ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark scheme June 2003

GCE

Environmental Science

Unit ESC3

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

Question 1

(a) Carbon Dioxide
Nitrogen; 1

(b) Evolution of autotrophs/plants/development of chlorophyll;
release of oxygen from photosynthesis; 2

Total marks = 3

Question 2

(a) Increase in predators or hunters/lack of food/no access to mates/loss of habitat/unable to adapt to changing habitat/disease; 1

(b) (i) Tame – used to humans/behavioural pattern changed/mating/hunting skills lost/ability to avoid predators lost; 1

(ii) Increase/improve gene pool/prevent inbreeding depression/disease immunity; 1

(c) Advantage: plant species are kept in optimum conditions/protected from pests and diseases/competition removed/selective breeding/ cloning possible/environmental stress reduced;
Disadvantage: isolated populations/natural selection reduced; 2

Total marks = 5

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Question 3

(a) Respiration; 1

(b) $0.5 \times 10^6 - 9000 = 491000$;
$(491000 \div 0.5 \times 10^6) \times 100 = 98.2\%$; 2
[**A** 98%]

(c) GPP – respiration/amount of primary production after respiration losses are removed; 1
[**A** GPP – Process A]

(d) $160 / 800 \times 100 = 20\%$ 1

Total marks = 5

Question 4

(a) (i) Bar or line graph – all points correct; 1

(ii) Number of organisms an area can support in a sustainable way; 1

(b) Overpopulation leading to lack of food/overgrazing;
overpopulation leading to spread of disease;
DR exceeds BR/breeding disrupted/high death rate/population crash; 3

(c) Leave or introduce predators/cull population once it reached carrying capacity/birth control/monitoring and removal of population; 1

Total marks = 6

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Question 5

- Less predation of rabbits/moles/voles/shrews/hares could lead to increase in their population;;
- Less competition for food therefore more food source for top predators;;

(1 for change and 1 for explanation × 2) MAX 4
[**A** other valid points]

(b) For foxes kill grouse/sheep/more food for rare/endangered species;
Against foxes eat mice and rabbits etc. which eat heather grasses and other plants/control of pests; 2

Total marks = 6

Question 6

(a) Increased mining/quarrying;
more pollution/waste;
increase land pressure/habitat loss; MAX 2

(b) (i) Tax reduction for small families/stop child benefits/tax per child/financial benefits/economic improvement to reduce dependency on children for old age; 1

(ii) Education/status of women;
easy access to contraception;
Government legislation; MAX 1

Total marks = 4

Question 7

(a) Blue and orange/red;
greatest amount of photosynthesis when these absorbed; 2

(b) 1. Rate of photosynthesis can be judged by rate of oxygen released/counting bubbles;
2. Elodea same size/plant;
3. device to catch and measure oxygen;
4. temperature constant;
5. same distance from light source/intensity;
6. time kept the same;
7. repeated with different turbidity;
8. repeated with each turbidity (to eliminate anomalous results)/average calculated;
9. CO_2 constant/abundant; MAX 6

Total marks = 8

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Question 8

(a) Abiotic pH/soil water content/light/nutrient availability/wind/rainfall/temp;
Biotic competition/grazing pressure/dispersal/disease/trampling; 2

(b) (i) Samples top to bottom of slope;
studies change along an environmental gradient; 2

(ii) Greater detail;
more area surveyed; MAX 1

(c) (i) Mark-release-recapture/Lincoln Index; 1
[**A** mark-recapture]

(ii) $18 \times 24 / 8 = 54$;; 2

Total marks = 8

Question 9

(a) (i) CITES 1

(ii) Customs controls;
licences for permitted products;
fine;
gaol; MAX 2

(iii) Some countries do not sign;
cost of implementation;
difficulty with interpretation of legislation/lack of policing;
smuggling/black market/corruption; MAX 3

(b)

Name (1 mark)	Role (1 mark)
NNR	[**A** Local NR] to protect, restore and enhance semi or natural vegetation
SSSI	protects most important habitats and their plant and animal species (together with geological and geomorphological sites)
ESA	areas receive grants to allow them to be farmed in environmentally friendly way – to maintain or improve environment
RAMSAR	wetlands protected as waterfowl habitat
SPA	for protection of habitats important for rare and migratory birds
SAC	to ensure biodiversity through protection of natural habitats and wild fauna and flora

MAX 9

Total marks = 15

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