

# A Level AQA Biology

## 11 Mass transport - answers

Question	Answers	Extra information	Mark	AO Spec reference
01.1	intense heat and lack of available water lowers the concentration gradient for diffusion of ions into the cells; risk of water diffusing out of cells is higher (if concentration outside cells is higher than inside cells); hump stores fat (not water) that can be metabolised when there is no food / water available via the respiration of fatty acids <b>OR</b> Large body surface area : volume ratio for heat loss;		3 max	AO2 3.2.3 3.3.1 3.3.2
01.2	Any four from: four chambers / atria and ventricles; septum divides left and right sides; walls of the left ventricle is more muscular than the right ventricle; atrioventricular valves between the atria and ventricles; semilunar valves between the ventricles and the arteries;		4 max	AO1 3.3.4.1
01.3	Any four from: blood has to pump a long way around the camel (as it has long legs); sufficient / high blood pressure is needed; capillaries to ensure effective blood supply / (gas) exchange to cells; provide oxygen and glucose to respiring cells; remove carbon dioxide (as a product of aerobic respiration); low surface area to volume ratio; regulates temperature of the camel (in hot desert temperatures);		4 max	AO2 3.3.4.1
02.1	atrioventricular valve closes at <b>A</b> because the pressure in the ventricle is higher than the atrium; semilunar valve opens at <b>B</b> because the pressure in the ventricle is higher than the aorta; semilunar valve closes at <b>C</b> because the pressure in the aorta decreases; atrioventricular valve opens at <b>D</b> because the ventricle pressure is lower than the atrium;		4	AO3 3.3.4.1

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02.2	prevents the backflow of blood;		1	AO1 3.3.4.1
02.3	0.7 seconds per heartbeat; $\frac{60}{0.7} = 86$ beats per minute;		2	AO3 MS 2.3 3.3.4.1
02.4	$\frac{6.2}{86}$ ; 0.072 dm <sup>3</sup> ;		2	AO2 MS 2.4 3.3.4.1
03.1	multiple polypeptide chains; hydrogen bonding; precise/specific shape;		3	AO1 3.1.4.1
03.2	(50 – 25) $\frac{25}{25} \times 100$ ; 100%;		2	AO2 MS 3.2 3.3.4.1
03.3	haemoglobin saturates at a high partial pressure of oxygen; increase difficulty in binding the first molecule of oxygen; shape of haemoglobin molecule is changed; this enables further binding of oxygen molecules;		4	AO3 3.3.4.1
04.1	to see if the valves in the arteries / semilunar valves open and close;		1	3.3.4.1 AO3
04.2	Infection risk to any cuts in skin so cover up with a plaster before dissecting; scalpel cuts the skin so keep fingers clear of the scalpel;		2	AO1 3.3.4.1

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04.3	the thicker walls have more muscle; which is needed to pump blood a greater distance around the body (systemic circulation);		2	AO2 3.3.4.1
04.4	reduce / stop oxygen reaching the heart; heart attack/chest pain;		2	AO3 3.3.4.1
04.5	Any four from:  <b>(Yes because):</b> there is a clear correlation between increased age and (cumulative incidence) increased percentage of deaths; more men die than women (regardless of cardiovascular or non-cardiovascular disease);  <b>(No because):</b> no indication of the sample size; 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;		4 max	AO2 3.3.4.1
05.1	Any two from: walls contain <u>only</u> cellulose; contains sieve plates; no pits; has companion cells;		2 max	3.3.4.2 AO1
05.2	glycolysis;		1	3.5.2 AO1

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05.3	two;		1	3.5.2 AO1
05.4	phosphorylation of glucose / phosphate group added to glucose; form glucose phosphate;		2	3.5.2 AO2
05.5	Any three from: transported to the matrix in the mitochondria via active transport link reaction occurs; (in the link reaction) pyruvate becomes oxidised forming reduced NAD and H <sup>+</sup> ; removal of carbon dioxide / decarboxylation;		3 max	3.5.2 AO2
06.1	$(5 - 3) = 2$ ; $\frac{2}{4}$ ; $0.5 \text{ mm}^3 \text{ min}^{-1}$ ;		3	3.3.4.2 AO2 MS 6.1
06.2	Any two from: increased kinetic energy of water molecules; greater (rate of) evaporation (of water molecules); greater diffusion rate (of water vapour);		2 max	3.3.4.2 3.1.7 AO3
06.3	Any four from: water evaporates into vapour and diffuses from the leaves via stomata; water potential gradient created between the spongy mesophyll and xylem (the water potential is higher in the xylem); (polar) water molecules cause cohesion; water molecules adhere to xylem walls; water pulled up as continuous column; water moves by osmosis from xylem into spongy layer;	Allow adhesion	4 max	3.3.4.2 3.1.7 AO1

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Question	Answers	Extra information	Mark	AO Spec reference																		
07	<p>The following are suitable topic areas from the specification that could be used to compare the movement of different substances in humans.</p> <p>In order to fully address the question and reach the highest mark bands students must also include at least five topics in their answer, to demonstrate a synoptic approach to the essay.</p> <table border="1"> <thead> <tr> <th>Specification reference</th> <th>Topic areas</th> </tr> </thead> <tbody> <tr> <td>3.2.3</td> <td>Transport across cell membranes</td> </tr> <tr> <td>3.2.4</td> <td>Cell recognition and the immune system</td> </tr> <tr> <td>3.3.2</td> <td>Gas exchange</td> </tr> <tr> <td>3.3.3</td> <td>Digestion and absorption</td> </tr> <tr> <td>3.3.4.1</td> <td>Mass transport in animals</td> </tr> <tr> <td>3.5.2</td> <td>Respiration</td> </tr> <tr> <td>3.6.2.2</td> <td>Synaptic transmission</td> </tr> <tr> <td>3.6.4</td> <td>Homeostasis is the maintenance of a stable internal environment</td> </tr> </tbody> </table> <p>Students may be able to show the relevance of other topics from the specification.</p> <p><b>Note:</b> other topics from beyond the specification can be used, providing they relate to the title and contain factually correct material of at least an A-level standard. Credit should not be given for topics beyond the specification which are below A-level standard.</p>	Specification reference	Topic areas	3.2.3	Transport across cell membranes	3.2.4	Cell recognition and the immune system	3.3.2	Gas exchange	3.3.3	Digestion and absorption	3.3.4.1	Mass transport in animals	3.5.2	Respiration	3.6.2.2	Synaptic transmission	3.6.4	Homeostasis is the maintenance of a stable internal environment		25 max	3.2.3 3.2.4 3.3.2 3.3.3 3.3.4.1 3.5.2 3.6.2.2 3.6.4 AO1
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### Skills box answers

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