **B** pumps blood to the whole body
 - **C** holds more blood
 - **D** has no valves
-

3.2 During exercise the heart rate increases.

(a) Explain why this is needed. [2]

(b) State two risk factors for coronary heart disease. [2]

Solutions

2.1 upper: atria; lower: ventricles.

2.2 it keeps oxygenated and deoxygenated blood apart (so they do not mix).

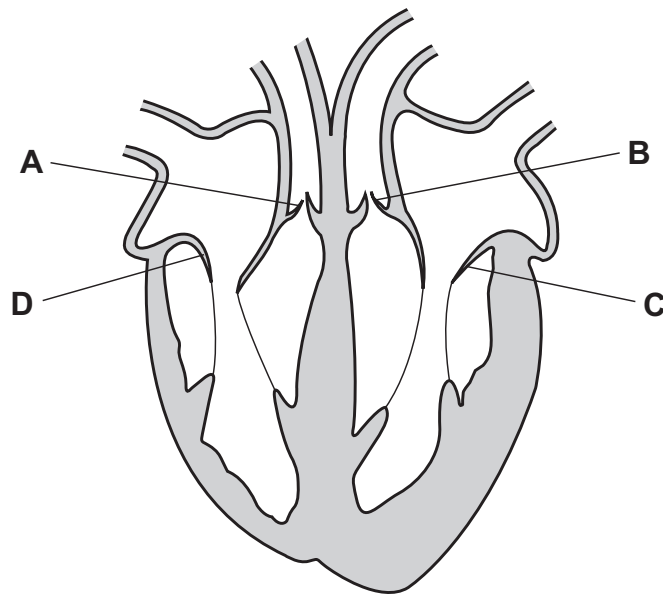
3.1 B. The left ventricle pumps blood to the whole body, so its wall is thickest.

3.2 (a) the muscles need more oxygen and glucose during exercise; a faster heart rate delivers blood (and these) to them faster.

(b) any two of: high-fat diet; lack of exercise; smoking; stress; genetics/age.

16 The diagram shows a section through a human heart.

Which structure is an atrioventricular valve in the right side of the heart?



- 4 Fig. 4.1 shows a section through a human heart and the main blood vessels.

