



ASSESSMENT and  
QUALIFICATIONS  
ALLIANCE

# Mark scheme

# June 2003

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## GCE

## Biology B

### Unit BYB6/A

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**Section A****Question 1**

- (a) mixes randomly/completely in population;  
marking does not have an effect/does not wear off;  
no migration/emigration/immigration;  
no change in population size between samples/life span longer than time  
between release and recapture;  
no births or deaths;  
not trap-happy/trap-shy; 2 max
- (b) (i) correct figures used in equation;  
104; 2
- (ii) large sample more representative of population;  
(*reject accurate/statistically viable*) 1
- Total 5
- 

**Question 2**

- (a) does not need repeated treatment;  
maintains low level of pest/  
not allowing pest numbers to rise (above economic threshold); 2
- (b) only feeds on pest species/does not affect non-target population;  
can live in environment of the host/ establish/maintain its population/  
can reproduce under conditions of use/active during the season;  
(*ignore references to effect on crop*) 2
- Total 4
-

**Question 3**

- (a)  $Y \rightarrow X$  / -800 to -1200, from less negative  $\Psi$  to more negative  $\Psi$  /  
higher water potential to lower water potential; 1
- (b) (i) takes salt (from the water)/stores/retains sugars/named solute; 1
- (ii) increasing solute concentration lowers water potential / water potential  
becomes more negative; 1
- (iii) water potential in cells is higher than the surrounding water;  
water moves out of the cells;  
by osmosis/diffusion;  
water cannot be taken up by the plant/ plant loses water;  
linked to metabolic reaction/photosynthesis;  
(*reject cannot grow*) 4 max
- Total 7
- 

**Question 4**

- (a) (i) (clover) gains ammonium compounds/ammonia/amino acids;  
(*reject nitrogen/nitrates*) (*accept nitrogen compounds*) 1
- (ii) (bacteria) get ATP/carbohydrate/organic compounds; 1
- (b) (*max 2 marks for each advantage and explanation*)  
clover is a natural/green fertiliser; }  
adds organic material/humus to the soil; }  
clover adds nitrogen compounds/nitrates; }  
needed by crop for protein production; }  
clover releases minerals slowly; }  
less run-off/less pollution; }  
clover cheaper than fertiliser; }  
therefore more profitable/fertilizer applied several times; } 4 max
- Total 6
-

**Question 5**

- (a) (i) **Y** because  
larger number/mass of young fish;  
protected and fed;
- OR
- smaller mass/number of older fish/steep decline (after 12 years);  
killed/harvested when young/12-13; 2
- (ii) **X** because  
smaller population/normal distribution;  
no older fish/mean lower; 2
- (b) gene identified/selected/found;  
gene removed using restriction enzyme;  
add to vector/plasmid;  
using ligase;  
gene inserted into appropriate cell/zygote; 4 max
- Total 8
-

**Question 6**

(a)	(i)	does not occur to as great a depth;	1
	(ii)	related to light penetration/depth; (light for) photosynthesis;	
		OR	
		related to depth of nutrients; (nutrient for) identified reason;	
		OR	
		related to heat penetration: reference to enzymes/metabolic processes;	2
(b)	(i)	oxygen level/concentration increases/ BOD decreases; less decomposition of phytoplankton; <i>(reject less dead matter)</i> less respiration of bacteria/fewer aerobic bacteria;	
		OR	
		light penetration increases; less phytoplankton present; due to less/fewer nutrients;	3
	(ii)	indicator species found (only) in specific conditions/named example;	1
	(iii)	samples; see whether species associated with more/less oxygen is present/ named species;	2
		Total	9

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**Question 7**

- (a) grid area;  
method of generating coordinates;  
to place quadrat at random; (*max 2 for sampling*)  
number of individuals;  
number of each species; 3 max
- (b) more light reaches the ground;  
more type of plant/producers; (*reject reference to trees*)  
more habitats/microclimates;  
more varieties of food/more complex food web;  
more niches;  
different nesting sites;  
dead wood/leaves left to rot providing more nutrients/shelter;  
greater variety of herbivore/primary consumer/carnivore;  
(*ignore reference to animals*) 4 max
- (c) reduces (the variety of alleles) / genetic diversity;  
only certain phenotypes allowed / selected to breed;  
(phenotypic) character controlled by allele;  
some/non-selected alleles eliminated/frequency decreased;  
others/selected alleles increase in frequency;  
(*reject reference to genes*) 4 max

Total 11

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