

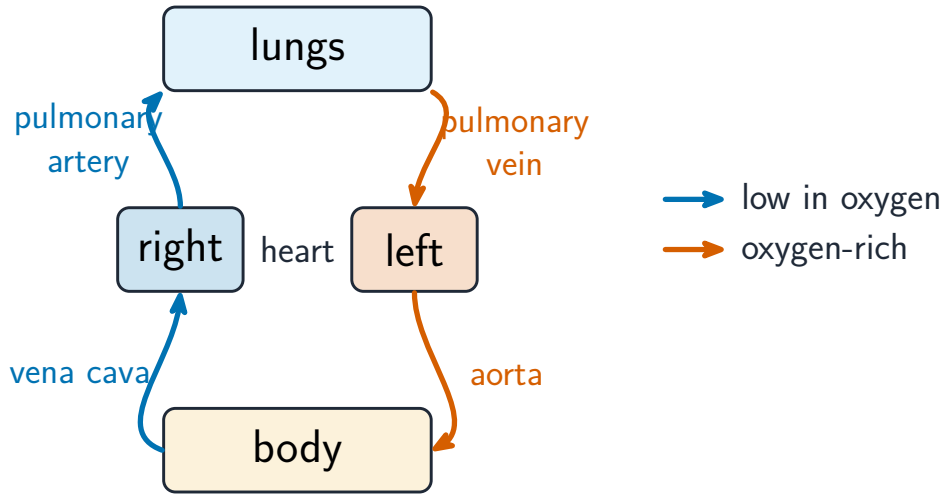
Exercise walk-through

8.1

The circulatory system

A-Level Biology

Double circulation



A closed double circulation

: blood passes through the heart **twice** per trip.

■ **pulmonary** loop – to the lungs

■ **systemic** loop – to the body

Order: **arteries** →
capillaries →
veins .

The conducting system of the heart

the sinoatrial node

the pacemaker, in the right atrium – it sets the rate and starts each wave

the atria contract

the wave spreads across both atria, emptying them into the ventricles

the atrioventricular node

picks up the wave and **holds it back for a moment**, so the atria finish emptying first

the bundle of His

carries it down the septum to the apex

the Purkyne fibres

spread it up through the ventricle walls, so they contract **from the bottom up**

and carbamino-haemoglobin

some carbon dioxide is carried by joining haemoglobin directly, rather than as hydrogencarbonate

The AVN delay is the point of the whole system: without it the ventricles would contract while the atria were still filling them.

The circulatory system

Mammals have a **closed double circulation**.

- the **pulmonary circulation** carries blood from the heart to the lungs and back.
- the **systemic circulation** carries blood from the heart to the rest of the body and back.
- the **pulmonary artery** – carries blood low in **oxygen** from the heart to the lungs.
- the **pulmonary vein** – carries oxygen-rich blood from the lungs back to the heart.

Exercises 2.1-2.2

2.1 Name the vessel that carries oxygen-rich blood from the lungs to the heart. [1]

2.2 Explain why an artery has a thick wall of elastic fibres. [2]

Exercises 2.1-2.2

2.1 Name the vessel that carries oxygen-rich blood from the lungs to the heart. [1]

2.1

- the pulmonary vein
-

2.2 Explain why an artery has a thick wall of elastic fibres. [2]

2.2

- the elastic wall stretches when the heart pumps and recoils between beats, smoothing the high-pressure flow / maintaining pressure

Exercises 3.1-3.2

3.1 Which feature is found in veins but **not** in arteries?

[1]

☐

A a muscular wall

B valves

C a lumen

D an endothelium

3.2 Why is a capillary wall only one cell thick?

[1]

☐

A to carry blood at high pressure

B to give a short diffusion distance for exchange

C to prevent backflow

D to store tissue fluid

Exercises 3.1-3.2

3.1 Which feature is found in veins but **not** in arteries?

[1]

☐

A a muscular wall

B valves

C a lumen

D an endothelium

3.1 B

- Veins have valves to prevent backflow; arteries do not

3.2 Why is a capillary wall only one cell thick?

[1]

☐

A to carry blood at high pressure

B to give a short diffusion distance for exchange

C to prevent backflow

D to store tissue fluid

3.2 B

- A one-cell-thick wall gives a short diffusion distance for exchange

Exercise 3.3

3.3 (a) Describe how tissue fluid is formed at the arterial end of a capillary. [3]

(b) State **two** substances that pass from the tissue fluid into the body cells. [1]

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(b) State **two** substances that pass from the tissue fluid into the body cells. [1]

3.3

(a)

- at the arterial end the blood (hydrostatic) pressure is high; this forces plasma/fluid out through the capillary wall; cells and large plasma proteins stay in

(b)

- oxygen and glucose

Exercise 3.4

3.4 Explain why most tissue fluid returns to the capillary at the venous end. [2]

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3.4

- at the venous end the blood pressure is lower; and the plasma proteins left behind lower the water potential, so water returns by osmosis