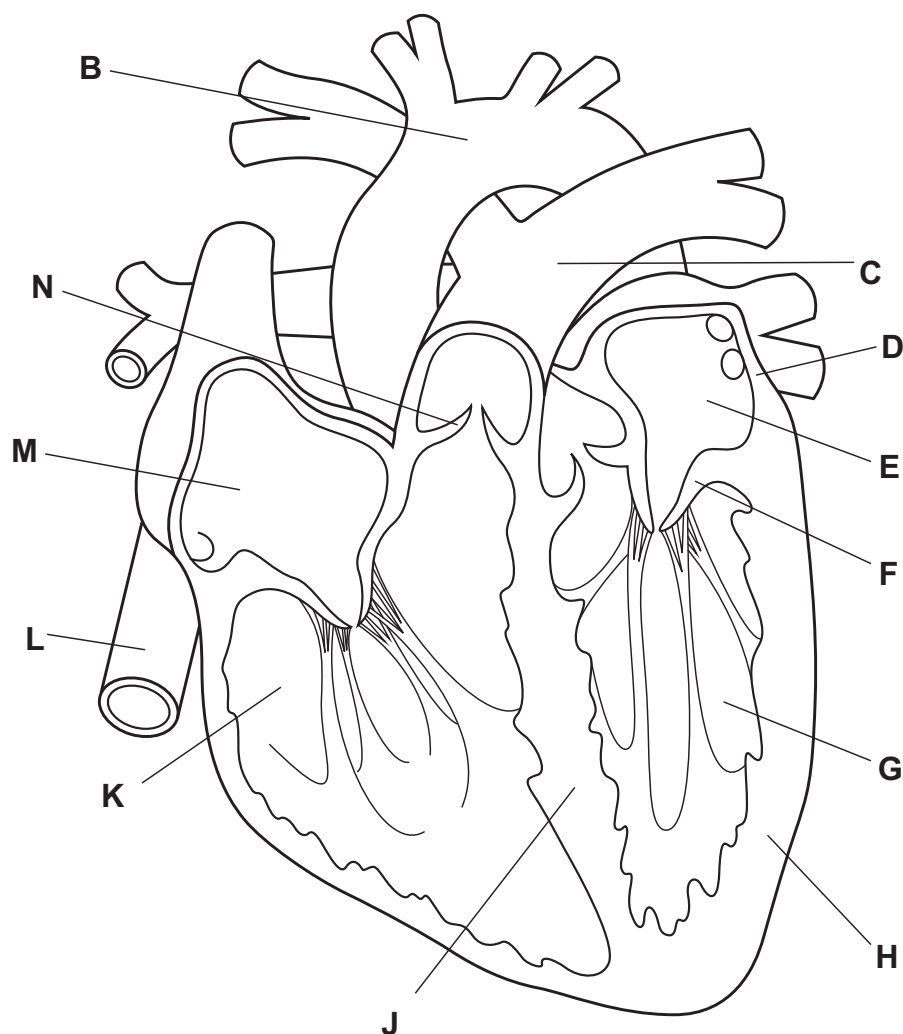


Fig. 4.1

- (a) (i) State the letter in Fig. 4.1 that identifies:
the structure that separates oxygenated and deoxygenated blood
an atrioventricular valve.

[2]

- (ii) Explain why the heart wall at **H** is thicker than the heart wall at **D** in Fig. 4.1.

.....

.....

.....

.....

.....

[2]

(iii) Table 4.1 contains eight descriptions of parts of the pathway a red blood cell takes as it moves from the vena cava to the aorta.

Using Fig. 4.1, complete Table 4.1 by numbering the descriptions to show the correct sequence.

Two have been done for you.

Table 4.1

description	sequence
blood enters C	
blood enters E and then E contracts	
blood enters M and then M contracts	1
blood travels to lungs	
blood moves into G	
blood moves into B	8
N opens	
blood moves into K	

[2]

(b) Fig. 4.2 shows the effect of exercise on heart rate.

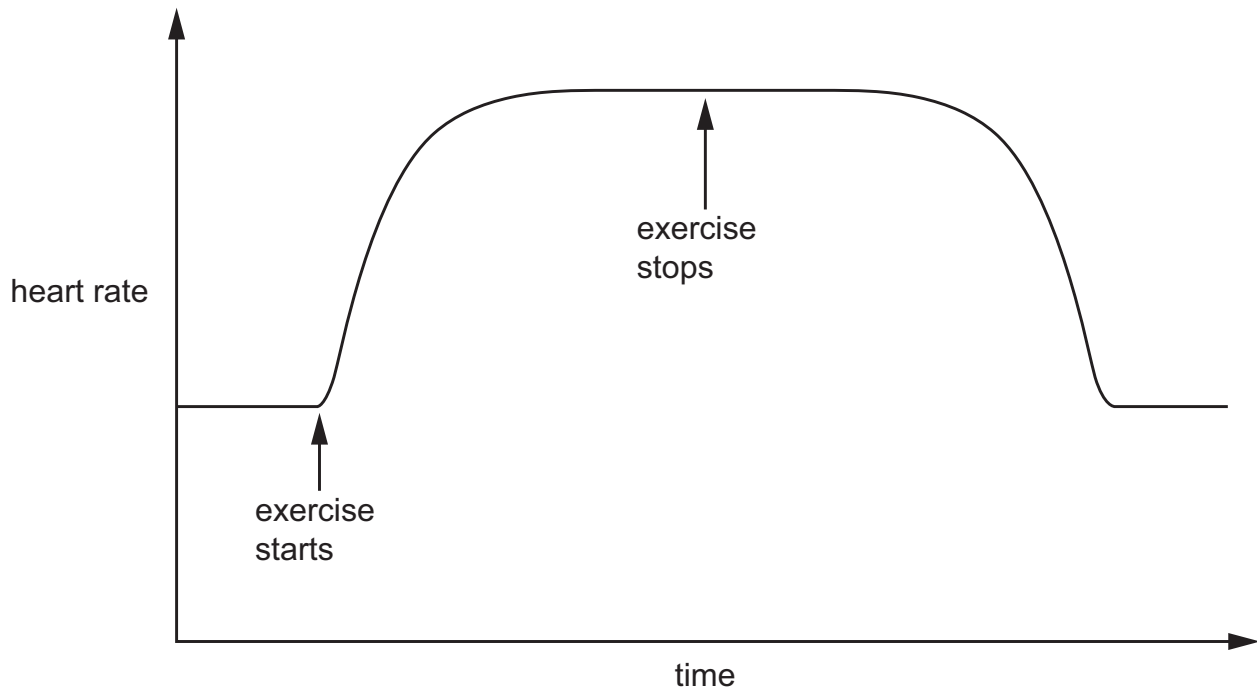


Fig. 4.2

(i) Explain the effect of exercise on heart rate shown in Fig. 4.2.

