



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 (<i>Accept goes through cytoplasm</i>) / 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	<i>Reject contracts</i> <i>Accept idea of smoother blood flow</i>
4	(c)	(i)	(A) C B D;	1	
4	(c)	(ii)	B; Semi-lunar valve open and <u>volume higher</u> / pressure <u>lower</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;	1	4 max
			High(er) concentration of (blood) proteins;	1	
			So water potential of blood lower than tissue fluid;	1	(Accept ref to concentration of water for water potential) (Reject fluid returns)
			So water returns by osmosis;	1	
			Small molecules / ions diffuse into venule end ;	1	(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;	1	
			Blood (on B side) pushes against valve flaps / forces flaps shut;	1	(Reject it shuts)
5	(b)	(ii)	Blood does not collect at bottom of leg / backflow prevented; (Pressure)	1	Pressure of elastic prevents backflow = 2 marks
			External pressure stops this happening / blood diverted to deeper veins; (Flow)	1	

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	
		(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)	1	If 1.6 given as answer, look at working and if 1.67 seen, but rounding incorrect, then allow 2 marks
			Principle correct gains 1 mark e.g. 0.6 secs for 1 beat;	1	
6	(b)	(ii)	Damage to cells / tissue (in AVN) that produce electrical activity;	1	2 max
			So no / low peak of activity / lower big spike / less electrical activity;	1	
			(Lower AVN spike) reduces the electrical activity of the rest of the heart;	1	
			OR	OR	
			(Damaged AVN) less ventricular contraction;	1	
			So less electrical activity generated by heart muscle;	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
7	(a)		Three descriptions; with explanation;		6 max
			Tick cell walls;	1	3 max if only features described
			Withstand tension / negative pressure;	1	1 feature with 1 explanation ONLY
			Lignin in cell walls;	1	Link explanation to feature
			Walls waterproof / withstand tension / negative pressure;	1	
			Xylem cells have no end walls / tubular (<i>not hollow</i>);	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;	1	
7	(a)	QWC	Reduces resistance to flow of water / so a continuous column of water;	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	
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