



General Certificate of Education

Environmental Science 5441

ESC2 The Lithosphere

Mark Scheme

2008 examination – June series

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Environmental Science**June 2008****ESC2****Instructions: ; = 1 mark / = alternative response A = accept R = reject****Question 1**

Description	Mineral/Rock
	Gravel/sand/aggregates ;
	Granite/rhyolite/diorite/sand(stone) ;
	Sand ;
	Lime(stone)/chalk/CaCO ₃ /calcium oxide/hydroxide ;
	China clay/kaolin ;

Total marks = 5

Question 2

- | | | | | |
|---|-----|------|---|-------|
| 2 | (a) | (i) | Igneous; | 1 |
| 2 | (a) | (ii) | Minerals/silicates; | 1 |
| 2 | (b) | (i) | Breakdown/decomposition <u>of rocks</u> /decay/disintegration/wearing away;
in situ;
produces regolith/solutes products;
[R denudation] | MAX 2 |
| 2 | (b) | (ii) | Loss/movement of ions/nutrients/minerals/particles/salts;
in solution/dissolves; | 2 |
| 2 | (c) | (i) | Contain different minerals/proportions of minerals;
(minerals) vary in resistance/hardness/solubility;
different structures/bedding planes/folds/faults/compaction/porosity/
permeability;
valid comparison eg sedimentary v igneous v metamorphic; | MAX 2 |
| 2 | (c) | (ii) | Breaks up rock; OWTTE
exposes/increases surface area/permeability;
named chemical process;
[R acid rain/solution] | MAX 2 |

Total marks = 10

Question 3

3 (a) DNA/proteins/nucleic acids/(co) enzymes/amino acids; 1

3 (b)

Reservoir	Form or equation
	G
	I
	H
	F
	J

5

3 (c) (i) Atmospheric nitrogen/large reservoir unavailable to plants/animals;
nitrogen acts as a limiting factor/limits growth/productivity;
plants/animals depend on bacteria/nitrification;
ref Haber process;
requires lots of fossil fuel energy; MAX 2

3 (c) (ii) Rapid/ (qualified) movement (between reservoirs)/ easily/ (qualified) taken up by
plants;
leaching;
pollution/contamination of aquifers/rivers/eutrophication;
atmospheric wash-out; MAX 2

Total marks = 10

Question 4**4 (a)**

1. Select 2 similar sites;
2. ref control;
3. replication;
4. same mass of seeds/unit area/planting density/pattern;
5. plant at same time;
6. timescale at least 1 year;
7. test soils OM before and after;
8. similar storage techniques;
9. dry soil;
10. weigh (dry) soil;
11. bunsen/heat in oven – organic matter will be lost/bake sample/burn/
ref suitable temp 130 °C +;
12. reweigh;
13. to constant mass;

EITHER

14. and 15. difference = weight of organic matter;
express as %;

OR

14. and 15. $\frac{\text{dry weight} - \text{incinerated weight}}{\text{dry weight}} \times 100;$

MAX 6

MAX 4 for OM technique/ MAX 4 for investigation/ plan

- 4 (b) (i)** Wider range of plants will be able to tolerate the pH;
increased nutrient availability;
more soil biota/organisms;
for decomposition/aeration/structure;

MAX 2

- 4 (b) (ii)** Source of nutrients/named;
soil binding effect/improves structure;
water retention/less leaching;
more soil organisms/biota;
increases thermal capacity;

MAX 2

Total marks = 10

Question 5

- 5 (a) X = limestone/chalk/ CaCO_3 ; 1
- sand/fine particles;
gravel/coarse particles/aggregates/crushed rock;
water; MAX 2
- 5 (b) (i) Urbanisation/increased construction/increased road building; 1
- 5 (b) (ii) **Causes**
quarrying/dredging/mining;
use of fossil fuel/transportation;
use of equipment/machinery;
- Effects**
habitat/landscape destruction/land take/reduced biodiversity/landslides/subsidence;
reduced photosynthesis/less vegetation;
less CO_2 uptake;
increased acid rain/global warming/named pollutant;
increased dust/noise;
visual/aesthetic pollution/scarification;
groundwater contamination/turbidity/sedimentation; MAX 4
- MAX 3 if only causes
MAX 3 if only effects
- 5 (c) 0.75×1.6 ;
1.2 (MkWh); 2

Total marks = 10

Question 6

- 6 (a) (i) Stop merging;
stop sprawl;
protect historic towns;
encourage brownfield development;
[R protect countryside] MAX 3
- 6 (a) (ii) Scenery/visual beauty;
landscape protection;
quiet recreation/enjoyment by public/understanding;
(local) economic purpose/employment etc;
[R refs to AONBs/habitats/natural environments] MAX 2
- 6 (b) **Greenbelts**
1. road building;
 2. leapfrogging;
 3. encourages commuting;
 4. exemptions eg golf courses;
 5. protects poor quality land;
 6. green wedges;
 7. increases house prices;
 8. designation waived in 'national interest';

Resolutions

1. CBA;
2. planning boards/authorities;
3. public inquiries;
4. EIAs;

National Parks

1. tourists v locals;
2. second homes;
3. national parks increases house prices/lack of affordable local housing;
4. limited employment;
5. national park authorities do not own land = persuasion policies;
6. unwanted designations;
7. traffic congestion;
8. afforestation;
9. quarrying;
10. reservoirs;
11. wind farms/HEP/nuclear/energy generation;
12. MoD;
13. agricultural change/intensification;
14. conflicting recreational activities;
15. intensive/inappropriate tourist developments eg cafes;

Resolutions

1. CBAs;
2. planning boards/authorities;
3. public inquiries;
4. EIAs;
5. postcode house purchasing policy;
6. space zoning;
7. time zoning;
8. prohibition;
9. honey pots;
10. wardens/rangers;
11. mitigation strategies eg traffic management/screening;

MAX Six conflicts

Four resolutions

Two examples

MAX 8

Quality of Written Communication

Mark	Descriptor
2	All material is logically presented in clear, scientific English and continuous prose. Technical terminology has been used effectively and accurately throughout. At least half a page of material is presented.
1	Account is logical and generally presented in clear, scientific English. Technical terminology has been used effectively and is usually accurate. Some minor errors. At least half a page of material is presented.
0	The account is generally poorly constructed and often fails to use an appropriate scientific style to express ideas.

MAX 2

Total marks = 15