



ASSESSMENT and
QUALIFICATIONS
ALLIANCE

Mark scheme

January 2002

GCE

Biology B

Unit BYB3

Question 1

- (a) (i) A = sieve element / cell / tube;
B = companion cell; 2
- (ii) $1\text{ cm} = 10\mu\text{m}$, $9.3 / 9.4 / 9.5 \times 10$;
 $93\text{-}95\mu\text{m}$; (correct answer = 2 marks) 2
- (iii) Cell A has no nucleus / fewer organelles / mitochondria /
less cytoplasm / large vacuole / sieve plate / pores; 1
- (b)
- | Organ | Source or sink |
|------------------|----------------|
| Developing fruit | Sink |
| Terminal bud | Sink |
| Mature leaf | Source |
- 1
- (c) (i) ^{14}C / radioactive carbon / $^{14}\text{CO}_2$ / $^{14}\text{C}_6\text{H}_{12}\text{O}_6$; 1
- (ii) Measure time taken and distance tracer has moved; 1
- Total 8

Question 2

- (a) (i) C / 0.001; 1
- (ii) B / 2.0; 1
- (b) Contraction of muscle;
Constriction / narrowing of arteriole; 2
- (c) In mammals blood returns to heart from lungs / passes through
heart twice / in fish passes through gills before tissues; 1
- Total 5

Question 3

- (a) Glycogen;
Triglycerides; 2
- (a) Decrease in acidity / pH;
Increase in acidity / pH;
Muscle fatigue;
Denaturation / alteration of proteins / enzymes; 2 max
- (c) (i) 0.225g (per kilogram of body mass); 1
- (ii) Lactate is produced during anaerobic respiration;
Athletes take in more oxygen (at higher intensities of exercise);
Anaerobic respiration delayed / aerobic respiration lasts longer;
Aerobic respiration provides more energy; 3 max
- Total 8

Question 4

- (a) Glucose / oxygen / amino acids / fatty acids / glycerol / salts (any two); 1
- (b) Proteins (in blood);
Lower water potential / becomes more negative;
Reabsorption of fluid by osmosis;
Via lymph system / lymph vessels; 3 max
- (c) (i) High blood pressure increases rate of filtration / forces more fluid out;
Lymph system cannot cope / higher pressure reduces reabsorption; 2
- (ii) Gravity / fewer lymph vessels; 1
- Total 7
-

Question 5

- (a) A = sinoatrial node / SAN;
B = atrioventricular node / AVN; 2
- (b) Emits wave of depolarisation / impulses / pacemaker / initiates beat;
Causing contraction of atria; 2
- (c) (i) $60 \div 0.72 - 0.76$;
79 - 83; (Correct answer = 2 marks) 2
- (ii) Ventricular pressure increases above pressure in atrium ; 1
- (d) Left ventricle has thicker / more muscle; 1
- Total 8
-

Question 6

- (a) (i) High transpiration rate, lower water potential of leaves; 1
- (ii) Transpiration involves evaporation of water;
Reduced water content lowers water potential / becomes more negative; 2
- (iii) Opening and closing of stomata / degree of opening; 1
- (b) (i) Initially high loss in mass, then decreases; 1
- (ii) (Loss in mass as) water is not replaced;
Initially stomata are open / later stomata close;
Higher water potential of leaf / diffusion of water from
leaf to atmosphere;
Water potential of leaf reduced / diffusion gradient decreased; 3 max
- (iii) Reduce sampling error / improve reliability of results; 1

(c)	<u>Thick</u> cuticle; hairs; sunken stomata; inrolled leaves; fewer stomata ; Reduced leaf surface area;	2 max
(d)	(i) Higher temperature provides more kinetic energy; For evaporation / diffusion; Air can hold more water vapour / increases water potential gradient;	2 max
	(ii) Reduces transpiration as less water uptake; Reference to water potential gradient (leaf and air / soil and root);	2 max
	Total	15

Question 7

(a)	(i) Loading of oxygen at high p.p. oxygen / in lungs; Unloads oxygen at low p.p. oxygen / in tissues;	2
	(ii) (Haemoglobin) releases more oxygen; For respiration;	2
(b)	(i) Respiratory centre in medulla; <u>Impulses</u> from inspiratory centre / medulla / respiratory centre; Causes contraction of muscles; Lungs inflate, stretch receptors stimulated; Send impulses to expiratory / inspiratory centre; Fewer impulses to respiratory muscles / inspiration inhibited / expiration occurs;	
	(ii) Chemoreceptors; In medulla / carotid body / aortic bodies; Detect increase in carbon dioxide; Impulses to medulla / respiratory centre / inspiratory centre; Impulses transmitted to respiratory muscles;	10 max
	Total	14
