



ASSESSMENT and  
QUALIFICATIONS  
ALLIANCE

# Mark scheme January 2003

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## GCE

### Biology B

### Unit BYB6

### Section A

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## Unit 6: Applied Ecology

### Question 1

- (a) Combustion/ burning of (sulphur-containing) fuels/ coal/ fossil fuels;  
(Accept: *Volcanic eruptions*) 1
- (b) Fish:  
Difficulty in regulating their internal salt concentration;  
which leads to water imbalance;
- Build up of mucus in the gills;  
which may lead to suffocation/gas exchange less efficient;
- Haemoglobin becomes less efficient at picking up oxygen;  
which may lead to suffocation/gas exchange less efficient;
- Reduce calcium ion uptake;  
so not possible to produce exoskeleton/endoskeleton/shell;  
(Accept *weakens*) 4 max
- Total 5
- 

### Question 2

- (a) In the light (accept converse for dark)  
1. Faster/further (slower/ shorter distance)/larger area;  
2. Fewer turns (more turns); 2  
(Reject *straighter lines*)
- (b)(i) Kinesis; 1
- (ii) Allows woodlouse to stay in/ to find favourable environment;  
Avoids predators; prevent desiccation/keeps gas exchange surface moist;  
near food source; 2
- Total 5
- 

### Question 3

- (a) (Projecting) leaf area/ area of leaf (available for photosynthesis);  
(Divided by) area of ground covered; 2
- (b) Plant B  
because the total leaf area over a given ground area is greater in B /  
more layers of leaves covering the same ground area in B; 1
- (c) Winter wheat  
develops earlier/ larger LAI;  
Therefore more (surface area for) photosynthesis/  
more dry matter produced; 2
- Total 5
-

**Question 4**

- (a) (Light intensity)  
When light intensity is increased, rate of photosynthesis increases; 1
- (b) (Carbon dioxide)  
An increase of CO<sub>2</sub> from 0.03 to 0.12% nearly doubles the rate of photosynthesis/ temperature change from 20 to 30 °C only small increase in photosynthesis;  
More CO<sub>2</sub> to convert/combine with RuBp (to GP);  
More GP available to use with the products of the light dependant reaction; 2 max
- (c) Light and CO<sub>2</sub> will be limiting factors;  
Increase temp will increase rate of respiration as well as photosynthesis/  
net gain / cost to increase temperature not matched by increase in photosynthesis/yield/not cost effective; 2
- (d) Any two from  
Misses chloroplast/  
Wrong wavelength/  
reflected; 2
- Total 7
- 

**Question 5**

- (a) Grid;  
Selection of coordinates using  
random number tables/ numbers from a hat; 2
- (b)(i) Correct use of  $\Sigma$ ;  
Correct answer/ 1.74; 2
- (ii) More individuals and more different species/  
**A** is abiotically more harsh/more demanding environment; 1
- (c) Dead plant material /humus is converted to nitrate by soil bacteria;  
(one mark for principle)  
Plant material decomposed by saprophytes/ saprobionts;  
Organic molecules containing nitrogen / protein converted to ammonia;  
Involving ammonifying bacteria;  
Ammonia to nitrite; nitrite to nitrate;  
Involving nitrifying bacteria; 4 max
- Total 9
-

**Question 6**

- |     |   |       |
|-----|---|-------|
| (a) | Closed seasons;<br>avoid reproductive time;<br>quotas;<br>maintain stock size;<br>Net size restriction;<br>avoid catching immature fish;                    | 2 max |
| (b) | Faeces/uneaten food;  | 1     |
| (c) | Increase algal growth;<br>Less light penetration;<br>Algae die;<br>Bacteria decay them;<br>Use up oxygen;   | 4 max |
| (d) | Compete for food;<br>Competes for mates/ mates with wild fish;<br>Affect gene pool/ genes passed to wild fish;<br>Farmed fish may carry parasites/ disease; | 2 max |
|     | Total   | 9     |
- 

**Question 7**

- |     |   |       |
|-----|---|-------|
| (a) | Thick waxy cuticle;<br>Impermeable to water;<br>Stomata on lower surface;<br>Out of direct sunlight/reduces evaporation rate;<br>Sunken stomata/rolled up leaves/hairs;<br>Keeps saturated air near leaf/reduces concentration gradient;<br>Reduced leaves/needles/spines;<br>Less surface area;  | 4 max |
| (b) | Water potential inside DCT/collecting duct higher/less negative;<br>Water leaves by osmosis;<br>Long loops of Henle produce a lower/more negative water potential in medulla;<br>Gradient produced from beginning to end of collecting duct;<br>Pituitary gland releases ADH into blood;<br>ADH acts on DCT/ collecting duct;<br>Increases number of water permeable channels/ increases permeability;<br><u>More</u> water reabsorbed into blood/ <u>less</u> lost in urine;<br>Urine is very concentrated/hypertonic; | 6 max |
|     | Total   | 10    |
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