Exercise walk-through

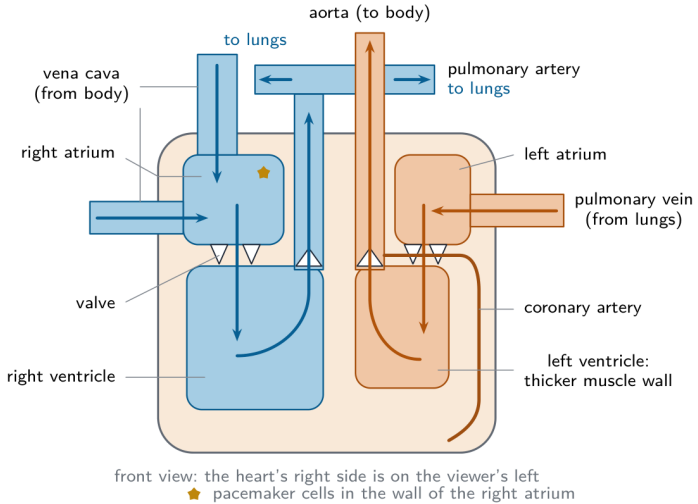
2.2
Heart, blood and CHD (4.2.2.2–4.2.2.4)

AQA · GCSE · Biology

The heart and blood vessels

- **The heart** pumps blood around the body.
- Humans have a **double circulation** : blood passes through the heart twice on each complete circuit.
- The right side pumps blood to the lungs to pick up oxygen; the left side pumps it to the rest of the body.
- The route of blood through the heart:

Figure: The heart and blood vessels



- The heart seen from the front, so its right side is on the left of the page: blue for deoxygenated blood, red for oxygenated
- Match each part of the diagram to the text.

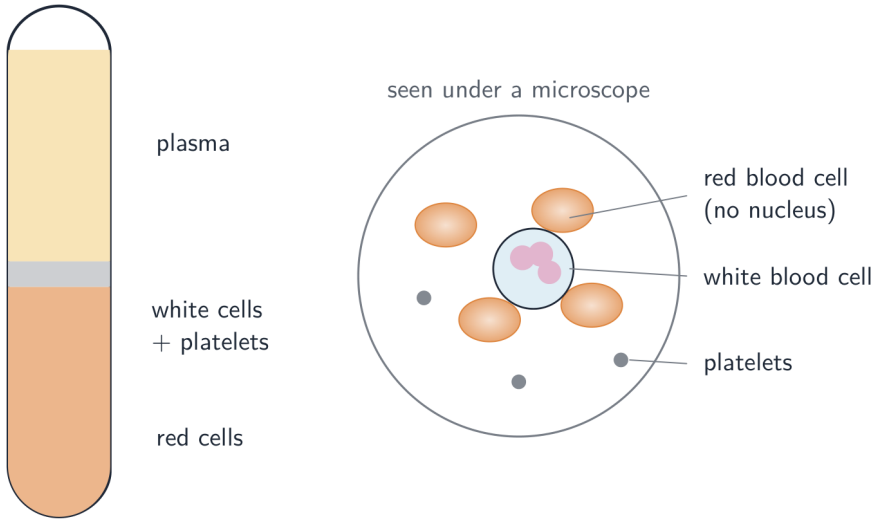
Blood

- **Plasma** is the pale yellow liquid. It carries dissolved glucose, amino acids, carbon dioxide, urea and hormones, and spreads heat around the body.
- **Red blood cells** carry oxygen. They contain **haemoglobin**, which joins with oxygen in the lungs; they have no nucleus, leaving more room for **haemoglobin**; and their shape, a disc pushed in on both sides, gives a large surface area.

Blood (2)

- **White blood cells** have a nucleus and defend the body: some engulf microorganisms and others make antibodies.
- **Platelets** are small pieces of cells that help blood to clot at a wound, stopping blood loss and keeping microorganisms out.

Figure: Blood



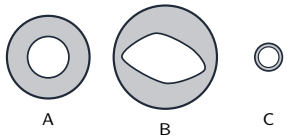
- The parts of blood: **plasma**, white cells and **platelets**, and red cells (not to scale)
- Match each part of the diagram to the text.

Coronary heart disease

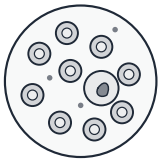
- In **coronary heart disease** , layers of fatty material build up inside the **coronary arteries** and narrow them.
- Less blood reaches the heart muscle, so it gets less oxygen and glucose.
- Its cells release less energy by aerobic respiration, so the muscle cannot contract properly, which can cause chest pain and, if an artery becomes blocked, a heart attack.
- **Treatments.**

Exercises 2.1·2.2

2.1 The diagram shows sections through three blood vessels. Which one is an artery and which is a capillary? [2]

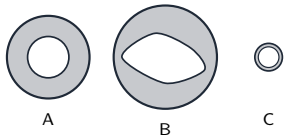


2.2 Name the part of the blood that carries oxygen, and the part that helps the blood to clot. [2]



Exercises 2.1·2.2

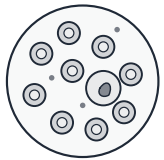
2.1 The diagram shows sections through three blood vessels. Which one is an artery and which is a capillary? [2]



2.1

- artery: **A** (thick wall, narrow lumen); capillary: **C** (wall one cell thick)

