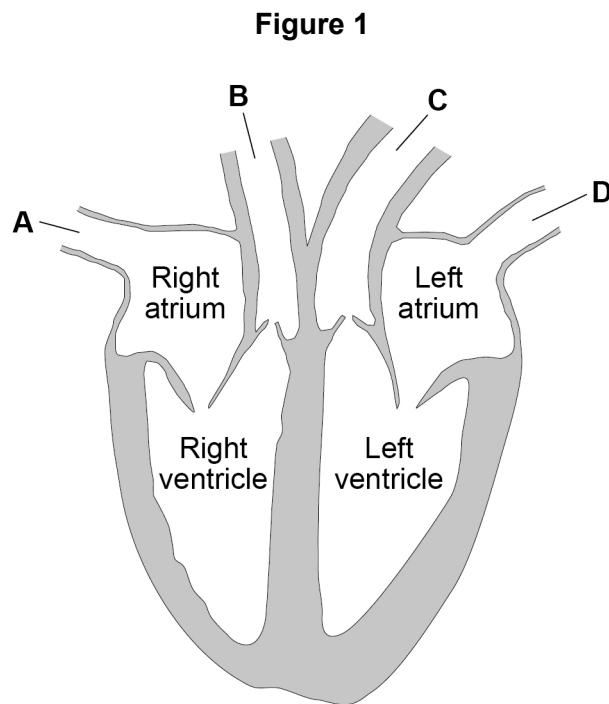


0 1

Figure 1 shows a human heart.



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



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

Turn over ►



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:

$$\text{cardiac output} = \text{stroke volume} \times \text{heart rate}$$

Give your answer to 2 significant figures.

[3 marks]

Stroke volume **X** = _____ cm³



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

Turn over for the next question

Turn over ►



Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	B		1	AO2 4.2.2.2
01.2	right atrium		1	AO1 4.2.2.2
01.3	foxgloves		1	AO1 4.3.1.9
01.4	X = 2800 / 52 53.846153 54 (cm ³)	an answer of 54 (cm ³) scores 3 marks allow correct rounding of an incorrectly calculated value of stroke volume	1 1 1	AO2 4.2.2.2

Question	Answers	Mark	AO / Spec. Ref.
01.5	<p>Level 3: Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.</p>	5–6	AO3 4.2.2.2 4.2.2.4 4.4.2.1 4.4.2.2
	<p>Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.</p>	3–4	AO2 AO1
	<p>Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.</p>	1–2	AO1
	<p>No relevant content</p>	0	
	<p>Indicative content</p> <p>effect of exercise</p> <ul style="list-style-type: none"> • during exercise body needs to transfer (more) energy • energy transferred during respiration • rate of respiration increases during exercise • (so) more oxygen is needed <p>effect of beta blockers</p> <ul style="list-style-type: none"> • beta blockers reduce (the increase in) heart rate (during exercise) • beta blockers reduce stroke volume (or described) • beta blockers reduce cardiac output • (so) heart cannot supply oxygen fast enough / in sufficient quantity to muscle cells <p>effect on breathing rate</p> <ul style="list-style-type: none"> • breathing rate increases to increase rate / amount of oxygen absorbed • breathing rate increases to increase rate / amount of carbon dioxide removed from body • (but) increased breathing rate cannot fully compensate for changes in heart function <p>A level 3 response should make links between all three sections of indicative content</p> <p>A level 2 response should attempt to link effect of exercise with oxygen / energy requirement and beta blockers to effect on heart function.</p>		
Total		12	