A Level OCR Biology

9 Transport in Animals – answers

Question	Answers	Extra information	Mark	AO Spec reference
1(a)	Any four from: four chambers / atria and ventricles ✓ septum ✓ walls are muscular ✓ atrioventricular valves between the atria and ventricles ✓ semilunar valves between the ventricles and the arteries ✓		4 max	AO1 3.1.2(e)
1(b)	Any four from: blood has to pump around the body (of the camel as it has long legs) ✓ sufficient / high blood pressure is needed ✓ provide oxygen and glucose to respiring cells ✓ remove carbon dioxide (as a product of aerobic respiration) ✓ oxygenated blood is pumped to the lungs through the pulmonary artery ✓		4 max	AO2 3.1.2(f) 3.1.2(a)
1(c)(i)	water potential is likely to be higher inside cells than outside cells ✓		1	AO2 2.1.5(e)
1(c)(ii)	large body surface area : volume ratio for heat loss ✓		1	AO2 3.1.2(a)
2(a)	Any three from: atrioventricular valve closes at **A** because the pressure in the ventricle is higher than the atrium ✓ semilunar valve opens at **B** because the pressure in the ventricle is higher than the aorta ✓ semilunar valve closes at **C** because the pressure in the aorta is higher than the ventricle ✓ atrioventricular valve opens at **D** because the ventricle pressure is lower than the atrium ✓		3 max	AO2 3.1.2(f)
2(b)	prevents the backflow of blood ✓		1	AO1 3.1.2(f)

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2(c)	0.7 seconds per heartbeat ✓ $\frac{60}{0.7}$ = 86 beats per minute ✓		2	AO2 3.1.2(f)
2(d)	0.072 dm^3 ✓ ✓	$\frac{6.2}{86}$	2	AO2 3.1.2(f)
2(e)	no / negligible blood pressure ✓ reduced oxygen demands ✓	Allow an explanation to insects taking in oxygen through tracheae	2	AO2 3.1.2(b)
3(a)	multiple polypeptide chains ✓		1	AO1 2.1.2(m)
3(b)	1.7 : 1 ✓		1	AO2 3.1.2(j)
3(c)	**Level 3 (5–6 marks)** Full and detailed explanation of the reasons for the shape of the adult haemoglobin dissociation curve. There is a well-developed explanation and. The information presented is relevant and clearly explained. **Level 2 (3–4 marks)** Response is aware of when or why haemoglobin saturates. Response partially explains the shape of the curve. There is a reasonable explanation and sequence. The information presented is in the most-part relevant and well-explained. **Level 1 (1–2 marks)** Response is aware of when or why haemoglobin saturates.	**Indicative content:** • haemoglobin saturates at a high partial pressure of oxygen • increase difficulty in binding the first molecule of oxygen • shape of haemoglobin molecule is changed / distorted • the joining of the first molecule of oxygen is slow • this enables further binding of oxygen molecules more easily • this is linked to the curve becoming steeper • binding of final oxygen molecules becomes more difficult	6	AO3 3.1.2(j)

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Question	Answers	Extra information	Mark	AO Spec reference
	The information is basic and communicated in an unstructured way. The information is supported by limited method which may be unclear. **0 marks** No response worthy of credit	• this causes the curve to flatten / plateau haemoglobin is unsaturated at a low partial pressure of oxygen		
4(a)	to see if the valves in the arteries / semilunar valves open and close ✓		1	AO2 3.1.2(e)
4(b)	Any two from: infection risk to cut to skin so cover up with a plaster ✓ scalpel cuts the skin so keep fingers clear of the scalpel ✓ disease transfer risk so hygiene is important ✓		2 max	AO3 3.1.2(e)
4(c)	pump blood around the body at a larger distance (systemic circulation) ✓		1	AO1 3.1.2(e)
4(d)	Any two from: reduce oxygen capacity to the heart ✓ heart muscle cells die / heart attack / chest pain ✓ less oxygen delivery to heart muscle cells ✓ less aerobic respiration ✓		2 max	AO3 3.1.2(c) 3.1.2(d) 5.2.2(a)
4(e)	Any two from: as age increases, the (incidence of) death (rate) increases ✓ the death rate is (consistently) higher for cardiovascular disease compared to non-cardiovascular disease ✓ men have a higher mortality rate at a lower age ✓ paired data quote with the % unit to support the trend, e.g., 20% increase for cardiovascular disease in men between the ages of 68 and 76 ✓	Allow positive correlation Allow a correct paired data quote with the unit %	2 max	AO2 3.1.2(h)

