

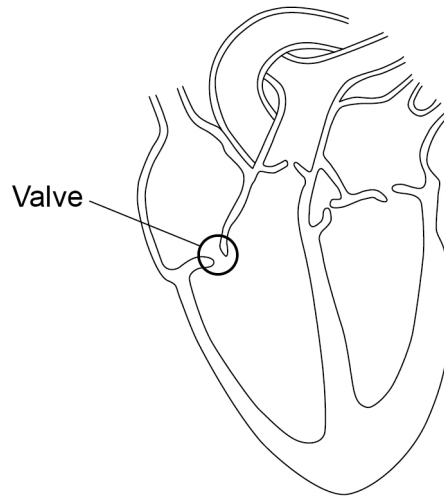
*Do not write
outside the
box*

0 5

Figure 6 shows the internal structure of the human heart.

One of the heart valves is labelled.

Figure 6



Sometimes a valve in the heart can start to leak.

0 5 . 1

Explain why a person with a leaking heart valve has difficulty exercising.

[4 marks]



A patient with a leaking heart valve may have the valve replaced.

A study compared two different types of replacement heart valve:

- mechanical valves
- biological valves from pigs.

The data used in the study was collected from female patients aged 50–69.

Table 4 shows the data.

Table 4

	Type of replacement heart valve	
	Mechanical	Biological
Number of patients given the valve	2852	1754
Number of patients who died from heart-related problems after valve replacement	180	178
Percentage of patients alive after 5 years	91	89
Percentage of patients needing a second valve replacement within 6 years	2.2	5.2
Percentage of patients who had a blood clot on the brain after surgery	5.8	0.1

0 5 . 2

Give **one** conclusion about the death of patients from heart-related problems after a valve replacement.

Include calculations to support your answer.

[3 marks]



Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	Level 2: Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.		3–4	4.2.2.4
	Level 1: Relevant points (reasons/causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.		1–2	4.2.2.2 4.1.3.1 AO2
	No relevant content		0	
	Indicative content: <ul style="list-style-type: none"> • backflow can occur or some blood flows backwards • less blood leaves the heart or less blood is pumped around the body or some blood stays in the heart (instead of being pumped out) or reduced blood pressure or reduced flow rate • less oxygen supplied to muscles / cells • (so) less <u>aerobic</u> respiration • (so) less energy released • (so) less (efficient) muscle contraction • anaerobic respiration takes place • less (efficient) removal of lactic acid or lactic acid builds up or oxygen debt occurs • (lactic acid building up) causes muscle fatigue • less (efficient) removal of carbon dioxide (from blood) <p>a level 2 response should refer to both respiration and the effects on exercise</p>			

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	<p>(deaths mechanical valve =) 6% / 6.31136%</p> <p>(deaths biological valve =) 10% / 10.14823%</p> <p>(therefore a) higher proportion / percentage of patients die with biological valve or patients are more likely to die with biological valve</p>	<p>ignore raw numbers from Table 4</p> <p>allow correctly rounded value</p> <p>allow correctly rounded value</p> <p>do not accept more patients die with a biological valve</p> <p>allow 2 marks for ratio mechanical : biological = 1:1.6 or 1:1.7 or correctly calculated value</p> <p>allow 3 marks for deaths with biological valves = 4% / 3.83687% higher or correctly rounded value or patients are 1.6 / 1.7 times more likely to die with biological valves</p> <p>if no other marks awarded, allow for 1 mark chance of death after a valve replacement is 8% / 7.77247% or correctly rounded value</p>	<p>1</p> <p>1</p> <p>1</p>	<p>4.2.2.4 AO3</p> <p>AO2</p>

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	platelets	allow thrombocytes	1	4.2.2.3 AO1
05.4	Level 3: A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.		5–6	4.2.2.4 AO2 AO3
	Level 2: Some logically linked reasons are given. There may also be a simple judgement.		3–4	
	Level 1: Relevant points are made. They are not logically linked.		1–2	
	No relevant content		0	
	Indicative content: mechanical valves <ul style="list-style-type: none"> • longer lasting or more durable or don't wear out as easily or less likely to need replacing (within 6 years) • blood clots (on the brain) are more likely (after surgery) • patient has to take anti-clotting medication (for the rest of their lives) • if medication not taken (correctly), clots can lead to blood clots on brain / heart attack • medication can lead to excessive bleeding (after injury) • some patients say they can hear the valves opening and closing • survival rate at 5 years is slightly higher for mechanical valve • lower percentage of deaths due to heart-related problems biological valves <ul style="list-style-type: none"> • no additional medication required • ethical issues surrounding use of animal tissue • valve may harden • more likely to need further operation or another new valve • more likely to be rejected • more likely to need (immuno-suppressant) medication both valves <ul style="list-style-type: none"> • both are readily available • little wait time a level 2 response should contain comparisons of both valves and some reference to own knowledge			
Total			14	