[5]

(ii) A lack of exercise can increase the risk of coronary heart disease.

State **three** other factors that can increase the risk of coronary heart disease.

1

2

3

[3]

[Total: 14]

17 Which structure in the heart separates oxygenated and deoxygenated blood?

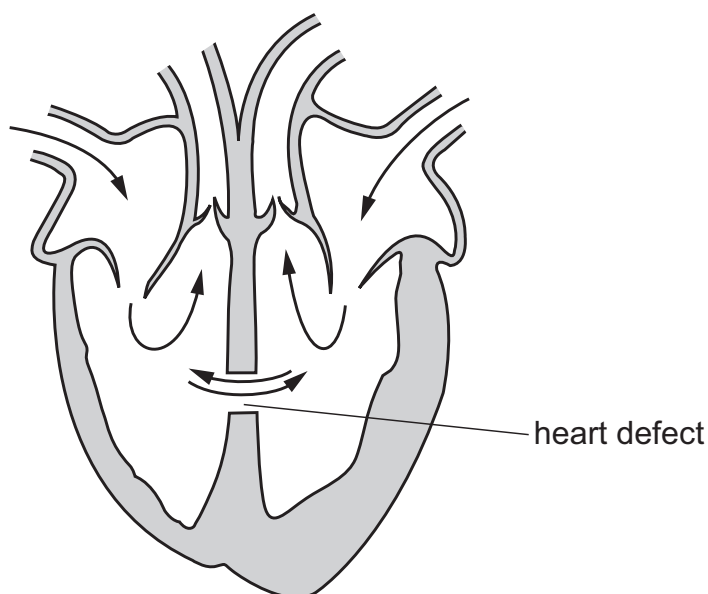
- A** atrioventricular valve
- B** muscle wall of left atrium
- C** semilunar valve
- D** septum

15 Through which pathway does blood leave the heart?

- A** through arteries from the atria
- B** through arteries from the ventricles
- C** through veins from the atria
- D** through veins from the ventricles

16 The diagram shows a heart defect that some babies are born with.

The arrows indicate direction of blood flow.



Which statement explains why this heart defect might cause the baby to have poor growth?

- A** Blood flows to the lungs at high pressure increasing rate of gas exchange.
- B** Blood flows to the lungs at low pressure decreasing rate of gas exchange.
- C** Mixing of blood results in less oxygen available for respiration.
- D** Mixing of blood results in more glucose available for respiration.

9.3 Blood vessels

Name: _____ Class: _____ Date: _____

Total: 6 marks

KEY WORDS lumen 管腔 • veins 静脉 • blood vessels 血管 • arteries 动脉 • ions 离子

Objective

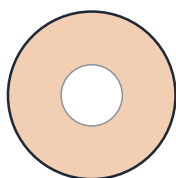
Build the skills to answer exam questions on **blood vessels** 血管 — **arteries** 动脉, **veins** 静脉 and **capillaries** 毛细血管, and how each is adapted.

You must be able to:

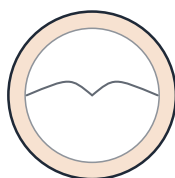
- compare arteries, veins and capillaries (wall, lumen, valves, job)
- explain how each is adapted to its function
- name the main blood vessels

1 Worked examples

■ The three vessels



artery
thick muscular,
elastic wall;
narrow lumen;
high pressure

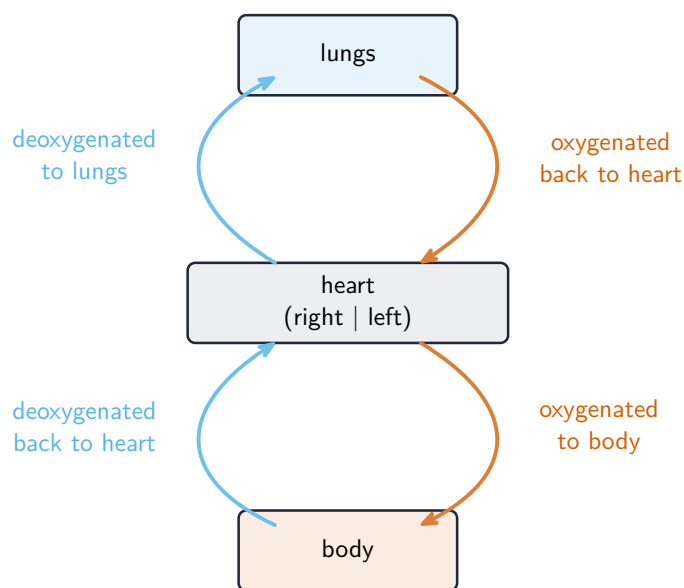


vein
thin wall;
wide lumen;
has **valves**;
low pressure



capillary
wall one cell
thick; lets
substances be
exchanged

Artery: thick wall, away from heart, high pressure. Vein: thin wall, valves, back to heart. Capillary: one cell thick, exchange



