

Answers to examination-style questions

Answers	Marks	Examiner's tips
1 (a) sinoatrial node/SAN;	1	SAN can be used to represent the s-noatrial node.
(b) (i) to allow the contraction/emptying of the atrium before the ventricle contracts/allows ventricles to fill before contraction;	1	Remember both atria contract simultaneously, followed by simultaneous contraction of the ventricles.
(ii) to force the blood upwards and out of heart;	1	This is required to force the blood upwards against gravity.
(c) (i) 0.3 s;	1	Blood pressure in the ventricle is greater than that in the aorta, forcing blood into the aorta.
(ii) 0.2 and 0.4 s;	1	Blood pressure in the ventricle is greater than that in the atrium, forcing the atrioventricular valves shut.
(d) thicker/more muscle in the left ventricle;	1	More muscle means a greater force of contraction.
2 (a) aortic valve/semi-lunar valve;	1	Always read the stem of the question. It states 'left side of the heart' so X must be the aortic valve.
(b) any 2 from – thicker wall of ventricle/reduced volume; atrioventricular/bicuspid valve shut; semi-lunar/aortic valve/valve X open;	2 max	Reference to the tricuspid valve would be marked wrong because the diagram is of the left side of the heart.
(c) (i) 178%; $750 - 270 = 480$ , $(480/270) \times 100 = 177.7$ ;	2	Correct answer = 2 marks. Correct working but incorrect answer = 1 mark.
(ii) provides glucose and oxygen and removes carbon dioxide; increases respiration/increases ATP yield;	2	Many candidates forget that blood removes carbon dioxide from respiring cells.
3 (a) (i) 75 beats per minute;	1	The question states a complete cardiac cycle, so add all the times together to give the total time for one heartbeat = 0.8 s. Then divide 60 s by 0.8 = 75.
(ii) 4.5 hours;	1	A quick method of calculating this is that the ventricle contracts for 3/8th of the total time. Therefore 3/8th of 12 hours = 4.5 hours

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(b) muscle is myogenic; sinoatrial node/SAN; wave of electrical activity/impulses initiates contraction of atria; atrioventricular node/AVN; bundle of His/purkyne tissue spreads impulse across ventricles; ventricles contract after atria/time delay enables ventricles to fill;	<b>5 max</b>	Ensure you remember the sequence. The wave of electrical activity can only pass to the ventricles via the AVN.
(c) mixing of oxygenated and deoxygenated blood; blood flow from left to right ventricle due to higher blood pressure on left side;	<b>2 max</b>	This results from a 'hole' between the ventricles. A similar condition can occur between the atria.
4 (a) (i) risk of high blood pressure increases with age; risk of heart attack increases with age/ no heart attacks before 35 years;	<b>2</b>	Credit would also be given for referring to the decrease in risk of high blood pressure after the age of 75.
(ii) females more likely to develop high blood pressure; females have lower risk of heart attack (as they get older/post-55);	<b>2</b>	Both marks can be gained for the converse argument for males.
(b) female – 47.5% ( $480 - 252 = 228$ and $(228/480) \times 100 = 47.5$ ); male – 46% ( $700 - 378 = 322$ , $(322/700) \times 100 = 46$ );	<b>2</b>	You must show both calculations to gain the 2 marks.
(c) in CHD the heart muscle receives a reduced amount of blood or oxygen/the coronary blood supply reduced; Smoking – raises concentration of fibrinogen (in blood)/increased risk of clotting; increases viscosity of blood; nicotine causes platelets to stick together/ causes vasoconstriction; carbon monoxide associated with plaque formation; reduces ability of arteries to dilate/reduces elasticity; Cholesterol – fatty deposits adhere to wall of arteries; atheroma/atherosclerosis/plaque; narrows lumen of artery; damages endothelium; can lead to formation of blood clot/ thrombosis;	<b>6 max</b>	The first mark is a general principle mark for describing CHD. You cannot gain more than 4 marks unless you discuss the effects of both smoking and cholesterol on the risk of developing CHD. You don't need to learn all these details but you must be able to recall enough facts to obtain 6 marks.

Nelson Thornes is responsible for the solution(s) given and they may not constitute the only possible solution(s).