



ASSESSMENT and  
QUALIFICATIONS  
ALLIANCE

# Mark scheme

# June 2003

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## GCE

# Environmental Science

## Unit ESC2

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

**Question 1**

- (a) (i) Weathering/erosion/denudation; 1  
[A any named process]  
[R “grinding”, “breakdown”]
- (ii) Pressure/metamorphism/compaction/compression; 1  
[R “heat” alone]
- (b) Limestone/chalk/CaCO<sub>3</sub>; 1
- (c) (i) Water freezes and expands; 1
- (ii) Splitting of chemical bond/link by/in water/hydrogen ion replaces metal ions 1  
e.g. K<sup>+</sup>;  
[R “chemical weathering”, “dissolves”]

**Total marks = 5**

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**Question 2**

- (a) Phosphate (ion)/PO<sub>4</sub><sup>3-</sup>; 1  
[A PO<sub>4</sub><sup>2-</sup>]  
[R “in solution”]
- (b) Algae/phytoplankton absorb PO<sub>4</sub><sup>3-</sup>;  
fish eats phytoplankton;  
bird eats fish/fish converted to fertiliser;  
guano/death and decomposition of bird/fertiliser applied to land;  
**OR**  
Ref: lithification (of phosphate-rich sediments);  
uplift/sea level falling;  
weathering/erosion;  
mining/quarrying; MAX 3
- (c) Sedimentary; 1  
[R “evaporites”]

**Total marks = 5**

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### Question 3

- (a) (Decaying) vegetation/fauna/leaves/litter; 1  
[R “humus”]
- (b) (i) Uptake by plants/leaching/carried by H<sub>2</sub>O OWTTE; 1  
(ii) Leaching/illuviation/eluviation/(chemical) weathering; 1
- (c) (i) **B**; 1  
(ii) Low organic matter in **B**/high clay content in **B**/high calcium or magnesium in **A**; 1  
[**A** converse]

**Total marks = 5**

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### Question 4

- (a) Overgrazing/overcultivation/salinisation; 1  
qualified ref to contamination;  
industrial obsolescence/closure;  
inner city decay;  
transport changes;  
warfare/military uses; MAX 2  
[R “earthquakes/floods” etc]
- (b) (i) Increases/positive correlation; 1  
(ii) Decay of vegetation/nitrogen fixation/application of nitrogenous fertilisers; 1  
[R “legumes” – no explanation]

**Total marks = 4**

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### Question 5

- (a) Land cost;  
mining costs/accessibility of deposit/overburden depth/size of deposit/drainage needs/folding/faulting/reclamation;  
labour/energy/processing costs/purity/form/industrial infrastructure;  
transport costs;  
market demand/cut-off grade;  
ref to designation/legislation e.g. National Park/SSSI; MAX 3
- (b) Quarrying/removal of surface deposits/shallow/overburden; 1
- (c) (i) Aesthetic pollution/loss of amenity;  
habitat loss;  
loss of topsoil/reduced fertility/damage to soil structure;  
visual scarring;  
impact on water table/ground H<sub>2</sub>O/aquifer;  
subsidence;  
dust/noise pollution; MAX 2  
[R air pollution", "traffic"]
- (ii) Alkaline/red mud;  
named air pollution – e.g. CO<sub>2</sub>/NO<sub>x</sub>/dust; 2  
[R "toxic waste"]
- (d) Strengthens(al)/lightens(Fe); 1

**Total marks = 9**

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### Question 6

- (a) Did not use (belt) transect/random sampling may not sample whole slope;  
not random/throwing creates bias;  
insufficient sample size; 3  
[R "samples not evenly spread"]
- (b) Same depth;  
recalibration;  
sufficient time to stabilise readings OWTTE;  
probe in soil for same length of time; MAX 2
- (c) Scorching/burnt off OM/incorrect temps used;  
did not weigh to constant weight/may not have driven off all moisture;  
did not use desiccator/keep dry;  
used two different instruments (auger and trowel); MAX 2

- (d) Exposure/vegetation (cover);  
respiration of organisms;  
colour/albedo;  
texture;  
depth;  
ref to organic matter; MAX 3

**Total marks = 10**

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### Question 7

- (a) Low maintenance;  
native vegetation/ref to “natural”/climax community;  
woods offer shelter (for people);  
can hide/hold many visitors/psychological carrying capacity/absorb noise/act as  
screen; MAX 2
- (b) Transport/communications;  
bare rock/sand/shingle;  
mineral workings;  
leisure/recreation/parks;  
military; MAX 2  
[R “roads/rail”]
- (c) Urbanised/planted with trees; 1
- (d) Advantages and disadvantages are given a monetary value;  
decision based upon net figure;  
go ahead if benefits > costs; 2

**Total marks = 7**

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### Question 8

- (a) Park activity/what they did/why they came;  
frequency of visit;  
satisfaction (with amenities)/suggested improvements or criticisms;  
travelling times/distances/access/mode of transport;  
which parts of the Park are used;  
typical spend/willingness to pay;  
types of visitor (age, sex, dependent/independent); MAX 3
- (b) Sample at different times of year/day/weather;  
different age groups/sexes/ethnic groups; 2  
[R “adequate sample size”]

(c) Example of points that would gain credit (not exhaustive)

		<b>National Parks</b>	
<b>Conflict (MAX 2)</b>		<b>Why Arose (MAX 2)</b>	<b>Re/Solutions (MAX 6)</b>
Quarry:	heavy traffic; habitat destruction; dust/CO <sub>2</sub> / noise pollution	expansion of existing quarry/existing mining agreements; increase in population; need for roadstone/cement/fertilisers;	EIA; public enquiry; planning permission;
Camp Site:	increases tourist pressure; litter/noise pollution;	increased recreation time; increased disposable income; increased motor vehicle accessibility; growing interest in countryside;	CBA; protection by other designations e.g. SSSI, ESA;
Housing Development:	visual pollution; increased traffic; habitat destruction;	more £ in local economy/employment; popn increase; counterurbanisation; more 2 <sup>o</sup> homes;	mining agreements including restoration; screening quarries/campsites; scheduling/restricting blasting/freighting; re-route and repair;
Footpath Erosion:	scarring of landscape; gulleying exacerbated;	as 'campsite' above	
		<b>Greenbelts</b>	
Housing estates:	CO <sub>2</sub> /SO <sub>2</sub> / NO <sub>x</sub> ; traffic congestion;	as housing development above	EIA; public enquiry;
Greenfield factories/ business park:	visual pollution; habitat destruction;	inner city dereliction; higher rates; greater accessibility in urban fringe;	planning permission; CBA; green wedges; grants to develop brownfield (elsewhere); gentrification of decaying urban areas; tax incentives e.g. no VAT on brownfield development;

10

**Total marks = 15**