AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.2.2.2

The heart and blood vessels

Past-paper questions

Tier	**Higher**
Question groups	**6**
Available paper years	**2018–2025**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.2.2.2 The heart and blood vessels

Question 01

June 2018 | 8464/B/1H | Original Q2

0 2 Coronary heart disease (CHD) is a non-communicable disease.

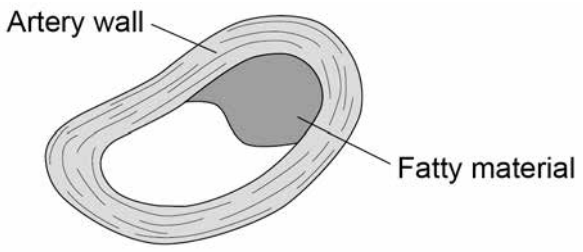
CHD is caused when fatty material builds up in the coronary arteries.

0 2 . 1 Explain what a non-communicable disease is.

[2 marks]

Figure 4 shows a coronary artery of someone with CHD.

Figure 4



0 2 . 2 Explain how CHD can cause a heart attack.

[3 marks]

4.2.2.2 The heart and blood vessels

Question 01 · continued

0 2 . 3 Explain how lifestyle and medical risk factors increase the chance of developing CHD.
[6 marks]

11

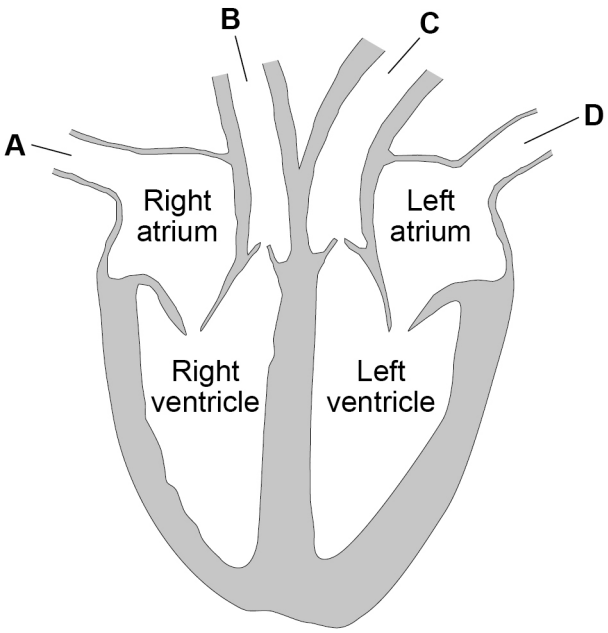
4.2.2.2 The heart and blood vessels

Question 02

June 2019 | 8464/B/1H | Original Q1

0 1 **Figure 1** shows a human heart.

Figure 1



0 1 . 1 Which blood vessel carries deoxygenated blood away from the heart to the lungs?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 1 . 2 The natural resting heart rate is controlled by a group of cells that act as a pacemaker.

Where in the heart are 'pacemaker cells' found?

[1 mark]

Tick (✓) **one** box.

Left atrium ☐

Left ventricle ☐

Right atrium ☐

Right ventricle ☐

4.2.2.2 The heart and blood vessels

Question 02 · continued

Some people may be treated with a drug to slow their heart rate.

0 1 . 3 Digitalis is a drug that slows the heart rate.

Where does the drug digitalis originate from?

[1 mark]

Tick (✓) **one** box.

- Bacteria ☐
- Foxgloves ☐
- Mould ☐
- Willow ☐

Question 1 continues on the next page

4.2.2.2 The heart and blood vessels

Question 02 · continued

Beta blockers are another type of drug that slows the heart rate.

Table 1 shows information for people who do not take beta blockers and for people who do take beta blockers.

- Stroke volume is the volume of blood pumped out of the heart each time it beats.
- Cardiac output is the total volume of blood pumped out of the heart each minute.

Table 1

	No beta blockers taken		Taking beta blockers	
	At rest	**During exercise**	**At rest**	**During exercise**
Heart rate in beats per minute	68	150	52	88
Stroke volume in cm^3	80	120	**X**	98
Cardiac output in cm^3 per minute	5440	18 000	2800	8624

0 1 . 4 Calculate stroke volume **X** in **Table 1**.

Use the equation:

cardiac output = stroke volume × heart rate

Give your answer to 2 significant figures.

[3 marks]

Stroke volume **X** = _____ cm^3

4.2.2.2 The heart and blood vessels

Question 02 · continued

0 1 . 5 Some people who take beta blockers get out of breath when they exercise.

