

Mark scheme January 2004

GCE

Environmental Science

Unit ESC3

Copyright © 2004 AQA and its licensors. All rights reserved.

Instructions: ; = 1 mark / = alternative response A = accept R = reject

Question 1

- (a) Water becomes less dense 0 to 4 °C/then increases above 6 °C; 1
- (b) Water freezes from top down/ice floats;
layer of ice then acts as insulator (to protect organisms lower down); 2
[R any ref to O₂]

Total marks = 3

Question 2

- (a) Biological/physiographic/geological feature of importance/rare species; 1
[R landscape]
- (b) Primary succession; 1
- (c) Secondary succession; 1

Total marks = 3

Question 3

- (a) (i) Number of individuals (of a species);
number of individuals in a specified unit area; 2
- (ii) Encouragement of sterilisation/contraception/abortion;
financial incentive/disincentive;
legal restraints;
public education /campaigns;
control of immigration/emigration; MAX 2
- (b) (i) 6.1; [A 6.0-6.2] 1
- (ii) 3.8; [A 3.8-4.0] 1
- (iii) Large pop. of old people/small workforce;
old people need medicine/welfare/pensions;
small workforce – high financial burden/taxes/industrial problems; MAX 2

Total marks = 8

Question 4

- (a) Decomposers breakdown dead organic matter/dead organisms/wastes;
no release of nutrients/biogeocycles stop/no recycling of nutrients; MAX 2
- (b) (i) Keep same;
leaf species/age/condition;
disc size/surface area;
disc numbers/mass;
depth of burial;
time of burial;
time of year;
soil conditions/temperature/moisture/pH/same location/same soil type;
repeats carried out; MAX 4
[R size of bag]
- (ii) Bigger mesh size more decomposition;
bigger mesh size allows the larger detritivores access;
earthworms/detritivores needed to physically breakdown matter/increase
surface area/make smaller pieces;
decomposers complete chemical breakdown/release nutrients; 4

Total marks = 10

Question 5

- (a) Organisation: English Nature/SNH/CCW/D.ENI/ RSPB/Local Authorities/National Trust;
Purpose: to protect areas of natural/semi natural vegetation and fauna/conservation of
communities/rare habitats; 2
- (b) (i) More seedlings/m² initially, the greater % underdeveloped plants;
(intraspecific) competition;
for nutrients/space/water/light; 3
- (ii) Density dependent: nutrients/space/water/light/disease/predator;
density independent: extreme weather change e.g. heat, storm, drought;
[A ref to trampling by visitors/grazing etc.] 2

Total marks = 7

Question 6

- (a) Qualified change for each named population ×3
- (i) Increased population;
reduced grazing/consumption/predation by mayfly;
 - (ii) Increased population;
less competition for food/more food available;
 - (iii) Decreased population;
less food for its prey – water boatmen;
OR
Increased population;
more food available;
OR
No change;
plenty of available food; MAX 6
- (b) (i) Kick-sweep/catch using suitable technique/net;
select suitable sites;
work up stream;
disturb sediment;
identify;
count;
repeat; MAX 4
- (ii) Many escape/difficult to identify/only samples benthic fauna/small area sampled;1
- (iii) $\frac{76 \times 75}{(156 + 462 + 306 + 506)}; = \frac{5700}{1430} ;= 3.99;$ 3
- [A 4.0]

Total marks = 14

Question 7

- (a) Scarce supply/or increased value;
makes it more profitable to kill rhino/worth risking being caught/worth more on
black market; 2
- (b) Limited mates/small gene pool;
in-breeding occurs;
loss of heterosis vigour/genetic defects;
increased risk of catastrophic extinction e.g. diseases/fire/hunting; MAX 3

(c)

Strategy	Example	Explanation/purpose
1 Banning damaging activities e.g.	Poaching	
2 Establishment of protected areas	NNR/SPA/SSSI etc	Aids breeding. Reduces loss via development etc.
3 Management of exploitation	IWC	Sustainable control.
4 Captivity – exsitu conservation	Zoo's Botanic gardens seed banks	Protects and encourages breeding/fertilisation. Maintains gene pool.
5 Artificially increasing breeding success	Captive breeding genetic manipulation sperm/egg/embryo storage	Enables enhanced breeding success. Release into wild when appropriate.
6 Removal of competitors/predators	Predator control control of exotic species prevention of succession	Maintains population.
5 Habitat management	Raising watertable for wetland species culling to prevent habitat damage bird/bat boxes food supplements ponds etc corridors	Maintains healthy population. Reduces species loss.
6 Education/publicity/volunteer groups/fund raiser	WWF/RSPB etc	Awareness reduces loss. Funds to develop projects.

[A ref to horn removal etc to reduce reason for exploitation]

1 mark for strategy, 1 for example and 1 for explanation/purpose

MAX 10

Total marks = 15