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ASSESSMENT and QUALIFICATIONS ALLIANCE

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_2;
Turbulence causes increase O_2 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	*Desmodium*
Species	*nudiflorum*

;; 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 CO_2;	
	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