Explain why beta blockers can have this effect during exercise.

You should refer to information given in **Table 1**.

[6 marks]

12

4.2.2.2 The heart and blood vessels

Question 03

June 2022 | 8464/B/1H | Original Q6

0 6 This question is about the heart.

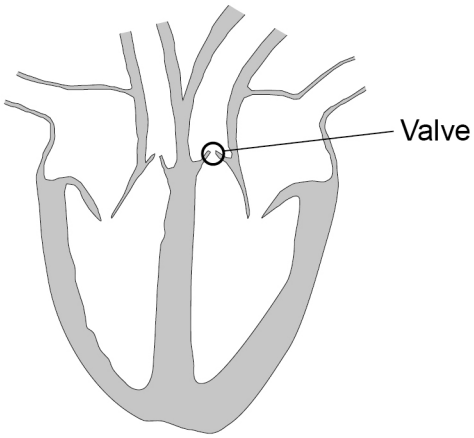
0 6 . 1 Why is the heart described as an organ?

[1 mark]

0 6 . 2 Valves in the heart keep the blood flowing through the heart in one direction.

Figure 11 shows the heart with one of the valves labelled.

Figure 11



Explain the effects on a person if the valve labelled in **Figure 11** developed a leak.

[4 marks]

4.2.2.2 The heart and blood vessels

Question 03 · continued

0 6 . 3 Faulty heart valves can be replaced using biological or mechanical valves.

The faulty valve is replaced during an operation.

Biological valves:

- are from animals or human donors
- allow blood to flow through them normally
- wear out and stiffen over time, so may need to be replaced.

Mechanical valves:

- are made from synthetic materials
- may cause blood clots on the surface of the valve
- require anti-clotting drugs to be taken for the rest of the patient's life
- can last for a very long time in ideal conditions.

A young woman enjoys extreme sports and would like to start a family.

The woman needs a heart valve replacing.

Describe the advantages and disadvantages for this young woman of having a biological heart valve instead of a mechanical heart valve.

[4 marks]

9

4.2.2.2 The heart and blood vessels

Question 04

June 2023 | 8464/B/1H | Original Q3

0 3 The circulatory system includes the heart, blood vessels and blood.

0 3 . 1 The heart pumps the blood in a double circulatory system.

Describe what is meant by a 'double circulatory system'.

[2 marks]

0 3 . 2 Heart rate is controlled by a group of cells that act as a pacemaker.

Where in the heart is the pacemaker found?

[1 mark]

0 3 . 3 Which blood vessel carries deoxygenated blood?

[1 mark]

Tick (✓) **one** box.

- Aorta ☐
- Coronary artery ☐
- Pulmonary artery ☐
- Pulmonary vein ☐

4.2.2.2 The heart and blood vessels

Question 04 · continued

The structure of a vein is different from the structure of an artery.

One difference is that veins have valves but arteries do **not** have valves.

0 3 . 4 Explain why veins have valves, but arteries do not.

[2 marks]

0 3 . 5 Describe **two** structural differences between a vein and an artery.

Do **not** refer to valves in your answer.

[2 marks]

1

2

8

4.2.2.2 The heart and blood vessels

Question 05

June 2024 | 8464/B/1H | Original Q7

0 7 Angina is a condition many people get as coronary heart disease (CHD) develops.

Angina can cause chest pain and tiredness.

People with angina are sometimes treated with a drug called GTN.

GTN widens the coronary arteries.

Explain:

- the causes and symptoms of angina
- how GTN reduces the symptoms of angina.

[6 marks]