Arteries, veins and capillaries in the circulation

2 Practice

2.1 State which vessel carries blood away from the heart.

[1]

2.2 State why veins have valves.

[1]

3 Exam-style questions

3.1 A capillary is well adapted for exchange because its wall is:

[1]

- **A** thick and muscular
- **B** one cell thick
- **C** full of valves
- **D** very elastic

3.2 Arteries carry blood at high pressure.

(a) Explain how the artery wall is adapted to high pressure.

[2]

(b) Name the artery that carries blood from the heart to the body. [1]

Solutions

2.1 an artery.

2.2 to stop the low-pressure blood flowing backwards.

3.1 B. A capillary wall is one cell thick, giving a short distance for exchange.

3.2 (a) it has a thick, muscular and elastic wall; to withstand and cope with the high pressure.

(b) the aorta.

15 What is a feature of veins?

- A** one-cell-thick wall
- B** narrow lumen
- C** thick muscular walls
- D** valves are present

2 (a) Fig. 2.1 is a diagram of part of the human circulatory system.

The arrows show the direction of blood flow.

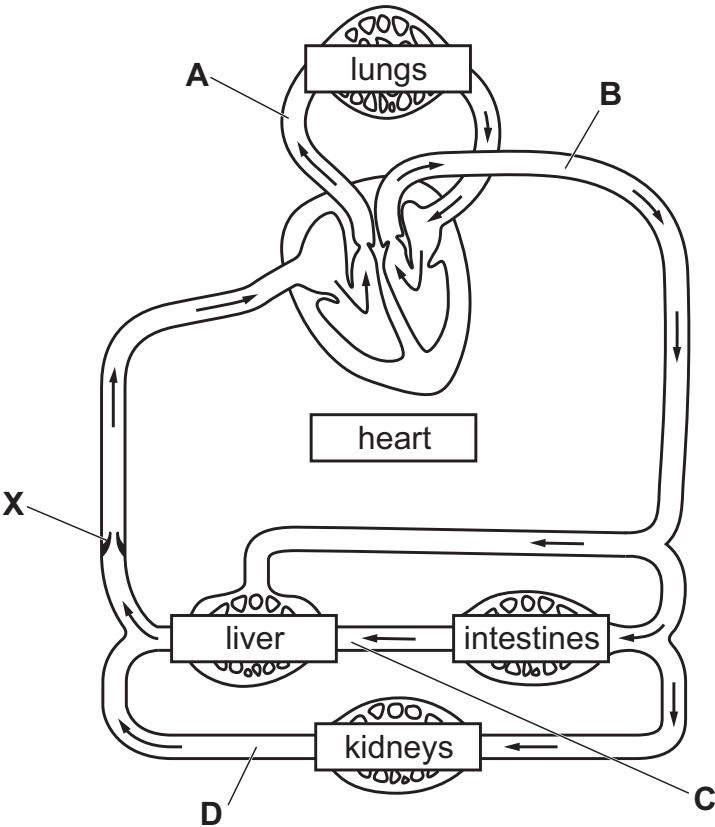


Fig. 2.1

(i) Complete Table 2.1 by naming the blood vessels in Fig. 2.1 and stating whether the blood in each vessel is oxygenated.

Table 2.1

letter in Fig. 2.1	name of the blood vessel	carries oxygenated blood (yes/no)
A		
B		
C		
D		

