



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 O₂;
 Turbulence causes increase O₂ 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

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 CO₂;
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

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