6

4.2.2.2 The heart and blood vessels

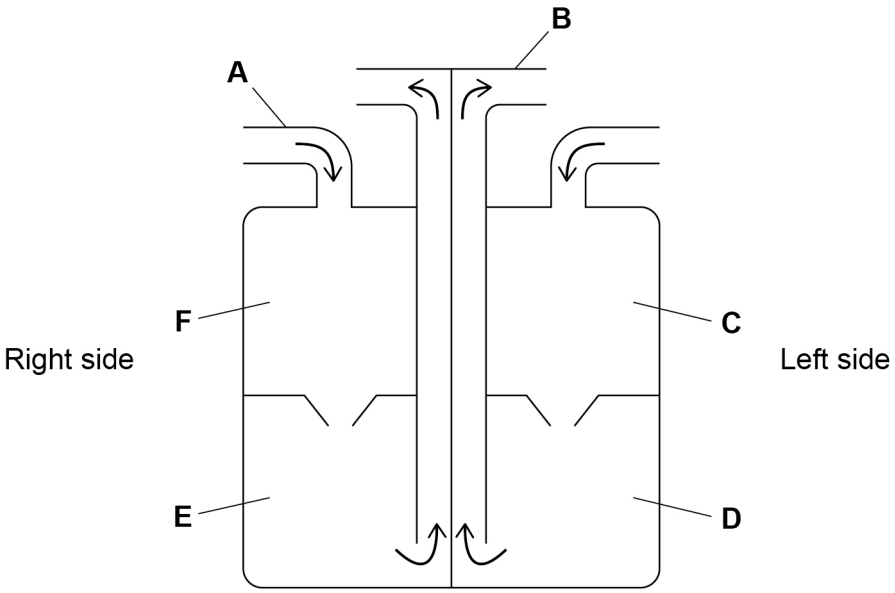
Question 06

June 2025 | 8464/B/1H | Original Q1

0 1 The heart is an organ that pumps blood around the body.

Figure 1 is a model of the heart and shows the direction of blood flow.

Figure 1



0 1 . 1 Draw **one** line from each blood vessel shown in **Figure 1** to the name of the blood vessel.

[2 marks]

Blood vessel	Name
	Aorta
A	Pulmonary artery
B	Pulmonary vein
	Vena cava

4.2.2.2 The heart and blood vessels

Question 06 · continued

0 1 . 2 Heart rate is controlled by a group of cells.

The group of cells acts as a pacemaker.

Where would the pacemaker be located in **Figure 1**?

[1 mark]

Tick (✓) **one** box.

C ☐ **D** ☐ **E** ☐ **F** ☐

0 1 . 3 Heart muscle cells contain many mitochondria.

Explain why heart muscle cells contain many mitochondria.

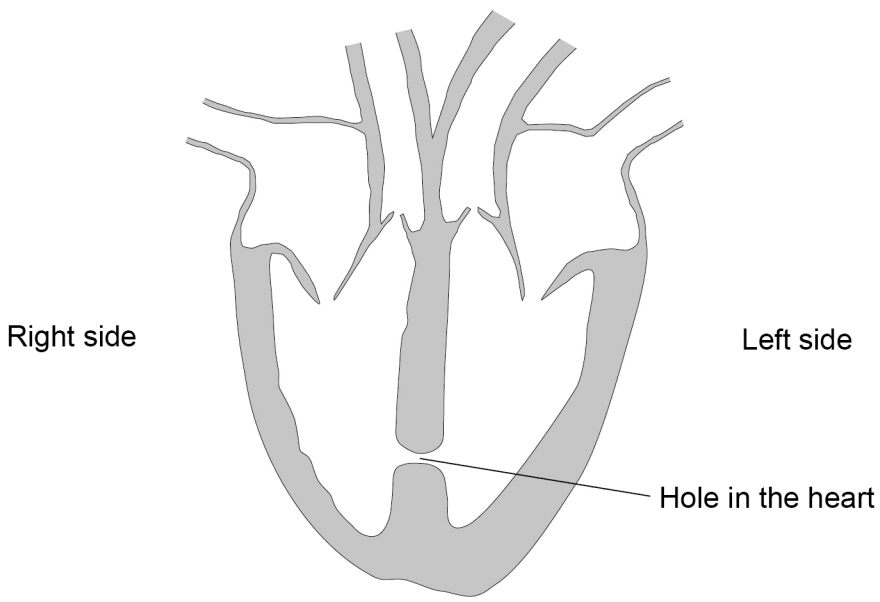
[3 marks]

Question 1 continues on the next page

A small number of people are born with a 'hole in the heart'.

Figure 2 shows the position of a hole in the heart.

Figure 2



0 1 . 4 The hole allows some blood from the right side of the heart to mix with blood in the left side of the heart.

Suggest **two** symptoms of having a hole in the heart.

[2 marks]

1 _____

_____

2 _____

_____

4.2.2.2 The heart and blood vessels

Question 06 · continued

0 1 . 5 In an operation to repair a hole in the heart:

- a flexible tube is inserted into a blood vessel and guided to the heart
- a mesh patch is passed down the tube
- the mesh patch covers the hole.

Heart tissue grows around the mesh and closes the hole.

Suggest **two** possible risks of this operation to repair a hole in the heart.

[2 marks]

1 _____

_____

2 _____

_____

10

Turn over for the next question