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Question	Answers	Extra information	Mark	AO Spec reference
4(f)	Any four from: *Yes, because:* there is a clear correlation between increased age and (cumulative incidence) increased percentage of people with cardiovascular disease ✓ *No, because:* more men have cardiovascular disease than women ✓ sample size is too small ✓ no information provided on how participants were selected for the investigation ✓ the non-cardiovascular disease category is too broad ✓ no evidence of the investigation being repeated/reproduced ✓ patients' relatives may not be qualified or may have misunderstood the cause of death ✓ correlation does not (necessarily) mean causation ✓	Allow could lead to bias Allow named non-cardiovascular diseases with a comparison of their different severities Allow that the patients' relatives may not be medically qualified	4 max	AO3 3.1.2(h)
5(a)	78.5% ✓ ✓	116 – 65 = 51 ✓ $\left(\frac{51}{65}\right) \times 100$ Allow two marks if working not shown	2	AO2 3.1.2(a)
5(b)(i)	0.92 ✓	$\frac{120}{130}$ Allow two marks if working not shown	2	AO2 5.2.2(k)
5(b)(ii)	*Idea of* fats / proteins are not the major respiratory substrate ✓ **OR** Carbohydrates are the main respiratory substrate ✓		1 max	AO2 5.2.2(k)

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Question	Answers	Extra information	Mark	AO Spec reference
5(c)	**Level 3 (5–6 marks)** Full and detailed explanation of how heart activity is controlled during exercise. There is a well-developed explanation and. The information presented is relevant and clearly explained. **Level 2 (3–4 marks)** Response explains the involvement of two of the following: respiration, increase of products in the blood or involvement of control systems. There is a reasonable explanation and sequence. The information presented is in the most-part relevant and well-explained. **Level 1 (1–2 marks)** Response is aware of the meaning of either respiration, increase of products in the blood or involvement of control systems (at least one is mentioned). The information is basic and communicated in an unstructured way. The information is supported by limited method which may be unclear. **0 marks** No response worthy of credit.	**Indicative content:** • respiration rate in muscle (cells) increases • increased carbon dioxide in the blood • increased lactic acid in the blood • involvement of the medulla / cardiovascular centre • involvement of stretch receptors and chemoreceptors • accelerator nerve • sino atrial node / pacemaker sends a depolarising wave across the walls of the atria • the impulse passes to the AVN • the impulse then passes to the purkyne fibres • involvement of adrenaline heart rate increases	6	AO 3.1.2(g) 5.1.5(g) 5.2.2(a)
6(a)	Any four from: the heart causes hydrostatic pressure ✓ plasma forced out of the capillaries ✓ small solutes are forced out of the capillaries ✓ small solutes are dissolved in the plasma ✓ oncotic pressure occurs ✓ there are gaps between endothelial cells ✓	Allow fluid but **not** water	4 max	AO1 3.1.2(d)

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Question	Answers	Extra information	Mark	AO Spec reference
	difference between hydrostatic pressure and oncotic pressure ✓ net pressure out ✓ larger proteins/red blood cells remain in the blood (as they are bigger than the gaps) ✓			
6(b)	plasma protein concentration increases over time ✓ correct manipulation of figures, such as the plasma protein concentration doubles between 20 and 25 days ✓		2	AO2 3.1.2(d)
6(c)	Any two from: water potential is decreased ✓ oncotic pressure is increased ✓ (therefore) blood volume increases ✓	Allow reverse arguments	2 max	AO3 3.1.2(d)

Skills box answers

Question	Answer
1	$CO = 120\,bpm \times 75\,cm^3$ $= 9000\,cm^3\,min^{-1}$
2	$SV = \frac{CO}{HR} = \frac{7250\,cm^3\,min^{-1}}{46\,bpm} = 157.6\,cm^3$
3	$HR = \frac{CO}{SV} = \frac{23\,000\,cm^3\,min^{-1}}{157.6\,cm^3} = 145.9\,bpm$