



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

**Question 7**

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