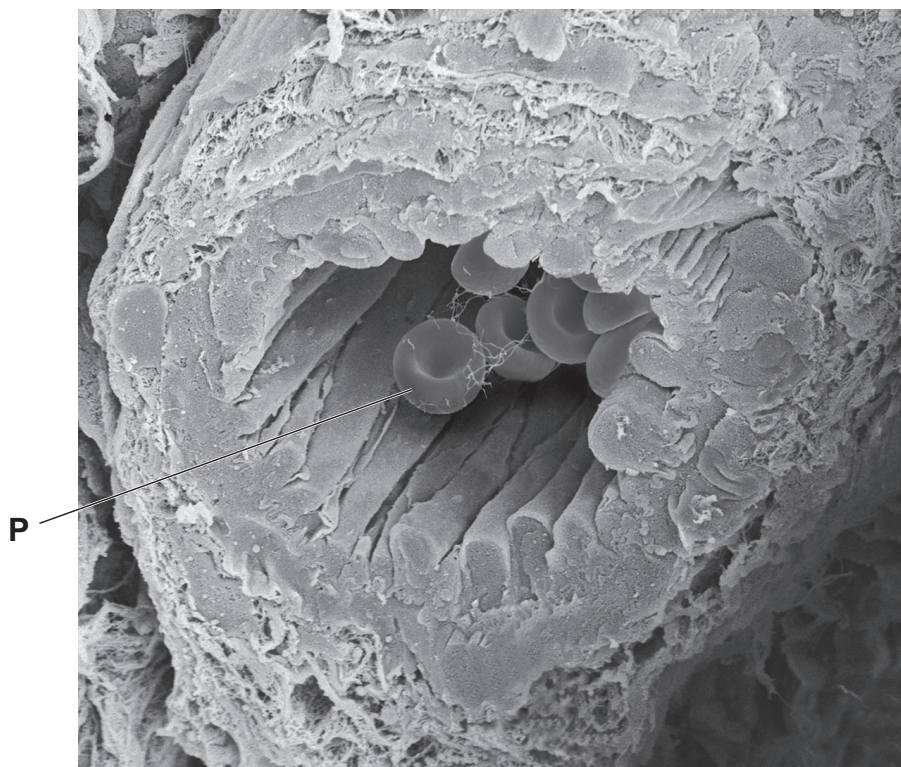
[4]

(ii) State the name of structure X in Fig. 2.1 and outline its function.

name

function

(c) Fig. 2.3 is a photomicrograph of an arteriole.



magnification $\times 1430$

Fig. 2.3

(i) Identify the structure labelled **P** in Fig. 2.3.

..... [1]

(ii) The magnification of the image is provided. Write the formula that would be used to calculate the actual diameter of the lumen of the arteriole in Fig. 2.3.

..... [1]

(iii) The actual diameter of the lumen of the arteriole shown in Fig. 2.3 is 0.0315 mm.

Convert 0.0315 mm to micrometres (μm).

..... μm [1]

[Total:15]

18 Which row shows the features of a vein?

	relative thickness of the wall to total vessel diameter	diameter of the lumen	presence or absence of valves
A	thick	large	absent
B	thick	small	present
C	thin	small	absent
D	thin	large	present

9.4 Blood

Name: _____ Class: _____ Date: _____

Total: 7 marks

KEY WORDS blood 血液 • antibodies 抗体 • pathogens 病原体 • clot 凝血 • haemoglobin 血红蛋白

Objective

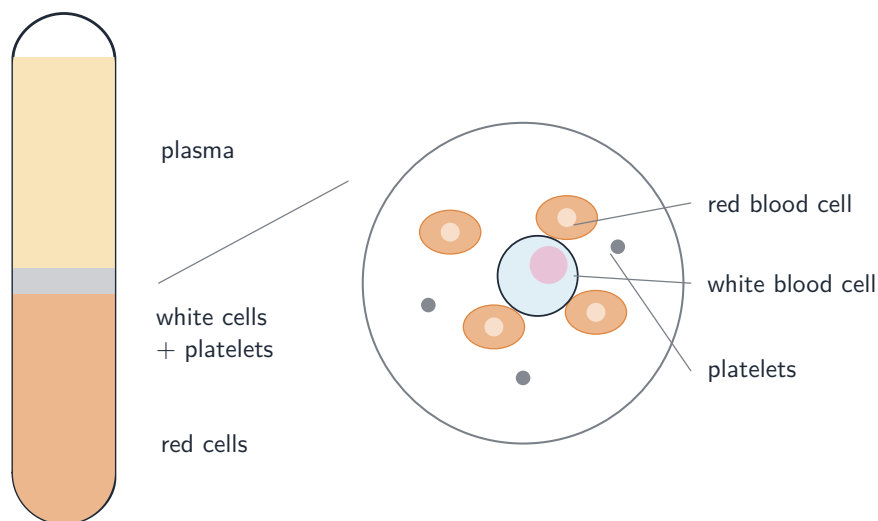
Build the skills to answer exam questions on **blood** 血液 — the four components, the role of white blood cells, and **clotting** 凝血.

