8 Transport in animals
Answers to practice questions

Question number	Answer	Marks	Guidance
1	squamous epithelium short(er) diffusion, distance / path ; large number of alveoli large(r) surface area ; good blood supply high / large / steep, concentration gradient OR removes oxygen (from lung surface) / brings carbon dioxide (to lung surface); good ventilation high / large / steep, concentration gradient OR supplies oxygen (to alveoli) / removes carbon dioxide (from alveoli) ;	4	ACCEPT reduced / shorter diffusion distance ACCEPT thin diffusion barrier IGNORE thin diffusion pathway ACCEPT increases surface area IGNORE SA : Vol ratio ACCEPT maintains / creates concentration gradient IGNORE ref diffusion gradient ACCEPT maintains / creates concentration gradient IGNORE ref diffusion gradient IGNORE ref to air
2 (a)	large surface area; alveoli and lamellae; thin diffusion distance; one cell thick epithelium (alveoli and lamellae); movement of blood (in capillaries);	4	Max 4
2 (b)	gills, external / extend into water and lungs, internal / air enters lungs; flow of water over gills is in the opposite direction to blood flow / countercurrent; (this) maximises concentration gradient; lower concentration of oxygen in water (compared to air);	3	Max 3
3 (a) (i)	13; –7;	2	
3 (a) (ii)	drains into lymphatic system; eventually returned to blood; (if this did not happen) fluid would accumulate; oedema / swelling of tissue;	4	
3 (b)	diffusion is necessary for movement, into / out of, cells or movement, into /out of, transport medium; diffusion distance has to be short; transport system reduces diffusion distance;	3	Max 3
3 (c)	open circulatory system; few vessels; open body cavities; transport medium pumped straight from heart to body cavity; open ended vessels;	4	Max 4
4 (a)	prevent backflow of blood;	1	
4 (b)	blood under pressure; from contraction of ventricle; does not pool in vessels;	2	Max 2
4 (c) (i)	contains a non-protein; haem group; porphyrin and Fe^{+};	2	
4 (c) (ii)	co-operative binding (of oxygen to haemoglobin); first oxygen cannot bind easily; this changes shape of haemoglobin; following oxygens bind more easily; first oxygen hardest to remove from oxyhaemoglobin;	4	Max 4
4 (d)	carbaminohaemoglobin;	1	
4 (e) (i)	myoglobin has a higher affinity for oxygen; higher saturation at the same partial pressure of oxygen;	2	

4 (e) (ii)	it only has one haem group; no co-operative binding;	2	
4 (e) (iii)	sigmoidal; in between the curve for myoglobin and haemoglobin;	2	
5 (a)	protein;	2	
5 (b)	increases rate of reaction; lowers activation energy (of reaction);	2	
5 (c)	carbon dioxide reacts with water; forms carbonic acid; carbonic acid dissociates; hydrogen and hydrogen carbonate, ions;	3	Max 3