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General Certificate of Education (A-level)
January 2012

Environmental Studies ENVS1

(Specification 2440)

Unit 1: The Living Environment

Mark Scheme

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised they are required to refer these to the Principal Examiner.

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Environmental Studies

January 2012 **ENVS1**

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

Question 1

<table>
<tr><th></th><th>Answers</th><th>Mark</th></tr>
<tr><td>1(a)</td><td>
<table>
<tr><th>Feature of the graph</th><th>Letter</th></tr>
<tr><td>Carrying capacity</td><td>C ;</td></tr>
<tr><td>The first point at which the population is likely to overexploit its environment</td><td>D ;</td></tr>
<tr><td>The point at which most deaths are caused by density independent factors/The point at which growth is exponential</td><td>B ;</td></tr>
<tr><td>A point at which the population is in the lag phase</td><td>A ;</td></tr>
</table>
</td><td>4</td></tr>
<tr><td>1(b)</td><td>Credit suitable example;
eg natural disaster
(extremes of) climate/pH/temperature/light/oxygen/toxins
[A weather]
[R food, disease, unqualified water]</td><td>1</td></tr>
<tr><td>Total</td><td></td><td>5</td></tr>
</table>

Question 2

	Answers	Mark
2(a)	Problems**;;** eg noise, aesthetic impacts, traffic congestion, increase in air pollution, health problems, habitat loss, land take, decreased property values, qualified impact on wildlife [**R** unqualified pollution]	2
2(b)	Prevent urban sprawl/expansion**;** prevent merging of urban areas/loss of character of each area**;** encourage brownfield development**;** [**R** conservation for wildlife/recreation]	MAX 2
2(c)(i)	Separates activities (that might conflict)/reduces land use conflicts**;** space zoning involves different uses in different areas**;** time zoning involves different uses at different times**;** credit suitable examples**;**	MAX 2
2(c)(ii)	Landscape features create/restore habitats**;** more features provide more niches**;** example of landscape feature/management practice**;;** eg pond, woodland, hedge, baffle mounds/bunds, wildflowers, stonewall, stone barn, coppicing, pollarding, hedge laying example of benefit to wildlife**;;** eg nest sites, food, biological corridor, protection (from predators or climate) visitor management/facilities inform/educate/raise money for conservation**;** honeypot sites/paths direct visitors away from more sensitive areas/wildlife**;**	MAX 4
Total		**10**

Question 3

	Answers	Mark
3(a)(i)	Protects wildlife habitat**;** protection from development/pollution/unsustainable land management/Potentially Damaging Operations/PDOs/Operations Likely to Damage/example of PDOs**;** planning controls/management plans for owners**;** grants available**;** government can insist that damage is restored**;** [**R** allows research/prevents public access]	MAX 2
3(a)(ii)	Wildlife and Countryside Act**;**	1
3(b)	Outside/limited range of tolerance**;** pH change affects/denatures/changes structure of proteins/enzymes**;** low pH makes it hard to produce/repair/dissolves exoskeleton/shell**;** nutrient availability**;** more vulnerable to predators/disease/reduced breeding success**;** [**A** reduction of food species]	MAX 2
3(c)	Predation**;** disease**;** interbreed with native species**;** competition for named resource**;;** eg shelter, habitat, food [**R** space unqualified, water, light] occupy same niche**;** habitat damage**;**	MAX 2
3(d)	Silting/sedimentation/organic matter builds up**;** loss of habitat/open water/water becomes shallower/dries out**;** colonisation by new species/better adapted species**;** change to named abiotic factor (eg light, turbidity)**;** new conditions out of range of tolerance**;** change in biotic factor/food supply/predation/competition**;**	MAX 3
Total		**10**

Question 4

<table>
<tr><th></th><th>Answers</th><th>Mark</th></tr>
<tr><td>4(a)</td><td>Evolution of photosynthesis/photosynthetic organisms;
produced oxygen/O_2;
oxidation of minerals;
allowed aerobic respiration;
ozone/O_3 formed;
less UV reaches ground level /protection from UV/UV absorbed/ionizing radiation absorbed;
[R UV blocked, reflected]
new/abundant source of organic molecules/chemical energy;
photosynthesis/living organisms reduced (the concentration of) CO_2;
carbon stored as sediment/fossil fuel/carbonate rock/carbon sink;
CO_2 is a greenhouse gas/absorbs infra-red radiation/retains heat;
changed/stabilised/controlled global temperatures;
soil formation/nutrient cycling/correct reference to water cycle;
eg transpiration, interception, reduced runoff