You must be able to:

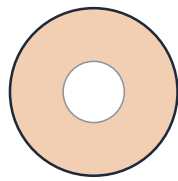
- name the four components of blood and their functions
- describe how phagocytes and lymphocytes defend the body
- describe how blood clots

1 Worked examples

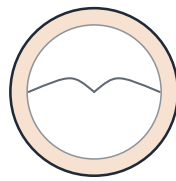
■ Components of blood



Red cells (oxygen, haemoglobin), white cells (defence), platelets (clotting), plasma (transport)



artery
thick muscular,
elastic wall;
narrow lumen;
high pressure



vein
thin wall;
wide lumen;
has **valves**;
low pressure



capillary
wall one cell
thick; lets
substances be
exchanged

Blood components travel in the vessels

- **phagocytes** engulf pathogens; **lymphocytes** make antibodies.
- clotting: fibrinogen → fibrin threads → a net that traps cells.

2 Practice

2.1 State the function of red blood cells.

[1]

2.2 Name the part of the blood that helps it clot.

[1]

3 Exam-style questions

3.1 The liquid part of blood that carries dissolved substances is the:

[1]

- **A** plasma
- **B** platelets
- **C** red blood cells
- **D** haemoglobin

3.2 White blood cells defend the body.

(a) Describe how a phagocyte deals with a pathogen.

[1]

(b) Describe how a lymphocyte deals with a pathogen.

[1]

3.3 Explain why clotting of blood at a cut is important.

[2]

Solutions

2.1 they carry oxygen (using haemoglobin).

2.2 platelets.

3.1 A. Plasma is the liquid that carries dissolved substances.

3.2 (a) it surrounds and digests (engulfs) the pathogen.

(b) it makes antibodies that stick to and destroy the pathogen.

3.3 the clot seals the wound to stop blood loss; and stops pathogens getting in.

2 (a) Fig. 2.1 is a diagram of part of the human circulatory system.

The arrows show the direction of blood flow.

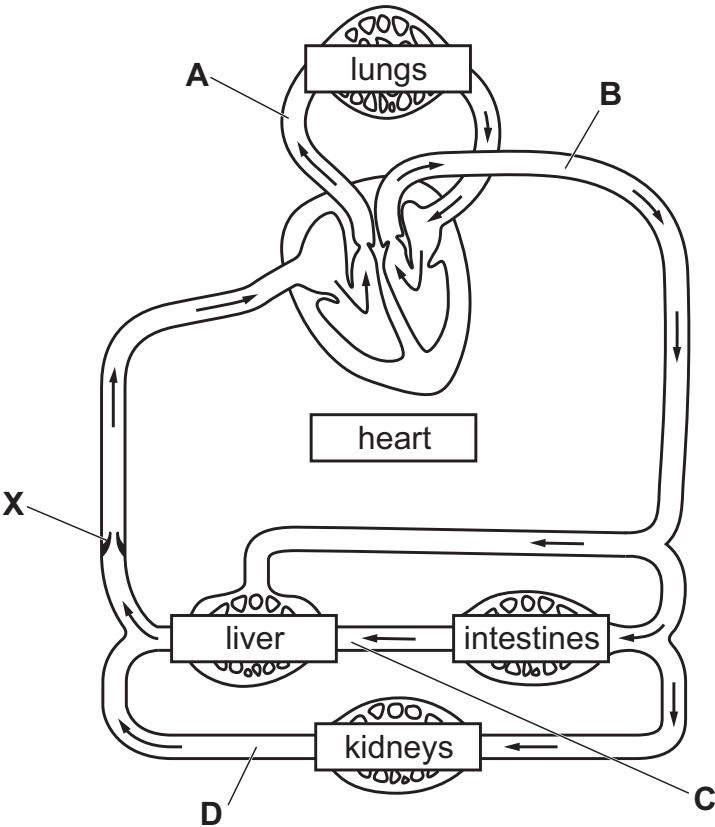


Fig. 2.1

(i) Complete Table 2.1 by naming the blood vessels in Fig. 2.1 and stating whether the blood in each vessel is oxygenated.

Table 2.1

letter in Fig. 2.1	name of the blood vessel	carries oxygenated blood (yes/no)
A		
B		
C		
D		

[4]

(ii) State the name of structure X in Fig. 2.1 and outline its function.

name

function

(b) Fig. 2.2 is a diagram of part of a fish circulatory system.

