Your notes

GCSE Biology: revision notes

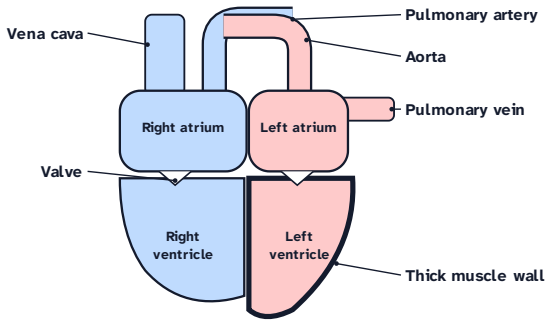
The heart, blood and blood vessels

Contents

1. Start here: the body's transport system
2. The heart and double circulation
3. Blood vessels
4. Blood
5. The lungs
6. Coronary heart disease
7. Exam tip
8. Common mistakes
9. Key terms
10. Quick questions
11. What to do next

Start here: the body's transport system

- Every cell needs oxygen and glucose, and has to get rid of carbon dioxide. Blood carries them all round the body.
- The heart is a pump that pushes blood through blood vessels: arteries carry blood away from the heart, **veins** bring it back, and tiny capillaries pass close to every cell.
- Humans have a double circulation: blood goes through the heart twice on each full trip, once to the lungs to pick up oxygen and once round the body.

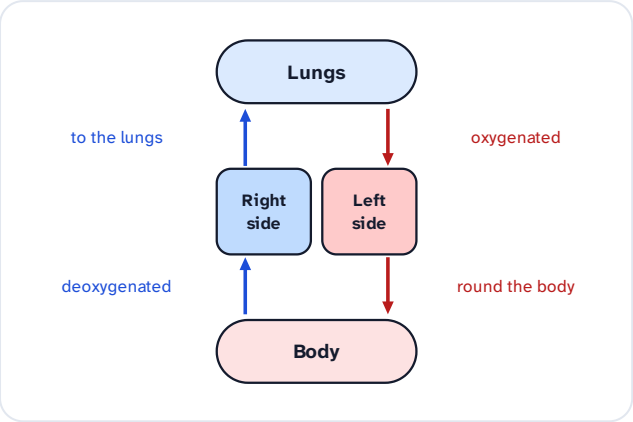


Seen from the front: the right side of the heart is on the left of the picture.

The heart and double circulation

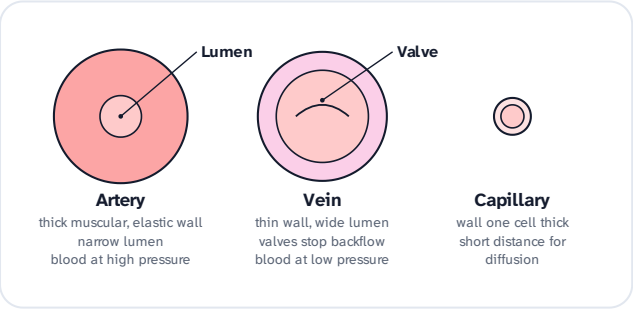
- The heart is an organ that pumps blood around the body in a **double circulatory system**.
- The right **ventricle** pumps deoxygenated blood to the lungs, where it picks up oxygen. The left **ventricle** pumps oxygenated blood around the rest of the body.
- The heart has four chambers: two atria at the top receive blood; two **ventricles** at the bottom pump it out. Valves stop blood flowing backwards.

- The left **ventricle** has a thicker muscular wall because it pumps blood all round the body.
- The heart muscle gets its own oxygen from the **coronary arteries**.
- The natural resting heart rate is controlled by a group of pacemaker cells in the right **atrium**. An artificial pacemaker can correct an irregular heart rate.



Blood vessels

- Arteries carry blood away from the heart at high pressure. They have thick, muscular, elastic walls.
- **Veins** carry blood back to the heart at low pressure. They have thinner walls, a wide lumen and valves to stop backflow.
- Capillaries are tiny vessels with walls one cell thick, so substances diffuse easily between the blood and body cells.
- Rate of blood flow = volume of blood ÷ time.



Blood

- Blood is a tissue made of **plasma**, red blood cells, white blood cells and **platelets**.
- **Plasma** carries blood cells, dissolved glucose, amino acids, carbon dioxide, urea, hormones and proteins.
- Red blood cells carry oxygen using **haemoglobin**. They are biconcave discs with no nucleus, giving more room for **haemoglobin** and a large surface area.
- White blood cells defend against pathogens. **Platelets** are cell fragments that help blood to clot.

Your notes

The lungs

- Air passes down the trachea, into two bronchi, then into bronchioles, ending in millions of alveoli.
- Oxygen diffuses from the alveoli into the blood in the capillaries, and carbon dioxide diffuses the other way.
- Alveoli are adapted with a huge surface area, thin walls, a moist lining and a rich blood supply.

Coronary heart disease

- In coronary heart disease, layers of fatty material build up inside the **coronary arteries**, narrowing them and reducing the flow of oxygen to the heart muscle.
- **Stents** are tubes that hold arteries open. **Statins** are drugs that lower blood cholesterol, slowing the build-up of fatty material.
- Faulty valves can be replaced with biological or mechanical valves. Heart failure may be treated with a donor heart or an artificial heart.
- Each treatment has risks and side effects; for example, surgery carries a risk of infection and **statins** may cause side effects.

Exam tip

- Learn the route: vena cava, right **atrium**, right **ventricle**, pulmonary **artery**, lungs, pulmonary vein, left atrium, left ventricle, aorta.
- Link structure to job: arteries have thick muscular walls for high pressure, **veins** have valves, capillaries are one cell thick for fast diffusion.

Common mistakes

- Mixing up left and right: a heart diagram is drawn as if it's facing you.
- Saying all arteries carry oxygenated blood. The pulmonary **artery** doesn't.
- Saying the left **ventricle**'s wall is thicker because it holds more blood. It pumps at a higher pressure, around the whole body.

Key terms

Double circulatory system	A system in which blood passes through the heart twice in each full circuit: once to the lungs and once to the body.
Atrium	An upper chamber of the heart that receives blood.
Ventricle	A lower chamber of the heart that pumps blood out.
Artery	A blood vessel with thick, muscular walls that carries blood away from the heart.

Your notes

Vein	A blood vessel with thin walls and valves that carries blood back to the heart.
Capillary	A tiny blood vessel with walls one cell thick where substances are exchanged.
Coronary arteries	The arteries that supply the heart muscle with oxygenated blood.
Haemoglobin	The red protein in red blood cells that carries oxygen.
Plasma	The pale yellow liquid part of blood that carries cells and dissolved substances.
Platelets	Cell fragments that help the blood to clot.
Stent	A mesh tube put inside an artery to keep it open.
Statin	A drug that reduces the level of cholesterol in the blood.

Your notes

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. Which chamber pumps blood to the lungs?
2. Why does the left ventricle have a thicker wall than the right?
3. What do the coronary arteries supply?
4. Where are the pacemaker cells that control the resting heart rate?
5. Which blood vessels have valves?
6. Why are capillary walls one cell thick?
7. What does haemoglobin carry?
8. Why do red blood cells have no nucleus?

Answers

1. Right ventricle
2. It pumps blood all around the body
3. The heart muscle
4. In the right atrium
5. Veins
6. So substances can diffuse quickly between blood and cells
7. Oxygen
8. To make more room for haemoglobin

What to do next

Practise 12 questions on this topic

Try 7 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.