STEM | Exam Builder

Mark scheme

The heart and double circulation

Biology 0610 · Questions from Paper 3, Paper 4 and Paper 6

Total marks

85

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	Total
6	6	7	9	10	10	11	12	14	**85**

Question 1 [6]

1	**(a)**	1 blood unable to reach muscle (in shaded region); 2 less / no oxygen / glucose reaches muscle; 3 less / no respiration; 4 less / no energy release; 5 (muscle) cells die; 6 causes a heart attack; any three – 1 mark each	[3]	lg – nutrients
	(b)	1 exercise (regularly); 2 reduce / stop smoking (tobacco); 3 reduce (animal / saturated) fat / cholesterol in diet; 4 lose weight; 5 reduce salt intake; 6 avoid stressful lifestyles; 7 use of medication qualified; any three – 1 mark each	[3]	A – examples of exercise lg – refs to balanced diet lg – refs to visits to doctor
			[Total: 6]	

Question 2 [6]

2	**1** *independent variable* different intensities of exercise / different exercises / exercise for different lengths of time **;** **2** *dependent variable* after / during, exercise measure, heart rate / pulse rate **;** **3 and 4** *detail of method* **;;** • description of named exercise of different intensities • ensuring heart rate returns to resting rate • use of a heart rate monitor **5, 6 and 7** *constant variables* **;;;** • same speed / distance / time, of exercise • same age of people • same sex of people • same, person / fitness level / mass of person / height of person / BMI • same, place / time of day / temperature / weather **8** at least three trials / two more repeats **;** **9** relevant safety precaution **;**	**6**	

STEM | Exam Builder

Question 3 [7]

3 (a) (i)	aorta;	[1]	
(ii)	coronary artery;	[1]	A – coronary vessel R – coronary vein
(iii)	no oxygen getting to heart muscle; severe pain / heart attack occurs / heart muscle dies;	 Max [1]	 A – description of heart attack
(iv)	wall / muscle of left ventricle much thicker / stronger than wall / muscle of right ventricle; L.V. has to force blood all round body / must create more force / pressure;	 [2]	A – ref LV valve 2 flaps, RV valve 3 flaps – 1 mark A – ORA
(b)	select suitable / named position (of artery); press on artery with fingers; count number of beats per minute / unit time;	 Max [2]	 R – thumb A – ref to pulse / heart rate meter
		[Total: 7]	

Question 4 [9]

4(a)	(group of) tissues working together, to pump blood around the body / AW / performing the (same) function **;**	**1**	
4(b)	**1** circulatory **;** **2** vena cava **;** **3** thinner **;** **4** diffusion **;** **5** left atrium **;** **6** septum **;** **7** coronary, artery / arteries **;**	**7**	MP1 **A** cardiovascular / circulation MP2 **A** veins MP3 **A** less
4(c)	ECG / electrocardiogram / listening to valves close / AVP **;**	**1**	

STEM | Exam Builder

Question 5 [10]

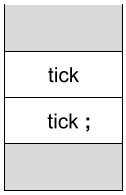
5(a)(i)	to pump blood / AW ;	1	
5(a)(ii)	(cardiac) muscle ;	1	
5(a)(iii)	ECG ; (counting the) pulse / heart beat ; using a, heart monitor / pulse monitor / blood pressure meter ; listening (to heart valves closing) ;	2	
5(b)(i)	a circle drawn around the coronary artery ;	1	
5(b)(ii)	*any one from* diet ; stress ; smoking ; genetic factors ; age / gender ; lack of exercise ; high blood cholesterol ; obese ; diabetes ;	1	**A** family history
5(b)(iii)	arteries veins ;	1	must have both in correct order
5(c)(i)	right atrium ;	1	**A** right auricle
5(c)(ii)	ensure one way flow of blood / prevent backflow ;	1	
5(c)(iii)	septum ;	1	

Question 6 [10]

6(a)(i)	arrow / (s) from a vena cava through atria and into right ventricle **;**	1	
6(a)(ii)	**C**, aorta **;**	1	
6(b)(i)	ventricles relax **;** increased volume of ventricles **;** higher blood pressure in, the arteries / **C**, **D** and **E** / aorta and pulmonary artery (than in the ventricles) **; ora**	1	
6(b)(ii)	stop back-flow (of blood) / ensure (blood) flows one way **;**	1	**I** pressure changes
6(c)	1 (right) ventricle contracts **;** 2 blood pressure increases (in heart) **;** 3 higher blood pressure in ventricles than in arteries **;** 4 semilunar valve / valve **1**, opens **;** 5 blood flows into, **D** / **E** / pulmonary artery **;** 6 semilunar valve closes (when blood in pulmonary artery) **;** 7 **D** / **E**, is a pulmonary artery **;** 8 valve **1** is a semilunar valve **;**	4	sequence of events must be in the correct order
6(d)	1 septum **;** *either* 2 separates oxygenated and deoxygenated blood **;** *or* 3 to allow a double circulation **;**	2	

