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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Biology 6416

Specification B

BYB6/A Applied Ecology

Mark Scheme

2008 examination - June series

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Dr Michael Cresswell Director General

Question 1

(a)

Factors that have a density-dependent effect.	Factors that have a density-independent effect.
e.g. Food availability Predation	e.g. Rainfall Temperature pH

;; 2

(b) Number of individuals of each species;
Total number of individuals (*Simpson's* Index) or number of species (*Margalef* Index); 2

Total 4

Question 2

(a) Consequence and explanation;;

e.g.
Decrease in otter prey;
So less food;

Oil blocks light;
So reduced photosynthesis / less photosynthetic species growth; 2

(b) Indicator species found in specific conditions / example given;
Compare species present with reference species / species known to be present in different water qualities;
High pollution = low oxygen concentration or high BOD; 2 max
(A*ccept converse)*

Total 4

Question 3

(a) (New cells produced by) mitosis / asexual reproduction;
Chromosomes / DNA / genes copied (and passed to daughter cells);
No recombination / reassortment; 2 max

(b) (Systemic herbicide):
(Is) absorbed / transported (through the tissues of the plant);
Kills whole plant / all parts of plant / underground stems; 2 max
Less affected by light / rain;
(Accept converse argument: not transported; only kills part of plant)

(c) Only affects target species;
Can survive in conditions of use;
Works on a large scale;
The species can be produced on a large scale; 2 max

Total 6

Question 4

(a) Suitable advantage;

e.g.
Consistent standard / quality / taste / size;
Regular supply;
Optimal / controlled growth (rates);
Supply not affected by external conditions; 1 max

(b) Difference with comparison;;

e.g.

Closed (1 mark)	Open (1 mark)
controlled conditions / cages	as near natural conditions / ponds
prepared food / pellets used	fertilisers used to promote growth of natural foods
day length may be controlled	natural day length
breeding stock separate from harvested	all fish / stock in together

;; 2 max

(Need comparison of <u>same</u> point, if not 1 mark max)

(c) (i)
1 Isolate donor gene(s);
2 That code for enzyme<u>s</u> needed;
3 Using restriction enzyme / endonuclease / reverse transcriptase on mRNA / gene sequencing;
4 Sticky ends (however formed);
5 Suitable named vector e.g. virus / plasmid;
6 Use ligase correctly;
7 Method of introducing vector; 4 max

(ii) (Microorganisms) may not absorb beta-carotene;
May not be able to transfer all three genes / gene not expressed / enzyme not produced (by same microorganism);
Intermediates may be broken down / digested (by microorganisms' enzymes);
Astaxanthin / intermediates may be toxic (to microorganisms); 2 max
(Reject may not take up DNA / enzyme not present)

Total 9

Question 5

(a) (i) Blocks stomata (on upper surface) / waterproofs the leaf / reduces light or heat hitting the leaf; 1

(ii) Uses carrier proteins in plasma membrane;
By active transport;
Using ATP / energy from respiration; 2 max

(b) (Position of leaves means):
Edge / sideways on to sun at hottest part of the day / midday;
Smaller surface / area of leaf exposed to the sun / less light hits leaf surface;
Less heating of leaves;
Stomata (partially) close;
Less transpiration / evaporation of water; 3 max

(c) Carbon dioxide does not combine directly with ribulose bisphosphate / binds with PEP;
Produces a 4-C compound / 4-C acid / oxaloacetate formed;
Different enzyme / PEP carboxylase used to fix carbon dioxide;
Occurs in bundle sheath cells / not in stroma; 2 max

Total 8

Question 6

(a) (i) (Fencing):
Rhinos come into contact more often;
Spread of infectious disease / leading to infection / more likely to suffer injury;

(Captive breeding):
(Inbreeding) may pass on harmful genes / reduces genetic variation (can die of the same diseases);
(Artificial environment means) young rhinos don't learn survival strategies; 4

(ii) More food available to support larger population / less spread of disease but poaching / hunting is still problem; 1

(b) Variation in resistance (to disease);
Individuals with resistance more likely to survive;
Pass on alleles / genes;
Causes a change in allele(s) frequency / higher frequency of allele(s) for resistance; 3 max

Total 8

Question 7

(a)
1 Sample a standard area of sea bed / use a quadrat;
2 Method of random / systematic positioning of sample; (e.g. random number table)
3 Repeat sampling;
4 Repeat at time intervals;
5 Scale up count to give estimate for whole area;
6 Use appropriate stats method; 4 max

(b) Two regulations;;

e.g.
Impose "quotas";
Create "no harvesting zones";
Have "closed seasons";
Restrict removal of immature stocks; 2 max

(c) (i)
Ventilation / water flow in relation to a gas;
Respiration in relation to a gas;
Circulation / blood flow in relation to a gas;
Countercurrent / description; 3 max

(ii)
Folding;
Thin (lamellae) wall / epithelium;
Many lamellae / filaments;
Large number of capillaries; 2 max
(Reject "good blood supply" and consequences of structural adaptations)

Total 11