



General Certificate of Education

Biology 5416

Specification B

BYB3/W Physiology and Transport

Mark Scheme

2008 examination - January series

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Question	Part	Sub Part	Marking Guidance	Mark	Comments
1	(a)		Description; Explanation;	1	2 max
			E.g. Increase in transpiration/evaporation/diffusion; Higher kinetic energy / faster movement of molecules/ particles/steeper water potential gradient; OR Decreases in transpiration/evaporation/diffusion; Due to closing of stomata;	1	
1	(b)		Sunken stomata/description;	1	
			Reduces water potential/diffusion/concentration gradient / traps humidity/water molecules; (<i>Reject traps water</i>)	1	
			Thick cuticle;	1	
			Impermeable to water (<i>Accept waterproof</i>) / increases diffusion pathway/distance;	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
2	(a)		Aortic body/aorta;	1	2 max
			Carotid body/carotid artery; (Reject carotid sinus)	1	
			Medulla;	1	
2	(b)		1. (Exercise leads to) increased carbon dioxide, lowers blood pH /increase in hydrogen ions/increase in acidity/increase in carbonic acid;	1	4 max
			2. Chemoreceptors send (more nerve) impulses;	1	
			3. (To) respiratory/inspiratory centre /medulla;	1	
			4. Sends impulses to intercostal muscles and diaphragm (to contract);	1	
			5. Increased rate/depth/force of contraction;	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
3	(a)	(i)	Root hair (cell);	1	
3	(a)	(ii)	Large/increased surface area;	1	
3	(b)	(i)	Endodermis;	1	
3	(b)	(ii)	Casparian strip/suberin; So water/mineral ions cannot move through apoplast/cell wall / can only move through symplast / have to cross cell membrane; Active transport of (mineral) ions into xylem;	1 1 1	2 max

Question	Part	Sub Part	Marking Guidance	Mark	Comments
4	(a)		Glucose;	1	2 max
			Glycogen;	1	
			Lipids/fats/triglycerides;	1	
			ATP;	1	
			Phosphocreatine/ creatine phosphate;	1	
			Protein:	1	
4	(b)		(Lactate) lowers pH/increases hydrogen ions;	1	
			Decrease enzyme activity / stops muscle proteins/fibres contracting/working (effectively); (<i>ignore denaturation</i>)	1	
4	(c)	(i)	Oxygen consumption rises then levels off, lactate starts low/is constant and then rises;	1	
4	(c)	(ii)	Low rate of exercise / initially aerobic respiration;	1	
			High rate of exercise oxygen is limiting;	1	
			Anaerobic respiration produces lactic acid;	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
5	(a)		Line to top right hand side (facing) chamber;	1	
5	(b)		Arrow into right atrium;	1	
			Arrow out of right ventricle (to semi-lunar valves/into pulmonary artery);	1	
5	(c)	(i)	Higher pressure in left ventricle/lower pressure in right ventricle (when contracting);	1	
5	(c)	(ii)	All the blood leaving the right side of the heart returns to the left side / (internal) volume of heart (chambers) same on both sides;	1	
5	(d)		Ventricle begins to contract/systole;	1	4 max
			This increase in pressure closes the atrioventricular valve/bicuspid valve;	1	
			Pressure rises above that in the aorta;	1	
			(So) semi-lunar valves open;	1	
			Blood moves out of the ventricle so volume decreases;	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
6	(a)		Sucrose/sugar actively loaded into phloem (in leaf);	1	4 max
			By companion cells; (Accept <i>transfer cells</i>)	1	
			(This) lowers the water potential inside phloem (sieve cells);	1	
			Water enters by osmosis;	1	
			Increasing (hydrostatic) pressure so forcing sugar in solution down phloem /causing mass flow;	1	
6	(b)		(Rapid) photosynthesis, to produce radioactive sugars / sugars containing ^{14}C ; (Accept <i>metabolites</i>)	1	
6	(c)		Plant A ;	1	
			No ^{14}C /radioactivity at the top of the plant (so ringed at X); (Accept <i>quoted figures</i>)	1	
			^{14}C /radioactivity in the roots (so not ringed at Y);	1	
6	(d)		To compare distribution with an unringed plant / plant with phloem present; (Accept to active as control if qualified)	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
7	(a)		1. High(er) hydrostatic/blood pressure at the arterial end of the capillary; 2. Forces fluid/water out of the capillary/blood (into tissues); 3. Proteins/large molecules stay in the capillary/plasma; 4. Water potential of the blood (plasma) falls/becomes more negative (below that in tissues); 5. Hydrostatic pressure falls; 6. Due to friction/resistance to flow/narrow capillary/loss of fluid; 7. Water moves back into blood/plasma in venous end (of the capillary) by osmosis; 8. Lymph system collects excess tissue fluid;	1 1 1 1 1 1 1	6 max
7	(a)		QWC	1	To be awarded on 7(a) and 7(b) but will only count once.
7	(b)		Anaemia leads to reduced (aerobic) respiration; DPG lowers affinity of haemoglobin for oxygen; (So) oxygen unloaded more easily / more oxygen unloaded / dissociates more readily; At higher PO_2/same PO_2; More oxygen to respiring tissues;	1 1 1 1 1	4 max

7	(b)	QWC	1	To be awarded on 7(a) and 7(b) but will only count once.
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