



ASSESSMENT and
QUALIFICATIONS
ALLIANCE

Mark scheme

June 2003

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; <i>(reference to ‘killing bacteria’ – neutral)</i>	2 max
(b)	(i)	loss of <u>water</u> ; (due to) hydrostatic pressure/blood pressure; explanation in terms of solute concentration / plasma proteins; <i>(allow once in either part);</i>	2 max
	(ii)	water enters; due to osmosis / more negative water potential (in capillary);	2
			Total 7

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) <i>(allow 1 mark for correct method dividing each distance by rate)</i>	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; <i>(reject strong contraction)</i>	1
(c)		rate of heart beat not adjusted to activity / carries on beating at constant rate / myogenic, so no effect; <i>(Accept: rate would increase because parasympathetic normally inhibits)</i>	1
			Total 8

Question 5

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

Question 6

- | | | | |
|-------|------|---|---|
| (a) | (i) | X just below leaf in right-hand plant;
(<i>accept mark other than X if clear</i>) | 1 |
| | (ii) | carbon dioxide used to form glucose / sugar;
by photosynthesis;
translocation / in phloem (<i>in context of sugar movement</i>) | 3 |
| (b) | | accumulation/storage in bud / incorporation into products of growth;
but sugar / radioactive carbon flowing in stem;
(<i>accept for 1 mark – buds use sugar for growth</i>) | 2 |
| (c) | | ringing removes phloem / phloem acts as transport route;
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 Fe²⁺ 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 CO₂ concentration / high temperature / high H⁺
concentration / low pH
9. dissociation curve shifts to right / oxyhaemoglobin dissociation at higher partial pressure

6 max

Total 10

QWC (See guidance)

1