



## **General Certificate of Education**

# **Biology 6416**

## *Specification B*

**BYB5/W Environment**

# **Mark Scheme**

*2008 examination - January series*

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**Question 1**

- (a) Shorter food chain;  
Less energy lost (transferring) between (trophic) levels; 2
- (b) Use coordinates/random numbers/permanent quadrats;  
*(reject transect)*  
Use a large number of Quadrats;  
Count number of (each) species of plant/percentage cover;  
Repeat at regular time intervals/stated time interval;  
Use data/ statistics to make a comparison; 4 max  
*(Accept ref. to diversity index)*

**Total 6****Question 2**

- (a) Mowing grassland kills other plants/prevents succession;  
(Once mowing stops) competition occurs;  
Changes in community lead to changes in abiotic/edaphic factors;  
Allowing trees/woodland/climax community to become established; 3 max
- (b) Temperature (of air) may affect transpiration/enzymes/temperature of soil as  
this may affect enzymes;  
Wind speed as this may affect rate of transpiration / seed/pollen dispersal;  
Light intensity as this may affect (LDR of) photosynthesis;  
Edaphic factors/named factor as this may affect nutrient availability / soil  
organisms;  
*(Accept pH of soil affecting enzymes, reject pH alone)*  
Humidity as this may affect rate of transpiration/water loss; 3 max  
*(Award mark for factor measured and explanation)*

**Total 6**

**Question 3**

- (a) (Organic material) allows rapid growth/increase of bacteria;  
 (Aerobic) bacteria take up oxygen (for respiration)/respire aerobically;  
 Further downstream, organic material decomposed/diluted;  
 So bacterial numbers drop (and so does their oxygen uptake);  
 Increase in plants/algae releases O<sub>2</sub>;  
 Turbulence causes increase O<sub>2</sub> from air; 4 max
- (b) Able to live where oxygen is low/adaptation to abiotic niche;  
 Haemoglobin has high(er) affinity for oxygen;  
 Can extract more oxygen from the water/better able to get oxygen; 3
- (c) Thin so short diffusion pathway;  
 Good blood supply / move to maintain diffusion gradient;  
 Large surface area for rapid diffusion;  
 No exoskeleton so permeable; 3 max  
*(3 features with no explanation = 1 mark)*

**Total 10****Question 4**

- (a) Each organism at higher levels in the food chain eats many organisms lower  
 in the food chain;  
 (As DDT isn't excreted) it accumulates in the body/fatty tissue; 2
- (b) Resistant insects present in the population/allele for resistance in population;  
 Not killed by DDT;  
 These will (survive) to breed/have more offspring;  
 Some offspring will inherit allele for resistance;  
*(reject gene)*  
 So proportion/frequency of resistant insects/allele will increase in the population; 4 max

**Total 6****Question 5**

- (a) Untreated plants release oxygen in the light by photosynthesis;  
 Untreated plants use oxygen in the dark as they are respiring;  
 Amitrole treated plants do not release oxygen/only use oxygen;  
 So must not be able to photosynthesise/only respire; 4
- (b) Treated have fewer lamellae/grana/thylakoids/membranes;  
 Less chlorophyll for absorbing sunlight/ less LDR;  
 Treated have fewer ribosomes;  
 Produce fewer enzymes/carriers (For LIR)/ fewer proteins for membranes; 4

**Total 8**

**Question 6**

- (a) *D. glutinosum* outcompetes *D. nudiflorum*;  
 Mean leaf length in *D. glutinosum* is reduced more by intraspecific competition;  
 Mean leaf length in *D. nudiflorum* is reduced more by interspecific competition; 2 max

- (b) Asexual reproduction/cells divide by mitosis;  
 Only one parent needed/rapid;  
 Produce genetically identical copies/clones of the parent plants;  
 Take advantage of favourable conditions/get nutrition from parent until established / underground stem maintains distance between plants; 3 max

(c)

Kingdom	Plantae
Phylum	Angiospermophyta
Class	Dicotyledoneae
Order	Fabales
Family	Fabaceae
Genus	<i>Desmodium</i>
Species	<i>nudiflorum</i>

;; 2

**Total 7**

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**Question 7**

- (a) 1 Decomposers/detritivores/bacteria/fungi/saprobionts;  
2 Release enzymes/extracellular digestion/saprophytic digestion;  
(*reject carbon is broken down*)  
3 Absorb products of digestion;  
4 Respiration (of carbon compounds) releases CO<sub>2</sub>;  
5 Carbon dioxide taken up by plants;  
6 via stomata;  
7 Burning/ human's activities return carbon dioxide to the atmosphere;  
(*reject fossil fuels*) 6 max
- (b) (i) nitrifying bacteria/named nitrifying bacterium; 1
- (ii) Bacteria have Slime capsule;  
No membrane bound organelles / example/have mesosome;  
70s ribosomes;  
Circular DNA/DNA not in a nucleus;  
No vacuole;  
Cell wall not made of cellulose / made from peptidoglycan;  
Bacteria have plasmids; 2 max
- (c) Polymer;  
Glycosidic link/bond;  
Straight /long/parallel chains / unbranched/hydrogen bonds between chains; 2 max

**Total 11**

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**Question 8**

- (a) 3 factors;;;  
3 explanations;;;  
  
e.g.  
1. Predation;  
2. Large numbers of predators would decrease population;  
  
3. Food supply:  
4. Lack of food lead to (starvation and) decrease in numbers;  
  
5. Disease/pathogens;  
6. Spread rapidly in dense populations;  
  
7. Competition for nest sites;  
8. When sites scarce fewer lemmings breed/have smaller litters; 6 max
- (b) 3:1 female to male;  
XX, X\*X, X\*Y female and XY male: 2
- (c) High energy radiation/X-rays/gamma rays/UV light/alpha/beta particles/  
named chemical/pesticides; 1
- (d) Fewer males born/ population of more than 50% females/largely female;  
Lead to rapid increase in population;  
Limited by number of offspring females can have/litter size/litter frequency;  
Limited by too few males to fertilise females; 2 max

**Total 11**