ASSESSMENT and QUALIFICATIONS ALLIANCE

# Mark scheme June 2002

# GCE

## Biology B

## Unit BYB5



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## SECTION A

### *Question 1*

(a) use of large numbers of quadrats in each area *(if number stated then 10+)*;
random sampling method *(e.g. grid + random numbers)*/systematic sampling method
*(allow regular sampling along a transect);*
counting.
**OR**
*(allow capture/recapture method*
mark and release*;*
recapture*;*
calculate proportion of marked snails in second sample*)* 3

(b) use of indicator OR meter OR probe *(litmus neutral)*;
detail e.g. obtaining soil solution *(damp soil neutral*
*(allow reasoning detail on use of probe)* 2

(c) prevents desiccation/keeps moist;
hidden from predators 2

(d) salty water has more negative water potential than fresh water;
osmotic effects of this on roots/water passes out 2

Total 9

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### *Question 2*

(a) kJ $m^{-2}$ $y^{-1}$ *(all 3 units needed - accept J, any area, any time)* 1

(b) 0.19 / 0.186 gains 2 marks
*(evidence of (1.5/807) × 100 gains 1 mark/0.2 with no working gains 1 mark*) 2

(c) (i) light/sunlight 1

(ii) by protoctists;
*and* by their consumers;
*and* by decomposers
transfer (to environment) as heat/thermal energy;
combustion of fossilised remains 3 max

Total 7

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## *Question 3*

(a) *reasonable attachment method(s):*
e.g. roots able to penetrate mortar;
suckers;
tendrils;
*xerophytic adaptation(s):*
e.g. leaves able to resist desiccation;
small leaves to reduce area for evaporation;
succulent stem/leaves;
*reasonable growth habits:*
e.g. stems grow outwards then upwards; 2

(b) (i) e.g. more light on south side/warmer on south side 1

(ii) control variables: similar soil, similar temperatures;
independent variable – one batch grown in high light intensity, one batch in low light intensity;
dependent variable –size of plants/leaves after reasonable interval
**OR**
large number sampling sites – north and south-facing walls;
light intensity measured at each site;
light intensity measured at each site; 3

Total 6

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## *Question 4*

(a) light intensity measured at each site;
temperature;
light intensity;
oxygen;
minerals/nutrients;
carbon dioxide;
pH 3 max

(b) L. trisulca produces fewer 'leaves'/does not grow as well when L. minor present as when alone;
L. minor produces more 'leaves'/grows better when L. trisulca present than when alone 2

(c) L. minor grows on surface therefore receives more light than L. trisulca;
therefore more photosynthesis by L. minor
**OR**
substances released by L. trisulca;
promote growth of L. minor 2

Total 7

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## *Question 5*

| | | | |
|---|---|---|---|
| (a) | (i) | climax | 1 |
| | (ii) | scheme carried by moving water trapped;<br>humus/underground stems/roots stablise soil;<br>on death, add humus/peat/litter/matter *(BUT NOT minerals nutrients)* | 2 max |
| | (iii) | active uptake of ions requires energy;<br>from (aerobic) respiration;<br>since against concentration gradient | 3 |
| (b) | | more niches greater <u>variety</u> of habitats/breeding sites;<br>greater <u>variety</u> of food<br>more stable;<br>less hostile/more favourable conditions/example | 2 max |
| | | Total | 8 |

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## *Question 6*

| | | |
|---|---|---|
| (a) | no <u>significant</u> difference in X/<u>significant</u> difference in both Y <u>and</u> Z<br>*gains 1 mark*<br>BUT <u>significant increase in Y AND significant decrease in Z</u> *gains 2 marks*;<br>computed values of $X^2$ for Y and Z <u>greater</u> than table value at 0.05 level<br>at 1 d.o.f;<br>*(allow computed values > 3.84 / probability of computed values < 0.05* | 3 |
| (b) | (winter grazing) only one to show a <u>significant</u> increase (over the 7 years) | 1 |
| (c) | more eggs laid (on each vetch plant) when grass kept short;<br>grazing keeps grass short;<br>no increase in butter flies (when sheep graze) in summer since will eat vetch<br>with eggs on | 3 |
| | Total | 7 |

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## SECTION B

### *Question 7*

(a) (i) conversion of ammonium or ammonia into nitrite/
ammonium or ammonia into nitrate/nitrite to nitrate 1

(ii) conversion of organic nitrogen/nitrate into nitrogen 1

(b) nitrate limiting factor for plant growth;
increased growth of plants/algae/protoctists;
nitrate needed by plants for protein synthesis;
competition for light/effect of competition (*e.g. plants underneath die*);
plants die, providing food supply for microorganisms/number of microbes increases;
use of oxygen for respiration of microorganisms 5 max

(c) haemoglobin has great affinity for oxygen/saturated over a range of oxygen p.p.;
haemoglobin/oxyhaemoglobin serves as oxygen store;
oxygen combines with haemoglobin to form oxyhaemoglobin;
oxyhaemoglobin releases oxygen at tissues/low oxygen p.p.;
maintaining diffusion gradient between blood and water 3 max

Total 10

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### *Question 8*

(a) loss of hedgerows;
since small fields impracticable for large machines;
soil more exposed to wind;
resultant increase in soil erosion *(once);*
reduction in diversity;
since smaller <u>variety</u> of niches/habitats;
since smaller <u>variety</u> of producers/plants
deeper rooted plants removed;
resultant increased soil erosion *(once);*
increased risk of large-scale crop failure/increased disease/increased number of pest;
since large numbers of same crop species grown close to each other;
increased use of fertilisers result in eutrophication/damage to soil structure;
reduction of gene pool
*(references to pesticides neutral)* 4 max

(b) (i) bioaccumulation in gull (via food chain);
explanation in terms of organisms at higher trophic level eating <u>large numbers</u> of organisms at lower trophic level; 2

(ii) different <u>shaped</u> molecules;
do not fit active sites of enzymes produced by decomposers 2

(iii) resistant forms more likely to survive/non resistant forms die;
to breed/reproduce;
their genes/alleles more likely to be passed to next generation
*(natural selection unqualified neutral)* 3

Total 11

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