



ASSESSMENT and  
QUALIFICATIONS  
ALLIANCE

# Mark scheme

# June 2002

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## GCE

## Biology B

## Unit BYB6

## Section A

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**Question 1**

- |     |   |       |
|-----|---|-------|
| (a) | British swallows to south Africa (and Europe);<br>European swallows fly to north/central Africa;  | 2     |
| (b) | swallows feed on insects which are scarce in Britain in winter;<br>abundant food in Africa;<br>endothermic with high surface area to volume ratio, so less heat loss; | 2 max |
| (c) | daylength at certain time of year consistently same from temperature variable;  | 1     |
|     | Total   | 5     |
- 

**Question 2**

- |         |  |       |
|---------|--|-------|
| (a)     | at low levels of fishing as increased effort results in more fish caught as underfishing occurs/more boat hours;<br>at peak of graph productivity maintained/maximum sustainable yield;<br>high effort results in overfishing;<br>remaining stock unable to reproduce at sufficient rate to replace caught fish; | 3 max |
| (b) (i) | (limiting number of fish caught so) greater chance of individuals surviving to breed;  | 1     |
| (ii)    | inaccurate estimate of MSY/size of fish populations;<br>fish caught above quota have to be returned – these are unlikely to survive;<br>quotas exceeded illegally;<br>quotas too high;<br>small fish may be caught;<br>fish eaten by predators;  | 1 max |
|         | Total  | 5     |
- 

**Question 3**

- |         |  |       |
|---------|--|-------|
| (a)     | light intensity;<br>as increase in light intensity results in increase in rate of photosynthesis;  | 2     |
| (b) (i) | increasing the temperature increases rate of photosynthesis in maize, but not in wheat/rate of photosynthesis higher in maize than wheat at high temperatures;<br>rate of photosynthesis increases at high light intensity in maize, but not in wheat/rate of photosynthesis higher in maize than wheat at high light intensity;<br><i>(if no comparison between maize and wheat allow 1 mark)</i><br>as rate of photosynthesis increases there is more productivity, as more carbohydrate formed; | 2 max |
| (ii)    | stomata open for less time;  | 1     |
|         | Total  | 5     |
-

**Question 4**

- |     |   |       |
|-----|---|-------|
| (a) | sulphur dioxide combines with water to form sulphuric/sulphurous acid;<br>nitrogen oxides combine with water to form nitric/nitrous acid;<br><i>(if only the oxides named award 1 mark)</i>                                       | 2     |
| (b) | increased mucus on gills;<br>so less efficient gas exchange;<br>interferes with ion regulation/excess loss of sodium through gill membranes;<br>reduces efficiency of oxygen uptake by haemoglobin;<br>prevents hatching of eggs; | 2 max |
| (c) | enzyme inhibition;  | 1     |
| (d) | (reduced decomposition so) N not recycled;<br>as bacteria in cycle inhibited by heavy metal ions/low pH;  | 2     |
|     | Total   | 7     |
- 

**Question 5**

- |     |  |       |
|-----|--|-------|
| (a) | genetically similar organisms/low genetic diversity/low variation;<br>breeding brings together harmful recessive alleles (or genes)/<br>homozygous recessive individuals formed;<br>which do not survive/has lower survival than individuals with dominant alleles;<br>all susceptible to same disease;<br>loss of alleles for future selection;   | 3 max |
| (b) | in large reserves<br>more individuals/species present;<br>fluctuations in population size will be smaller;<br>populations less likely to become extinct;<br>higher number of species results in more interactions/more complex food webs;<br>so change in numbers of one species unlikely to affect numbers of others;<br>high diversity associated with stability of ecosystem;<br>more niches present;<br>more chance of escape from natural disaster; | 3 max |
| (c) | rare species;<br>rare habitat;<br>variety of species present;  | 2 max |
|     | Total  | 8     |
-

**Question 6**

- (a) random samples;  
method of randomisation e.g. random number tables;  
large sample;  
valid point on quadrat use e.g. what to do when individuals touch edge; 2 max
- (b) sites with high BOD have low oxygen or converse/site A has low BOD,  
high oxygen, site B has high BOD, low oxygen;  
BOD is the amount of oxygen used by microorganisms;  
this oxygen is used up in decomposition of organic matter;  
by respiration of bacteria;  
differences in sites due to amount of organic matter; 4 max
- (c) (i) 2.90;  
working of denominator i.e.  $(3 \times 2) + (60 \times 59) + (51 \times 50) + (94 \times 93)$ ; 2
- (ii) species do not have to be identified;  
no information on oxygen tolerance is required;  
index of diversity takes into account number of individuals; 2 max
- Total 10

**Question 7**

- (a) reduces stability of ecosystem;  
killing of non target species/specific sub-lethal effect;  
method – direct toxicity/loss of food sources/bioaccumulation/  
details of sub-lethal effect; 2 max
- (b) (i) continuous; 1
- (ii) due to effect of genes and environment;  
due to polygenes;  
description of polygenic activity;  
random assortment/crossing over/random fertilisation;  
role of mutation; 3 max
- (c) variation in resistance to insecticide present;  
individuals resistant to the insecticide survive/less likely to reproduce;  
pass on their alleles/genes;  
causing a change in allele (or gene) frequency/higher frequency of  
alleles (or genes) for resistance; 4 max
- Total 10