9. Transport in animals

9.1 Circulatory systems

Paper 3 and 4

Marking Scheme

Q1.

(d)(i)	**A** lungs ; **B** heart ; **C** kidney ;	**3**	

Q2.

(e)	heart / ventricles / atrium, pump / contract / AW ; valves in the heart ; valves in veins ; valves prevent back-flow (of blood) ; valves ensure blood does not go from ventricle to atrium ; valves prevent blood flowing from, pulmonary artery / aorta, to ventricle ; AVP ;;	**4**	

Q3.

(c)	*total of four from:* *similarities to max 3:* 1 both have, heart / blood vessels / capillaries / arteries / veins ; 2 (heart with) one ventricle / no (visible) septum ; 3 both have valves (in the heart) ; 4 blood flows through atrium and then ventricle ; 5 no (visible) separation of oxygenated and deoxygenated blood ; *differences to max 3:* 6 fish have capillaries in gills **and** amphibians have capillaries in lung and skin ; 7 fish have a single circulatory system **and** amphibians have a (incomplete) double circulatory system ; 8 fish has a 2-chambered heart / amphibian has 3-chambered heart ; 9 amphibians have two atria / fish have one atrium ; 10 amphibians have a separate circuit to the, gas exchange surface / AW ; 11 fish have one valve (in heart) / amphibians have three valves (in heart) ;	**4**	MP7 **A** blood flows through the heart once <u>in a circuit</u> in fish and twice in an amphibian

(d)	*any three from:* 1 ref. to double (rather than single) circulatory system ; 2 (allows / maintains) high(er) blood pressure (to tissues / body) ; 3 for faster / more efficient, transport, (named) substances / blood ; 4 supports fast(er), metabolism / respiration ; 5 allows lower pressure to lungs ; 6 (lower pressure) allows more time for, gas exchange / absorption of oxygen ; 7 prevents damage to lungs / AW ; 8 AVP ;	**3**	MP1 **A** separation of oxygenated and deoxygenated blood / heart has a septum MP8 e.g. ref. to temperature regulation

Q4.

(a)	*any two from:* single circulation / blood flows through the heart once on one circuit of the body ; ref. to, one atrium and one ventricle / two chambers in the heart ; no septum in the heart ; only deoxygenated blood / no separation of oxygenated and deoxygenated blood, in the heart ; blood is under less pressure ;	**2**	*assume answer is about fish unless mammal stated* **A** no separate systemic and pulmonary circuits *if answered for mammals:* MP1 double circulation / blood flows twice through the heart in one circuit of the body **A** systemic and pulmonary circuits MP2 two atria and two ventricles / four chambers MP3 heart has a septum MP4 oxygenated and deoxygenated are separated MP5 blood pressure is higher

(b)	*any three from:* 1 prevents mixing of oxygenated and deoxygenated blood ; 2 blood able to flow at high pressure (to the body) ; 3 efficient / fast, supply of, blood / glucose / oxygen / nutrients ; 4 efficient / fast, removal of, waste / carbon dioxide / urea / lactic acid ; 5 allows efficient filtration in kidneys (for excretion) ; 6 to allow / maintain, a high, metabolic rate / rate of respiration ; 7 lower pressure, in pulmonary circuit / to lungs ; 8 to prevent damage to, delicate tissue / capillaries, in lungs ; 9 allows more time for gas exchange ; 10 AVP ;	**3**	e.g. larger diffusion gradient between capillaries and respiring tissues / allows large body size

Q5.

(a)(i)	**Q** – heart / ventricle / cardiac muscle ; **T** – renal vein ; **W** – vena cava ; **X** – pulmonary artery ;	**4**	
(a)(ii)	**V –** septum ; separates / prevents mixing of, oxygenated and deoxygenated blood ;	**2**	
(a)(iii)	blood passes through heart once in a complete circulation (of the body) ;	**1**	**A** in one circuit of the body
(a)(iv)	*any three from:* **1** efficient / AW, supply of, blood / oxygen / nutrients (to, body / AW) ; **2** efficient / AW, removal of, carbon dioxide / urea / wastes (from body / AW) ; **3** low(er) pressure in, pulmonary, artery / circuit / AW ; **4** to prevents damage to (capillaries in the) lungs ; **5** allows more time for gas exchange ; **6** allows high(er) pressure (in body) ; **7** to allow efficient, filtration in kidneys (for excretion) ; **8** to allow / maintain, a high, metabolic rate / rate of respiration ; **9** AVP ;	**3**	MP8 **A** allows a high(er) body temperature / maintains body temperature MP9 e.g. larger / steeper, diffusion gradient between capillaries and respiring tissues OR allows large body size

(c)(i)	alveoli / alveolus ;	**1**	
(c)(ii)	glomeruli / glomerulus / nephron(s) ;	**1**	**A** Bowman's capsule / cortex
(c)(iii)	assimilation ;	**1**	**R** absorption
(c)(iv)	deamination ;	**1**	
(c)(v)	ovary ;	**1**	

Q6.

(b)(i)	shading in any part of the pulmonary vein only ;	**1**	
(b)(ii)	*any two from:* heart has, two / left and right, sides / AW ; blood must flow through the heart twice in one (complete) circuit / AW (of the body) ; pulmonary and systemic circuits / circuits from heart to lungs and from heart to rest of body ;	**2**	

(b)(iii)	*any four from:* **1** oxygenated and deoxygenated blood, are kept separate / do not mix / separated by septum ; **2** ensures efficient supply of oxygen (to, body / AW) ; **3** ensures efficient supply of (named) nutrients (to, body / AW) ; **4** low(er) pressure in, pulmonary, artery / circuit / AW ; **5** to prevents damage to (capillaries in the) lungs ; **6** allows more time for gas exchange ; **7** allows high(er) pressure (in body) ; **8** to ensure efficient, blood supply to (rest of) body ; **9** to allow filtration in kidneys (for excretion) ; **10** to allow / maintain, a high, metabolic rate / rate of respiration ; **11** AVP ;	**4**	e.g., larger diffusion gradient between capillaries and respiring tissues