



ASSESSMENT and
QUALIFICATIONS
ALLIANCE

Mark scheme

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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

Question 2

- (a) $\text{kJ m}^{-2} \text{y}^{-1}$ (*all 3 units needed - accept J, any area, any time*) 1
- (b) 0.19 / 0.186 gains 2 marks
(evidence of $(1.5/807) \times 100$ 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

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
-

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
-

Question 5

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

Question 6

(a)	no <u>significant</u> difference in X/ <u>significant</u> difference in both Y <u>and</u> Z <i>gains 1 mark</i> BUT <u>significant increase in Y AND significant decrease in Z</u> <i>gains 2 marks</i> ; computed values of X^2 for Y and Z <u>greater</u> than table value at 0.05 level at 1 d.o.f; <i>(allow computed values > 3.84 / probability of computed values < 0.05</i>	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; grazing keeps grass short; no increase in butter flies (when sheep graze) in summer since will eat vetch with eggs on	3
Total		7

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/protocists;
nitrate needed by plants for protein synthesis;
competition for light/effect of competition (<i>e.g. plants underneath die</i>);
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 |

Question 8

- | | | |
|---------|--|-------|
| (a) | loss of hedgerows;
since small fields impracticable for large machines;
soil more exposed to wind;
resultant increase in soil erosion (<i>once</i>);
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 (<i>once</i>);
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
(<i>references to pesticides neutral</i>) | 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
(<i>natural selection unqualified neutral</i>) | 3 |
| | Total | 11 |