AQA

ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark scheme January 2003

GCE

Environmental Science

Unit ESC3

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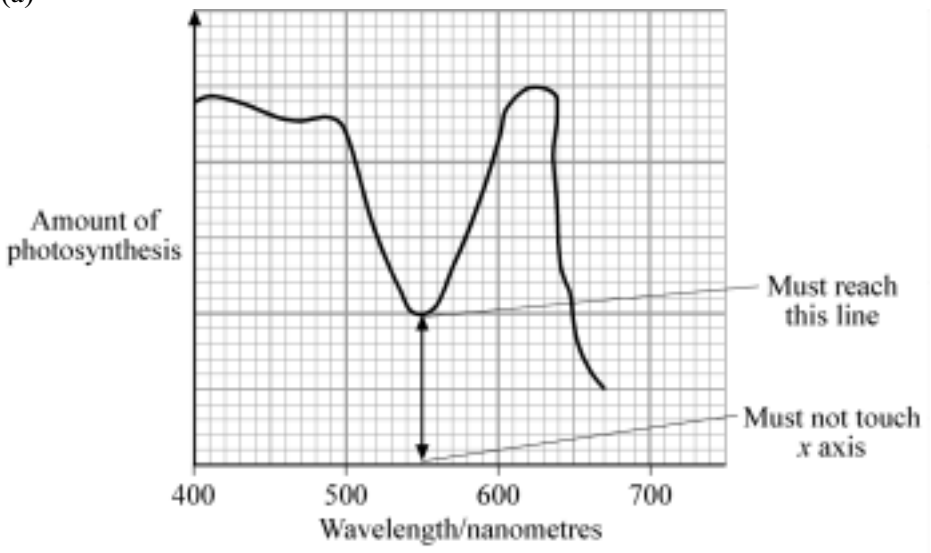
Unit 3: The Biosphere

General instructions

; = 1 mark / = alternative response
A = accept **R** = reject

Question 1

(a)



1

(b) Initial increase as enzymes function more efficiently;
decrease after optimum temperature as enzymes become less efficient/denatured; 2

(c) Increased oxygen by product;
ozone formation/O_3;
ozone utilises UV radiation;
[**R** shields/blocks/reflects]
[**R** ref to GHE]

Total marks = 6

Question 2

(a) More bird species become extinct each time period than mammal species;
overall trend: extinction rate for both groups has increased; 2

(b) Habitat loss;
pollution;
destruction of food source;
import of non native/exotic species/disease brought in;
hunting/pet trade; MAX 2

(c) Some extinct before they were identified;
some areas of world not surveyed/accessibility;
inaccurate identification; MAX 1
[**R** any ref to pop. size]

Total marks = 5

Question 3

(a) (i) Reduction in size;
fragmentation/islandisation; 2

(ii) Recreation pressure;
agricultural changes;
urbanisation/infrastructure;
[**R** unqualified pop. increase, just road building] 1

(b) Loss of habitat/adapted to new habitat;
loss of species diversity;
increased competition;
loss of food supply;
reduced viability of populations due to fragmentation; MAX 2

Total marks = 5

Question 4

(a) (i) correct axis and labelled with units; 1
5 correct plots; 1

(ii) Increase in organisms/biomass;
(increase in organic matter;)
decomposition; MAX 2

(b) (i) Natural progression of plant communities interrupted/climax community not reached; 1

(ii) Human recreation;
climate change;
rise in sea level/flooding;
grazing/mowing;
burning;
conservation management; MAX 1

(c) Secondary succession; 1

Total marks = 7

Question 5

(a) Organism - rabbit/cow; 1
role of micro-organisms;
adapted extra stomachs;
regurgitate and chew again;

OR

partially digested pellets egested;
role of micro-organisms;
eaten and absorbed;
modification large intestine (caecum);
[**A** ref to adaptation to teeth for either] MAX 2

Total marks = 3

Question 6

(a) **B**;
small no. of Oaks /large trees; 2

(b) **C**;
secondary consumer level numbers greater than primary;

OR

B;
parasites primary consumer and numbers greater than producers;
[**A** correctly drawn pyramid (1) with explanation (1)] MAX 2

Total marks = 4

Question 7

(a) (i) Education/research/public awareness;
fundraising;
direct intervention/protests;
pressurise industry;
lobby government; MAX 2

(ii) FoE/Greenpeace/CPRE/RSPB/Wildlife Trusts/WWF; 1

(b) (i) Random sampling grid;
suitable traps described or drawn/pitfall traps;
numbers of traps; (min 20)
sample caught-counted-marked released;
suitable time allowed before second sampling; (min 24 hrs)
second sample count total and total recaptured;
use Lincoln index;
explanation of equation;
3% min sample;
repeat many times to increase validity of results; MAX 6

(ii) Assumes no emigration or immigration/population stable/births and deaths;
carnivores in trap may eat others;
marked organisms are not predated;
trap happy/trap shy;
assumes random mixing; MAX 2

(c) (i) Site of Special Scientific Interest; 1

(ii) English Nature/CCW/Scottish Natural Heritage/DoE NI; 1

(iii) Prevents development;
or other potentially damaging activity; MAX 1

(iv) Ramsar/NNR/local nature reserve/SAC; 1

(d) (i) (Random) quadrat survey;
belt transect; MAX 1

(ii) Difficult to identify; 1

(iii) $\frac{22\,(22-1)}{(6\times5)+(10\times9)+(1\times0)+(5\times4)}$; $\frac{462}{140}$; = 3.3; 3

Total marks = 20

Question 8

(a) (i) decline in whale population/endangered species; 1
(ii) IWC/International Whaling Commission or Convention;
(iii) Vast oceans to cover/cost/difficulty of checking research against commercial whaling/time restraints/not all countries signed up to the agreement; 1

(b) Fewer whales therefore increase in population of their prey e.g. squid, penguin;
so increased predation of fish; 2

(c) Reduced viability of seed/damaged by storage;
cannot be used by all species;
small gene pool;
no evolution/no ongoing adaptation; MAX 2

(d) Reason and explanation (1) example (1)
(1) maintenance of atmosphere;
(2) ecological balance;
(3) maintenance of species diversity;
(4) use of species for food;
(5) use of species for medicine;
(6) use of species for raw materials/industrial products;
(7) ethical/right of individual to exist;
(8) beauty/aesthetic reasons;
(9) leisure/recreation/tourism;
(10) scientific research/education;
(11) benefit of indigenous people;
(12) genetic research;
(13) moral – duty of care for future generations;

(Credit relevant examples throughout – max one per marking point) MAX 13

Total marks = 20