2.2 Name the part of the blood that carries oxygen, and the part that helps the blood to clot. [2]

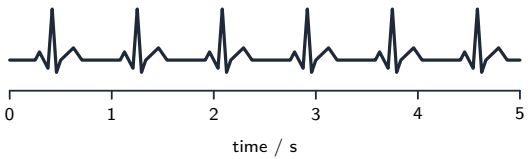


2.2

- red blood cells; platelets

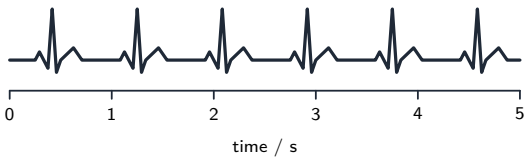
Exercise 2.3

2.3 The trace shows a person's heart beats over 5 seconds. Calculate the heart rate in beats per minute. [2]



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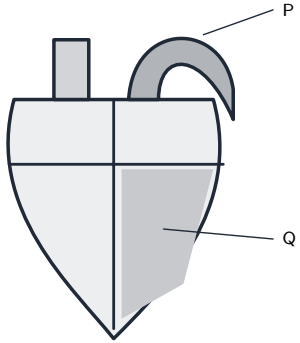


2.3

- 6 beats in 5 s; $6 \times 12 = \mathbf{72}$ beats per minute

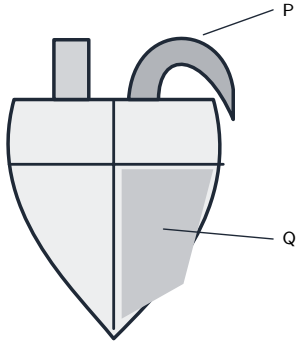
Exercise 3.1

3.1 Part Q of the heart is the left ventricle. Explain why its wall is thicker than the wall of the right ventricle. [3]



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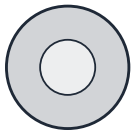


3.1

- the left ventricle pumps blood to the whole body; the right only to the lungs
- it needs more muscle to contract more strongly
- so the blood leaves at a higher pressure and can travel a longer distance

Exercise 3.2

3.2 Explain **three** ways a red blood cell is adapted to carry oxygen. [3]



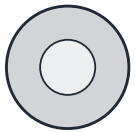
from above



from the side

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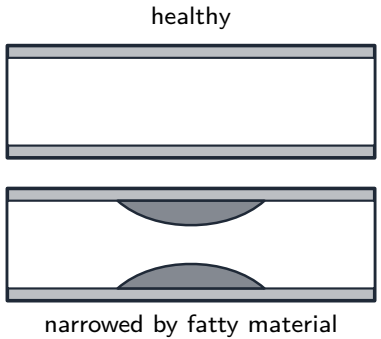
3.2

- it contains haemoglobin, which joins with oxygen
- it has no nucleus, so there is more room for haemoglobin
- its biconcave shape gives a large surface area for oxygen to diffuse in

Exercise 3.3 (a)

3.3 The diagram shows a healthy coronary artery and a coronary artery with fatty material inside. The space inside the healthy artery is 4.0 mm wide. In the narrowed artery it is 1.5 mm wide.

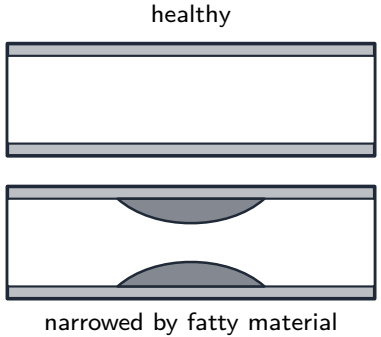
(a) Calculate the percentage decrease in the width of the space inside the artery. [2]



Exercise 3.3 (a)

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(a) Calculate the percentage decrease in the width of the space inside the artery. [2]



(a) $\frac{4.0-1.5}{4.0} \times 100 = \mathbf{62.5}\%$

Exercise 3.3 (b)

3.3 The diagram shows a healthy coronary artery and a coronary artery with fatty material inside. The space inside the healthy artery is 4.0 mm wide. In the narrowed artery it is 1.5 mm wide.

(b) Explain why a narrowed coronary artery can cause a heart attack. [3]

Exercise 3.3 (b)

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(b) Explain why a narrowed coronary artery can cause a heart attack. [3]

(b) less blood flows to the heart muscle; so the muscle gets less oxygen (and glucose); the muscle cells cannot respire enough and die

Exercise 3.3 (c)

3.3 The diagram shows a healthy coronary artery and a coronary artery with fatty material inside. The space inside the healthy artery is 4.0 mm wide. In the narrowed artery it is 1.5 mm wide.

(c) Explain how statins lower the risk of coronary heart disease. [2]

Exercise 3.3 (c)

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(c) Explain how statins lower the risk of coronary heart disease. [2]

(c) statins lower the cholesterol level in the blood; so less fatty material builds up in the arteries

Exercise 3.3 (d)

3.3 The diagram shows a healthy coronary artery and a coronary artery with fatty material inside. The space inside the healthy artery is 4.0 mm wide. In the narrowed artery it is 1.5 mm wide.

(d) A patient with coronary heart disease could be treated with a stent, with statins or with a heart transplant. Evaluate these treatments. [6]

Exercise 3.3 (d)

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(d) A patient with coronary heart disease could be treated with a stent, with statins or with a heart transplant. Evaluate these treatments. [6]

(d) points to include:

- a stent is a mesh tube that holds the artery open; a quick operation, works at once
- but the artery can narrow again, and there is a risk of blood clots or infection
- statins are tablets that slow the build-up; no operation, but must be taken for life, act slowly and may have side effects
- a transplant replaces the whole heart when it is badly damaged; it needs a donor, which may not be available
- after a transplant the patient takes drugs to stop rejection for life
- a conclusion that matches the treatment to how serious the disease is

Levels: **5–6** a full, logical answer with correct biology and correct terms; **3–4** several correct points, partly linked; **1–2** one or two relevant points.