



## **General Certificate of Education**

# **Biology 5416**

## *Specification B*

**BYB3/W    Physiology and Transport**

# **Mark Scheme**

*2007 examination - June series*

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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Question	Part	Sub Part	Marking Guidance	Mark	Comments
1	a		More or thick(er) muscle/elastic tissue /small(er) lumen;	1	<b>X</b> (no mark) Accept fibres for tissue
1	b		1) Contain (semilunar/pocket) valves; 2) (valves) work in one direction only/explanation of valve action;	1	Ref to blood flow neutral Ref to AV/mitral etc loses first mark Explanation must be linked to valve
1	c	i	<b>C</b> ;	1	
1	c	ii	<b>A</b> and/or <b>B</b> ;	1	
1	c	iii	<b>E</b> ;	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
2	a		1) Seal has more enzyme <b>M</b> /enzyme for anaerobic respiration; 2) so <u>more</u> anaerobic respiration; 3) when <u>oxygen limiting</u> (diving);	1 1 1	
2	b		Glycogen;	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
3	a		1) (Hydrostatic/blood) pressure is low(er) (at venous end of capillary);	1	3 max
			2) lower/more negative water potential in capillary;	1	Accept solute potential
			3) due to blood/plasma proteins;	1	
			4) (it) returns by osmosis /diffusion;	1	
			5) (it) returns to blood via lymph vessels;	1	
3	b		1) Swelling caused by fluid build up;	1	
			2) because fluid cannot be drained (into lymph vessels);	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
4	a	i	<p>Factor and explanation e.g.  <b>Temperature (no mark)</b>                      Higher temperature give molecules more kinetic energy; increase rate of evaporation;  <b>Air movement (no mark)</b>                      In still air a layer of water vapour build up around stomata/reduces W.P. gradient; reduces the rate of evaporation;  <b>Humidity (no mark)</b>                      High humidity reduces the water potential gradient; reduces the rate of evaporation;  <b>Light (intensity) (no mark)</b>                      High light (intensity) causes stomata to open; increases rate of transpiration;</p>	<p>1                      1                      OR                        1                      1                      OR                        1                      1                      OR                        1                      1</p>	<p>2 max                        Accept Transpiration instead of Evaporation                      Reject "Water lost"</p>
4	a	ii	<p>1) <b>T</b>;                      2) Via calculation rate = <math>\frac{40}{30} = 1.33 \text{ mm}^3 \text{ cm}^{-2} \text{ min}^{-1}</math>;</p>	<p>1                      1</p>	
4	a	iii	<p>1) <b>S</b>;                      2) Will lose least volume of water per unit area of leaf;</p>	<p>1                      1</p>	

4	b	<p>1) <math>K^+</math> (ions/chloride) cause stomata to open/ <math>Na^+</math> (ions/chloride) cause stomata to close;</p> <p>2) more <math>K^+</math> (ions/chloride) in (guard) cells/ Less <math>Na^+</math> (ions/chloride) in (guard) cells;</p> <p>3) <math>K^+</math> (ions/chloride) lowers water potential inside/ <math>Na^+</math> (ions/chloride) lowers water potential outside;</p> <p>4) different (guard) cell wall thickness causes opening (of stomata);</p>	1 1 1 1	3 max
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Question	Part	Sub Part	Marking Guidance	Mark	Comments
5	a	i	Sinoatrial node/SAN;	1	Accept pacemaker
5	a	ii	<p>1) Produces impulses;</p> <p>2) (impulses) travel to AVN/ down bundle of His;</p> <p>3) causing (muscle) contraction;</p> <p>4) output modified by medulla/ sympathetic/ parasympathetic;</p>	1 1 1 1	2 max
5	b		NKLJF / KLNJF;	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
6	a		$\frac{12800}{800}$ ; = 16;	1	Award 1 mark for correct denominator or numerator
				1	
6	b		1) Heart or muscles need <u>more</u> energy/ <u>more</u> contractions;	1	4 max
			2) <u>increased</u> blood flow (to heart and/or muscles);	1	
			3) <u>more</u> O <sub>2</sub> for <u>aerobic</u> respiration/delays anaerobic respiration/prevents lactate build up;	1	
			4) aerobic respiration produces <u>more</u> ATP/releases <u>more</u> energy;	1	
			5) waste products removed <u>faster</u> ;	1	
			6) less blood flow to liver as blood diverted to muscle;	1	

Question	Part	Sub Part	Marking Guidance	Mark	Comments
7	a	i	Phloem;	1	
7	a	ii	Xylem;	1	
7	b	i	<p>1) Sucrose made in leaves/by photosynthesis/from breakdown of storage compounds;</p> <p>2) (Sucrose) actively transported into phloem;</p> <p>3) by companion/transfer cells;</p> <p>4) water potential decreases;</p> <p>5) water enters by osmosis;</p> <p>6) hydrostatic pressure increases;</p> <p>7) In growing areas/sinks /storage areas sucrose is removed;</p>	1 1 1 1 1 1 1	4 max
7	b	ii	<p>1) (Sucrose) must travel through the apoplast;</p> <p>2) when <u>PCMBS added</u> (rate of) sucrose transport decreased;</p>	1 1	



Question	Part	Sub Part	Marking Guidance	Mark	Comments
8	a		1) Partial pressure of oxygen is high in lungs;	1	6 max
		2) (O <sub>2</sub> ) binds to Hb;	1		
		3) forms oxyhaemoglobin(HbO <sub>2</sub> );	1	Accept HbO <sub>2</sub>	
		4) in red blood cells;	1		
		5) Hb has a high affinity for oxygen;	1		
		6) dissociation occurs when partial pressure of O <sub>2</sub> is low;	1	Accept "unloading" for "dissociation"	
		7) dissociation is <u>increased/ faster</u> by high CO <sub>2</sub> ;	1		
		8) partial pressure of O <sub>2</sub> is low in respiring tissues;	1		
8	b		1) Decreased pH/increase in CO <sub>2</sub> ;	1	5 max
		2) detected by chemoreceptors;	1		
		3) in carotid/aortic bodies/medulla;	1		
		4) impulses sent to cardiac centre/medulla;	1		
		5) impulses sent along sympathetic/accelerator nerve/noradrenaline released (to SAN/from Medulla);	1		
		6) heart pumps faster/greater stroke volume;	1		
		7) increase in blood pressure;	1		
		8) Caused by muscles squeezing veins;	1		
		9) detected by baroreceptors /pressure receptors;	1	Must be in context of CO <sub>2</sub>	

8	a/b	QWC	1	To be awarded once only but on 8a or 8b. QWC covers both questions
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