Quality of Written Communication
<table><tr><th>Mark</th><th>Descriptor</th></tr><tr><td>2</td><td>All material is logically presented in clear, scientific English and continuous prose. Spelling, punctuation and grammar are almost always correct. Technical terminology has been used effectively and accurately throughout. At least half a page of material is presented.</td></tr><tr><td>1</td><td>Account is logical and generally presented in clear, scientific English. Minor errors occur in spelling, punctuation and grammar. Technical terminology has been used effectively, and is usually accurate.
Some minor errors. At least half a page of material is presented.</td></tr><tr><td>0</td><td>The account is generally poorly constructed and often fails to use an appropriate scientific style to express ideas.</td></tr></table></td><td>MAX 4

2</td></tr>
<tr><td>4(b)(i)</td><td>Dynamic equilibrium;
population fluctuates around a norm/carrying capacity/maintains constant/stable population size; [A births = deaths]
as population increases, density dependent factors/death rates increase;
as population decreases, density dependent factors/death rates decrease;
negative feedback;

[A description of predator/prey relationship]</td><td>MAX 2</td></tr>
<tr><td>4(b)(ii)</td><td>Greatest amount that can be (sustainably) harvested/taken;
without causing population decline/preventing replenishment;
number of individuals/biomass harvested = natural increase;</td><td>MAX 2</td></tr>
<tr><td>Total</td><td></td><td>10</td></tr>
</table>

Question 5

	Answers	Mark
5(a)	Named food issue**;;** eg human food, food for other species from which humans benefit named reproductive issue**;;** eg pollination, seed dispersal named soil quality issue**;;** eg (action of) detritivores, decomposition/nutrient release, aeration, mixing named research/biomimetics/education/medicine/biotic index**;;** named product**;;** eg honey, wax, dye ,silk tourism/recreation/aesthetics**;;** [**R** second example if same benefit eg 2 medicines]	MAX 2
5(b)	Named example of management practice**;;;** eg beetle banks, conservation headlands/field margins/buffer strips, pond, planting hedgerows/wild flower meadows, undisturbed areas/set aside, timing of hedgerow/meadow cutting/harvesting provision of food sources**;** provision of breeding sites**;** provision of biological corridors**;** organic farming/reduced use of pesticides/inorganic fertilisers**;** shelter/protection from named hazard**;** [**A** hay meadow for timing of meadow cutting] [**R** provision of habitat]	MAX 4
5(c)	Random/systematic sampling/multiple sampling sites**;** examples of standardised technique**;;;** eg consistent height/length of sweep/sweep set area, for set time, same number of sweeps, same weather conditions, suitable weather, identified pattern of sweep identification**;** repeat at different time of day/year**;**	MAX 4
Total		**10**

Question 6

	Answers	Mark
6(a)	Number per unit area**;** direct sightings**;** indirect evidence**;** eg search for signs, tracks, droppings, scratching post multiple study sitess/along transect**;** estimate territory size of individuals**;** multiply up to larger area/number of territories**;** trap, bait/camera trap**;** identify individual/sampling DNA/avoid double counting**;** qualified mark**;** eg in non-harmful way, clipping fur, tag, fit radio collar release-recapture/Lincoln index**;** time for mixing**;** Lincoln index formula/ $\frac{n_1 \times n_2}{n_m}$ qualified sample size/duration of search**;** time of sampling/repeat at different times of the year**;**	MAX 5
6(b)(i)	Inbreeding/inbreeding depression**;** expression of disadvantageous/homozygous recessive features/genes/alleles**;** reduced genetic diversity/small gene pool**;** increased probability of harmful genetic traits/birth defects/increased susceptibility to disease**;** more vulnerable to environmental change**;** reduced choice/availability of mates**;** [**A** susceptibility of small population to natural disaster/density independent factors] [**R** ref to causing mutation]	MAX 2
6(b)(ii)	Allows safe movement into suitable habitats/find named resources**;** [**R** unqualified movement] north is more suitable habitat/southern end of range becomes less suitable**;** (further north) may provide more denning sites/dens persist longer/deeper snow/other named resource**;**	MAX 2
6(c)(i)	Buried seeds increase populations of Whitebark Pine**;** Pine provides shelter for Wolverines/food for prey species**;** **OR** bird stores food for squirrels/other rodents**;** Wolverines eat squirrels/rodents**;** [**A** Wolverines eat birds/eggs] **OR** conservation of bird involves conservation of the tree**;** tree provides shelter for Wolverines/food for prey species**;**	MAX 2

6(c)(ii)	*Ribes* species are hosts to pathogenic fungus**;** fungus harms trees**;** reduce hosts to reduce transmission/population of fungi**;** *Ribes* species compete with trees for named resource**;**	MAX 2
6(d)	Threat of extinction/endangered/maintain biodiversity**;** moral reasons/ethical/stewardship**;** qualified ecological reason**;** eg species interdependence, food chain education/scientific research/medical research**;** aesthetic/recreational reason/tourism**;** qualified economic use**;** eg valuable fur, money from tourism biomimetics**;**	MAX 2
Total		**15**

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