The arrows show the direction of blood flow.

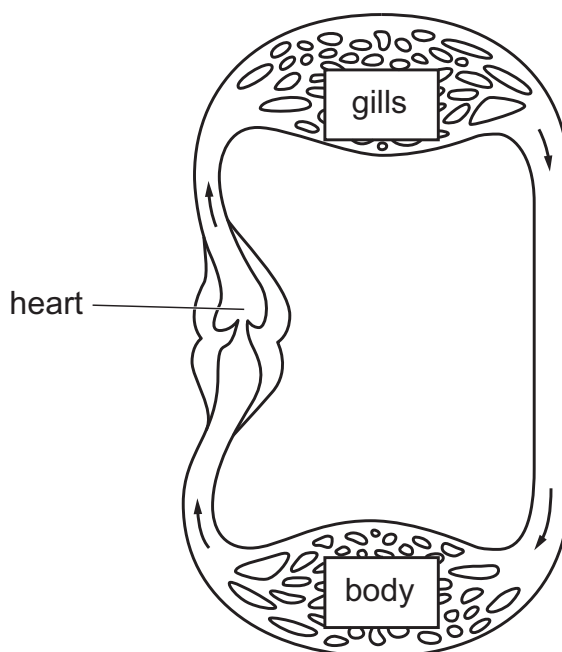


Fig. 2.2

(i) Describe how the structure of the fish heart in Fig. 2.2 differs from a human heart.

.....

.....

.....

.....

..... [2]

(ii) Explain the advantages of the type of circulatory system found in humans, compared with the circulatory system shown in Fig. 2.2.

.....

.....

.....

.....

.....

.....

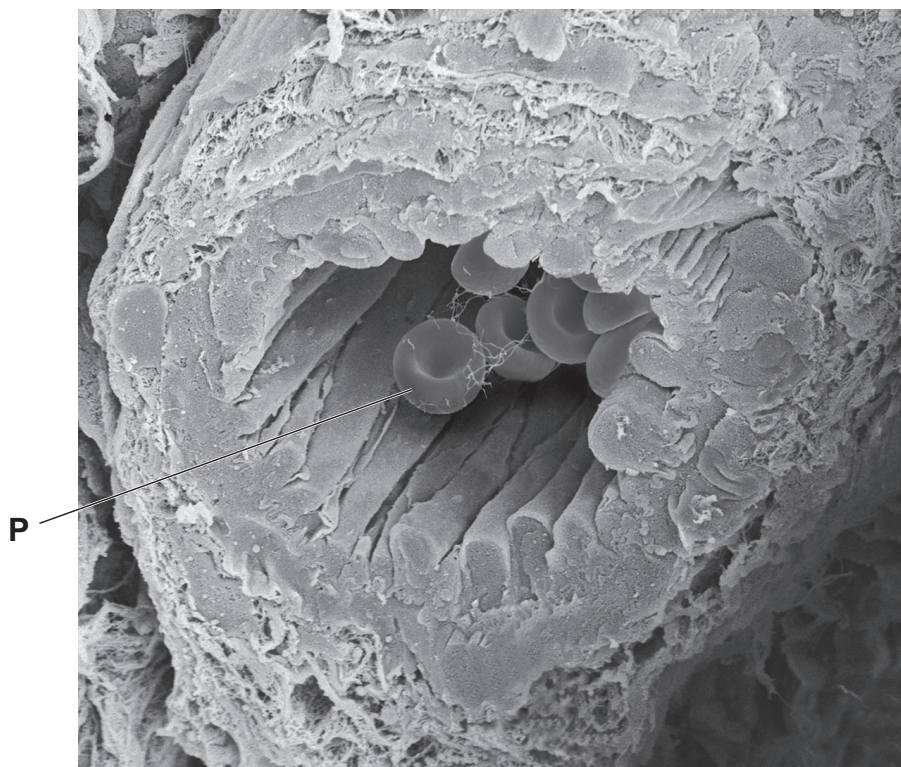
.....

.....

.....

..... [4]

(c) Fig. 2.3 is a photomicrograph of an arteriole.



magnification $\times 1430$

Fig. 2.3

(i) Identify the structure labelled **P** in Fig. 2.3.

..... [1]

(ii) The magnification of the image is provided. Write the formula that would be used to calculate the actual diameter of the lumen of the arteriole in Fig. 2.3.

