Cardiac Cycle and Ventilation - Mark Scheme

Q1.

Question Number	Answer	Additional Guidance	Mark
(i)	• correct calculation of both cardiac outputs • correct calculation of difference and converted to dm^3 (1)	Example of calculation 70 x 55 = 3850 (cm^3) / 3.85 (dm^3) 110 x 160 = 17600 (cm^3) /17.6 (dm^3) An increase of 13.75 ($dm^3\,min^{-1}$) Correct answer with no working gains full marks. If correct answer not given ALLOW 13750 for 1 mark Or 13.64 to 13.86 for 1 mark	**(2)**

Question Number	Answer	Additional Guidance	Mark
(ii)	An explanation that makes reference to two of the following: • increase supply of oxygenated blood (to muscles) (1) • to allow aerobic respiration • to provide more energy (to meet the increased demands)	ALLOW more oxygen (to the muscles)	**(2)**

Q2.

Question Number	Answer	Mark
(a)	1. heart rate increases / eq ; 2. {stroke volume / eq} increases / eq ; 3. {SAN /eq} activity increases / ; 4. AVN time delay decreases / eq ; 5. idea that more blood returning (to the heart) causes {heart / muscle} to stretch ; 6. idea that ventricles contract with greater force ;	**(4)**

Question Number	Answer	Mark
(b) (i)	<table><tr><th>**Approximate value for**</th><th>**0.1 dm^3**</th><th>**0.5 dm^3**</th><th>**6 dm^3 min^{-1}**</th><th>**6 breaths min^{-1}**</th><th>**12 breaths min^{-1}**</th></tr><tr><td>Resting breathing rate</td><td></td><td></td><td></td><td></td><td>☒</td></tr><tr><td>Resting tidal volume</td><td></td><td>☒</td><td></td><td></td><td></td></tr></table>	**(2)**

Question Number	Answer	Mark
(b)(ii)	1. more {peaks / eq} in the same time / higher frequency / distance between (consecutive) peaks would decrease ; 2. idea of distance from peak to trough would increase ;	**(2)**

Question Number	Answer	Mark
(c)	Any **two** from the following: 1. how often they play 2. age 3. body size / BMI / eq 4. gender / eq 5. fitness level / eq 6. health status / eq 7. lifestyle e.g. smoker or swimmer ; ;	**(2)**

Q3.

Question Number	Answer	Additional Guidance	Mark
	1. idea that initiates electrical activity over atria ; 2. causes atria to contract / eq ; 3. {forcing / eq} the (oxygenated) blood into the left ventricle / eq ; 4. electrical activity from SAN {received by AVN / travels through {bundle of His / Purkyne fibres / eq }} ; 5. causing left ventricle to contract (forcing blood into aorta) / eq ;	1. **ACCEPT** initiates impulse / initiates depolarisaton 2. **ACCEPT** systole for contract 4. **ACCEPT** Purkinje for Purkyne 5. **ACCEPT** systole for contract **NOT** left and right	**(4)**

Q4.

Question Number	Acceptable Answer	Additional Guidance	Mark
	x axis: time AND y axis: voltage / potential difference		**(1)**

Question Number	Answer	Additional Guidance	Mark
	A (P)		**(1)**

Question Number	Answer	Additional Guidance	Mark
	B (Q to R)		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
	An explanation that makes reference to: • length of time between T and P is variable (1) • irregular heart rate (1)		(2)

Q5.

Question Number	Answer	Additional Comments	Mark
(a)(i)	Actin = 14 (%) ; Myosin = 10 (%) ;	**For Actin Accept** 28 (%)	(2)

Question Number	Answer	Additional Comments	Mark
(a)(ii)	1. {Ca^{2+} / eq} bind to troponin ; 2. troponin molecules {changes shape / moves / eq} ; 3. idea that this displaces tropomyosin ;	**3. Ignore** comments on exposing myosin binding sites	(2)

Question Number	Answer	Additional Comments	Mark
(a)(iii)	{right / R} atrium ;		(1)

Question Number	Answer	Additional Comments	Mark
(b)(i)	The higher the concentration of troponin T in the blood, the higher the mean number of days in hospital / eq ;	**Accept** the longer the stay in hospital **Accept** the higher the concentration of troponin T in the blood, the more severe the CVD is **T1 (1)**	

Question Number	Answer	Additional Comments	Mark
(b)(ii)	1. idea that the conclusion is valid ; 2. as there is no overlap between the range of data for each concentration of troponin T / eq ; 3. the validity (of the conclusion) becomes less the higher the concentration of troponin T / eq ; 4. (because) the data becomes less reliable at higher concentrations of troponin T / eq ; 5. idea that the range of data becomes greater ;	**Accept** comments relating to spread of data or standard deviations	(2)