



ASSESSMENT and  
QUALIFICATIONS  
ALLIANCE

# Mark scheme

# June 2003

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## GCE

## Biology B

### Unit BYB3/W

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**Question 1**

- (a) arrows at **A** and **B** both correct - **A** 'down', **B** 'up';  
arrows at **C** and **D** both correct - **C** 'to right', **D** 'to left'; 2
- (b) (i) **D**  
(ii) **B** 2
- (c) valve closing prevents backflow;  
due to (pressure of) ventricle contracting / higher pressure in ventricle;  
(*reject: valves opening/closing of own accord*) 2
- Total 6
- 

**Question 2**

- (a) phosphate, magnesium, nitrate; 1
- (b) (i) active transport;  
energy / respiration/ATP used, or through carrier proteins;  
(*accept channel proteins*)  
(*accept diffusion, if qualified, e.g. some by diffusion*)  
(*accept movement through apoplast; in water flow*) 2
- (ii) xylem; 1
- (c) reduce/prevent water loss;  
from large (root hair) surface into soil; 2
- Total 6
-

**Question 3**

(a)	(i)	lymph / lymphatic;	1
	(ii)	water / (tissue) fluid returned to blood; drains excess / because not all re-enters capillaries / prevents accumulation of fluid; transport of fats / plasma proteins or 'large' protein molecules; (reference to 'killing bacteria' – neutral)	2 max
(b)	(i)	loss of <u>water</u> ; (due to) hydrostatic pressure/blood pressure; explanation in terms of solute concentration / plasma proteins; (allow once in either part);	2 max
	(ii)	water enters; due to osmosis / more negative water potential (in capillary);	2
			Total 7

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**Question 4**

(a)	(i)	guideline to upper part of right atrium;	1
	(ii)	supply oxygen / nutrients to heart muscle / for <u>contraction</u> ;	1
(b)	(i)	0.15s = 2 marks; (working 0.04 + 0.10 + 0.01 = 1 mark) (allow 1 mark for correct method dividing each distance by rate)	2
	(ii)	delays contraction of ventricles; until after atria have contracted / ventricles filled;	2
	(iii)	rapid contraction of ventricles / both ventricles contract together / rapid transmission to tip so contraction starts at bottom of ventricles; (reject strong contraction)	1
(c)		rate of heart beat not adjusted to activity / carries on beating at constant rate / myogenic, so no effect; (Accept: rate would increase because parasympathetic normally inhibits)	1
			Total 8

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**Question 5**

- |       |      |  |       |
|-------|------|--|-------|
| (a)   | (i)  | ATP / creatine phosphate;  | 1     |
|       | (ii) | glucose/sugars; <i>(not carbohydrate)</i><br>triglycerides / fats / fatty acids /glycerol;<br>proteins / amino acids;<br>creatine phosphate;<br><i>(accept ATP, if not given in (i))</i><br><i>(reject lactate / lactic acid / pyruvate)</i> | 2 max |
| (b)   |      | energy value;  | 1     |
| (c)   |      | (diet supplies) glucose / sugar; <i>(not carbohydrate)</i><br>converted to/stored as glycogen (in muscle);<br><i>(reference to liver only disqualified)</i>  | 2     |
| (d)   |      | fat not stored in muscle / less glycogen in muscle;<br>has to be converted to glucose / fatty acids / glycerol first;<br>has to be transported to muscle (by blood).<br><i>(reject more time to break down fats)</i>                         | 2 max |
| Total |      |  | 8     |
- 

**Question 6**

- |       |      |   |   |
|-------|------|---|---|
| (a)   | (i)  | <b>X</b> just below leaf in right-hand plant;<br><i>(accept mark other than X if clear)</i>   | 1 |
|       | (ii) | carbon dioxide used to form glucose / sugar;<br>by photosynthesis;<br>translocation / in phloem <i>(in context of sugar movement)</i>   | 3 |
| (b)   |      | accumulation/storage in bud / incorporation into products of growth;<br>but sugar / radioactive carbon flowing in stem;<br><i>(accept for 1 mark – buds use sugar for growth)</i> | 2 |
| (c)   |      | ringing removes phloem / phloem acts as transport route;<br>sugars/carbohydrate unable to pass to roots, so no radioactivity;   | 2 |
| Total |      |   | 8 |
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**Question 7**

- (a) large numbers /network, so large surface area for diffusion / gas exchange;  
thin walls/one cell thick, so short diffusion distance;  
*(not just 'thin', or 'thin membrane')*  
flattened cells in walls, so short diffusion distance;  
narrow lumen, so red cells touch walls/pass singly;  
walls / membranes permeable / porous to gases, for diffusion;  
*(not 'lots of pores')*  
*(accept low rate of flow; so more time for diffusion/gas exchange)*  
*(allow 1 for two features without explanation)*  
*(reject fenestrated)* 4 max
- (c) 1. diffusion of oxygen into red cell / haemoglobin in red cells;  
2. high affinity of haemoglobin in high oxygen concentration;  
3. (therefore) loads / becomes saturated in lungs / where oxygen abundant;  
4. oxyhaemoglobin formed;  
5. reference to role of haem e.g. energy changes /role of  $\text{Fe}^{2+}$  ions /  
Hb molecule combines with fewer oxygen molecules;  
6. unloads / low affinity in low concentration;  
7. explanation in terms of dissociation curve  
i.e. small changes in concentration gives large changes in saturation;  
8. respiration in tissues gives high  $\text{CO}_2$  concentration / high temperature / high  $\text{H}^+$  concentration / low pH  
9. dissociation curve shifts to right / oxyhaemoglobin dissociation at higher partial pressure
- 6 max
- Total 10

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QWC (See guidance)

1