..... [1]

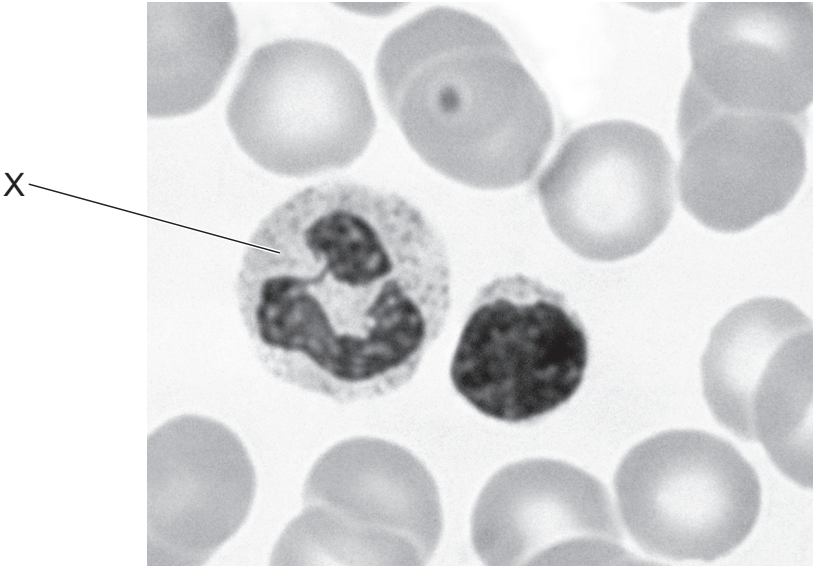
(iii) The actual diameter of the lumen of the arteriole shown in Fig. 2.3 is 0.0315 mm.

Convert 0.0315 mm to micrometres (μm).

..... μm [1]

[Total:15]

16 The photomicrograph shows some blood cells.



Which row shows the name and function of the cell labelled X?

	name	function
A	lymphocyte	engulfs pathogens
B	lymphocyte	produces antibodies
C	phagocyte	engulfs pathogens
D	phagocyte	produces antibodies

2 Fig. 2.1 is a photomicrograph of human blood.

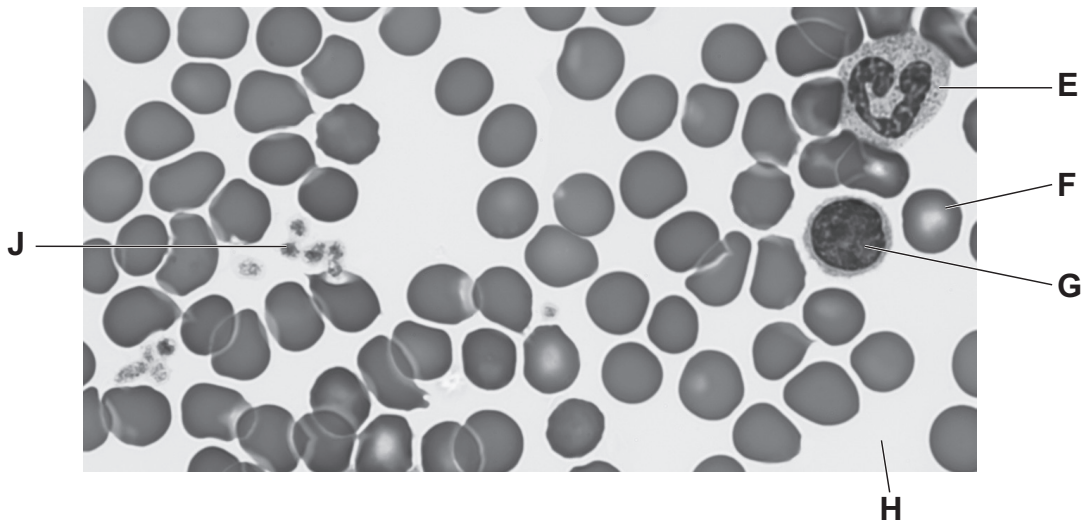


Fig. 2.1

(a) Use the information in Fig. 2.1 to complete Table 2.1.

Table. 2.1

component of blood	letter from Fig. 2.1	function
red blood cell		
		production of antibodies
	H	
		phagocytosis
platelet	J	

(b) Some diseases are transmissible.

(i) State the name of a pathogen that is transmitted by direct contact with blood.

..... [1]

(ii) State **two** ways that a pathogen can be transmitted **indirectly**.

1

2

[2]

(c) Describe the role of antibodies in the defence against pathogens.

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

(d) Explain how active immunity differs from passive immunity.

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

[Total: 14]