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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Biology 5416

Specification B

BYB3/W Physiology and Transport

Mark Scheme

2008 examination - June series

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Question	Part	Sub Part	Marking Guidance	Mark	Comments
1	(a)	(i)	Epidermis, outer ring labelled;	1	
1	(a)	(ii)	Phloem, one of four smaller areas in the middle labelled;	1	
1	(b)		(Endodermis) has waterproof / impermeable / casparian strip; So water/mineral ions must cross cell membranes/go via symplast *(Accept goes through cytoplasm)* / apoplast blocked; Mineral ions move by active transport (into xylem); Creating water potential / osmotic gradient for water to diffuse into xylem / lowers water potential in xylem;	1 1 1 1	2 max Free standing points Using ATP, pumped into
1	(c)		Suitable description of adaptation; With explanation; e.g. Extensive root system / root system that goes down far into the ground; Greater chance of gathering what water there is / to reach water that is further down	1 1	Long roots, reach deep water = 2 marks *(Accept root hairs, so larger surface area for absorption)* *(Accept physiological adaptation e.g. creating water potential gradients)* *(Accept only grow roots when it rains)*

Question	Part	Sub Part	Marking Guidance	Mark	Comments
2	(a)	(i)	ATP is used for muscle contraction / used to release energy / source of energy / used faster than produced / anaerobic respiration produces less ATP;	1	*(Reject makes ATP / used up / for energy)*
2	(a)	(ii)	Anaerobic respiration occurs;	1	
2	(a)	(iii)	Glycogen broken down to glucose / Glycogen used in respiration;	1 max	
2	(b)		Passes into the blood; Transported to the liver / some stays in muscle; Some is converted to glucose / glycogen / pyruvate; Some is respired; To form carbon dioxide and water; Needs oxygen / oxidised / involves aerobic respiration;	1 1 1 1 1 1	4 max *(Accept converted to glycogen)*

Question	Part	Sub Part	Marking Guidance	Mark	Comments
3	(a)		Slow increase, then faster increase (with increasing carbon dioxide concentration);	1	2 marks in 1 statement
			Steep increase from 5.4(%) / no increase until after 0.8 - 1(%);	1	
3	(b)		Impulses to respiratory centre;	1	3 max
			In medulla;	1	
			More impulses (from medulla);	1	
			To diaphragm / intercostals (muscles);	1	
			Increases rate of (muscle) contraction;	1	
3	(c)		Idea of affinity decreased / reduced saturation;	1	Be aware of graph annotation
			Oxyhaemoglobin dissociates at higher oxygen concentration / partial pressure in the blood / more oxygen unloaded at the same partial pressure of oxygen;	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
4	(a)		Aorta;	1	
4	(b)		Causes recoil / allows stretching; maintains blood pressure or to allow smoother / more constant blood pressure / prevents rupture (physical damage);	1 1	*Reject contracts* *Accept idea of smoother blood flow*
4	(c)	(i)	(A) C B D;	1	
4	(c)	(ii)	B; Semi-lunar valve open <u>and</u> volume high<u>er</u> / pressure low<u>er</u> (than D);	1 1	Incorrect letter = 0 marks

Question	Part	Sub Part	Marking Guidance	Mark	Comments
5	(a)	(i)	Difference; and reason; e.g. (x) Lower oxygen; Because oxygen used in respiration by cells;	1 1	It = X *(Reject reference to cells Accept pressure at Y forces water to leave)*
5	(a)	(ii)	Low blood / hydrostatic pressure at venule end; High(er) concentration of (blood) proteins; So water potential of blood lower than tissue fluid; So water returns by osmosis; Small molecules / ions diffuse into venule end ;	1 1 1 1 1	4 max *(Accept ref to concentration of water for water potential)* *(Reject fluid returns)* *(If blood pressure is lower than water potential, then = 1 mark)*
5	(b)	(i)	(Valve shuts when) the pressure at B is higher than at A; Blood (on B side) pushes against valve flaps / forces flaps shut;	1 1	 *(Reject it shuts)*
5	(b)	(ii)	Blood does not collect at bottom of leg / backflow prevented; *(Pressure)* External pressure stops this happening / blood diverted to deeper veins; *(Flow)*	1 1	Pressure of elastic prevents backflow = 2 marks

Question	Part	Sub Part	Marking Guidance	Mark	Comments
6	(a)	(i)	Produces electrical activity / impulses / action potentials that initiates each beat / produces electrical activity that causes atria to contract / stimulate AVN; Is myogenic / initiates each beat;	1 max	
6	(a)	(ii)	(AVN produces electrical activity that) causes ventricles to contract (after atria);	1 max	*(Accept reference to causing delay between (contraction of) atria and ventricles)*
6	(a)	(iii)	Carries electrical activity from AVN to base of ventricles / causes contraction from the base of ventricles;	1	*(Reject bottom of heart)*
6	(b)	(i)	Correct answer of 100 beats per minute / 1.7 beats per sec / 1.67 beats per sec gains 2 marks; *(Remove 1 mark for correct answer but no units)* Principle correct gains 1 mark e.g. 0.6 secs for 1 beat;	1 1	If 1.6 given as answer, look at working and if 1.67 seen, but rounding incorrect, then allow 2 marks
6	(b)	(ii)	Damage to cells / tissue (in AVN) that produce electrical activity; So no / low peak of activity / lower big spike / less electrical activity; (Lower AVN spike) reduces the electrical activity of the rest of the heart; OR (Damaged AVN) less ventricular contraction; So less electrical activity generated by heart muscle;	1 1 1 OR 1 1	2 max

Question	Part	Sub Part	Marking Guidance	Mark	Comments
7	(a)		Three descriptions; with explanation;		6 max 3 max if only features described 1 feature with 1 explanation ONLY Link explanation to feature
			Tick cell walls;	1	
			Withstand tension / negative pressure;	1	
			Lignin in cell walls;	1	
			Walls waterproof / withstand tension / negative pressure;	1	
			Xylem cells have no end walls / tubular (*not hollow*);	1	
			So a continuous column of water;	1	
			Xylem vessels are stacked on top of each other;	1	
			So a continuous column of water;	1	
			Have no cytoplasm / hollow;		
			Reduces resistance to flow of water / so a continuous column of water;	1 1	
			Xylem cells have pores / pits (in side walls);	1	
			Enable sideways flow / by-pass blockages / allows entry or exit of water;	1	
			Narrow tubes;	1	
			Allows capillarity / increased surface area for adhesion;	1	
			(Molecules in) cell walls;	1	
			Allows adhesion;	1	
7	(a)	QWC		1	To be awarded on 7(a) only

7	(b)		The sap is forced / pushed out / leaves phloem; Because of high pressure in phloem; liquid / air is pulled / sucked in to xylem / enters xylem; due to negative pressure / tension in xylem / pulling force upwards in xylem;	1 1 1 1	