Question number	Answer	Notes	Marks
1 (a)(i)	1. allows diffusion / evaporation / transpiration / loss of water; 2. creates transpiration pull / transpiration stream / water pulled up / water drawn up; 3. osmosis; 4. water absorbed by root;		Max 2
(ii)	1. oxygen <u>out</u> + carbon dioxide <u>in</u>; 2. diffusion; 3. photosynthesis	ignore reference to respiration CO_2 and O_2 to enter and leave = 1 O_2 and CO_2 to enter and leave = 0 CO_2 and O_2 to enter or leave = 0	Max 2

(b)(i)	S scale linear and at least half of both axes; L lines straight, neat and through points; A axes correct way round; P points plotted accurately; U units stomatal pore μm and rate of transpiration mg / m^2 / s; K key still air and moving air;	bar chart no L and no P non-linear scale no P if no plot for 0,0 no P but allow L P allow within one square	6
(ii)	1. transpiration increases in both / eq; 2. levels off in still air / continues to increase in moving air / more increase in moving air / eq;		2
(iii)	1. takes water away / blows water away / less water outside / eq; 2. increases / maintains gradient; 3. (increases) diffusion;	maintains diffusion gradient = 2 marks	3

Total 15 marks

Question number	Answer	Notes	Marks
2 (a) (i)	136 / 136.1;;	allow one mark for ÷ 20 in working	2
(ii)	Thomas;		1
(iii)	1. nervous / excited / anticipation / thinking about exercise / worried / anxious; 2. adrenalin(e); 3. increase in heart rate / eq;	allow reference to autonomic system	Max 2
(iv)	1. intensity / amount / type of exercise / eq; 2. diet; 3. fitness / health / eq; 4. gender; 5. age / mass;	ignore temperature	Max 2

Question number	Answer	Notes	Marks
2 (b)	1. heart is larger / has more muscle / stronger / grows / eq; 2. due to exercise / training / eq; 3. pumps more blood in each beat / eq; 4. low rate delivers same volume (in given time) / fewer beats deliver same volume / eq; 5. provides (more) oxygen; 6. (aerobic) respiration;	reject reference to anaerobic	Max 4

Total 11 marks

Question number	Answer	Notes	Marks
3 (a) (i)	ventricle / chamber B wall is thinner / ventricle / chamber B has thinner walls / ventricle / chamber B less muscular / heart diagrams always have RHS on the left / vena cava attached / pulmonary artery attached;	allow converse for LHS of heart ignore references to blood ignore references to chamber size / valve	1
(ii)	left ventricle;		1
(iii)	pulmonary artery correctly labelled;		1
(iv)	1. eft ventricle/chamber A/it) more muscle; 2. enerate more pressure / create more force / stronger pumping / eq; 3. pumps blood to body / pumps blood further / eq;	allow converse for right ventricle 1. ignore thicker wall 2. gnore withstand pressure	Max 2

(b) (i)	atrioventricular valve / AV valve / tricuspid valve;	ignore valve alone	1
(ii)	prevent backflow / blood flows in one direction / allows blood to flow from atrium to ventricle / eq;	prevents backflow into ventricles = 0	1
3 (c)	1. lows blood to mix / eq; 2. oxygenated and deoxygenated blood / deoxygenated into left ventricle/chamber A / oxygenated blood into right ventricle/chamber B; 3. ess oxygen (to body / to cells); 4. less respiration / less energy / ATP / more anaerobic respiration / more lactic acid; 5. les growth / smaller size;	3. ignore reference to oxygen to lungs	Max 3

(d) (i)	1. (ace fingers on) artery / wrist / neck / chest / use heart monitor / eq; 2. count pu e/beat/pumps/heart rate for stated time period/ one minute / measure in bpm;	allow appropriate technology	2
(ii)	1. repeat / use many people / group / calculate average / remove anomalies / eq; 2. same duration / ntensity / type of exercise; 3. use same gender / age / size / mass / fitness / eq;	ignore rest period ignore same person / same people	Max 2

Question number	Answer	Notes	Marks
4 (a) (i)	S – scale linear and half of both grids; L – lines straight and through points; A1 – axes correct way around – (altitude on x axis); A2 – axes labelled: (mass of) haemoglobin in g per litre and altitude/height in metres / eq; P – correct plotting of all points;	lose S mark if axis for data for Hb not truncated max 3 for bar chart	5
(ii)	1. level / no change (0 to 1000); 2. ncrease / eq;	the higher the altitude the higher the haemoglobin = 1	2
(iii)	1. more haemoglobin / more red blood cells; 2. (more) oxygen; 3. (more) respiration; 4. (more) energy / (more) ATP; 5. less lactic acid / oxygen debt / less anaerobic respiration;	idea of more must be evident once not run faster	3

Question number	Answer	Notes	Marks
(b) (i)	1. lower pressure / slower blood flow / less blood flow /eq; 2. thinner wall; 3. easier to see / nearer surface / easier to access / eq;	allow will not spurt out allow converse for artery ignore one cell thick	2 1
(ii)	4. ider lumen; too small / eq;		
(iii)	1. no pathogens / bacteria / virus / microorganism / parasite / named virus / HIV / eq; 2. infection / disease / illness / AIDS;	ignore sickness	2

(Total = 15 marks)