STEM | Exam Builder

Question 7 [11]

7	(a) (i)	right ventricle ;	[1]	**ignore** ventricle alone
	(ii)	lung(s) ;	[1]	**ignore** left or right
	(iii)		[1]	both ticks correct for 1 mark 0 marks for more than two ticks
	(iv)	(cardiac) muscle ;	[1]	
	(b) (i)	any valve correctly labelled with a V ;	[1]	
	(ii)	ensure one-way flow of blood / prevent blood flowing in the wrong direction / prevent backflow / AW ;	[1]	
	(c) (i)	(heartbeat) faster / accelerates / speeds up / AW ; contracts more, forcefully / strongly, / AW ; increased output per beat / increased stroke volume / AW ;	[max 2]	**ignore** contracts better / more efficient **ignore** pumps more blood **A** 'heartbeat increases' for 1 mark if no other marks awarded
	(ii)	*cause:* blocked coronary artery / AW ; high fat diet / high cholesterol / high stress levels / smoking / sedentary life style ; *explanation:* heart muscle / tissue, receives insufficient blood / AW ; heart muscle / tissue, receives insufficient oxygen / glucose ; respiration limited ; insufficient / poor, energy released ; heart (muscle) can't contract sufficiently (to support exercise) ;	[max 3] **[Total: 11]**	award max 2 marks for each of cause and explanation

STEM | Exam Builder

Question 8 [12]

8(a)(i)	*correct labelling of :* atrium ; septum ; ventricle ; valve ;	**4**	
8(a)(ii)	**B** and **C** ; **D** ;	**2**	
8(b)	*any two from:* ECG ; listening to the closing of the valves ; AVP ;	**2**	
8(c)(i)	coronary arteries ;	**1**	
8(c)(ii)	*any three from*: diet (or described); obesity ; stress ; smoking ; genetic predisposition ; age ; sex ; AVP ;;	**3**	

STEM | Exam Builder

Question 9 [14]

9(a)(i)	**J** ; **F** ;	**2**	**R** each additional letter
9(a)(ii)	*any two from:* **1** (left ventricle / **H**) contains more muscle **; ora** **2** (muscle) contracts / pumps, with more force **; ora** **3** (contraction) creates a high(er) pressure **; ora** **4** blood (leaving the ventricle) is required to move further / out of the heart / to aorta / to the (whole) body / left atrium is only pushing blood to the ventricle ;	**2**	
9(a)(iii)	<table><tr><th>description</th><th>sequence</th></tr><tr><td>blood enters **C**</td><td>4</td></tr><tr><td>blood enters **E** and then **E** contracts</td><td>6</td></tr><tr><td>blood enters **M** and then **M** contracts</td><td>1</td></tr><tr><td>blood travels to lungs</td><td>5</td></tr><tr><td>blood moves into **G**</td><td>7</td></tr><tr><td>blood moves into **B**</td><td>8</td></tr><tr><td>**N** opens</td><td>3</td></tr><tr><td>blood moves into **K**</td><td>2</td></tr></table> ;;	**2**	all correct = 2 marks four correct / only 2 wrong = 1 mark
9(b)(i)	*any five from:* **1** (exercise can lead to release of) adrenaline that increases heart rate ; **2** (exercise results in) increased (rate of) blood (flow) to muscle (cells) ; **3** needed for (delivery of), oxygen / glucose **OR** removal of carbon dioxide ; **4** respiration releases energy ; **5** energy required for (muscle) contraction ; **6** (exercise can lead to) anaerobic respiration / production of, lactic acid / lactate ; **7** correct ref**.** to oxygen debt ; **8** (heart rate remains high after exercise) to remove, lactic acid / lactate (quickly) from muscles / to liver **OR** to continue supplying oxygen (to repay the oxygen debt) ; **9** lactic acid / lactate, broken down / (aerobically) respired / converted to glucose / carbon dioxide and water / oxidised, in liver**;** **10 AVP** ;	**5**	e.g**.** increased, carbon dioxide / acidity, in the blood increases heart rate
9(b)(ii)	*any three from:* **1** diet **OR** a diet high in, salt / saturated fats / cholesterol **;** **2** (uncontrolled) stress **;** **3** smoking (tobacco) **;** **4** genetic (predisposition) **;** **5** (old) age **;** **6** sex **;** **7** and **8 AVP** **;;**	**3**	e.g**.** high blood pressure / excessive alcohol consumption / obesity

STEM | Exam Builder