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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Environmental Science 5441

ESC2 The Lithosphere

Mark Scheme

2007 examination – June series

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Environmental Science

June 2007 **ESC2**

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

Question 1

Statement	True	False	
Gneiss is a sedimentary rock		✓	;
Some metamorphic rocks are formed from igneous rocks	✓		;
Most igneous rocks are crystalline	✓		;
Most sedimentary rocks may be identified because they are deposited in layers or strata	✓		;
Most igneous rocks are more resistant to weathering than sedimentary rocks	✓		;

Total marks = 5

Question 2

(a) **Advantage**
easy to carve/cut/sculpt/shape/homogenous/attractive/aesthetic/naturally jointed/occurs in blocks/freestone;

Disadvantage
permeable/porous/susceptible to acid rain/weathering/expensive; 2

(b) (i) Clay; 1

(ii) Cheaper/can be mass produced;
lighter/easier to use/build;
can be made locally/reduces transport costs; MAX 2

(c) Fine/smooth/inert/amorphous/hydrophilic/lipophilic/tasteless/pure white;
paper making/pharmaceutical/paint/pigment/pottery/filler/cosmetics;
OR
impermeable/waterproof/can be moulded/fired/opaque;
[**A** pliable/malleable]
pottery; 2

(d) Extraction of ore/bauxite/quarrying/open cast;
minerals released by dissolving in sodium hydroxide;
crushed/milled/flocculation/precipitation;
alumina formed;
alumina heated/dissolved/in cryolite;
electrolysis;
OR
mining/extraction of ore/named ore;
blast furnace;
coke/limestone;
reduction;
by CO;
[**R** CO_2]
limestone removes named impurities/impurities forms slag; MAX 3

Total marks = 10

Question 3

(a) Insufficient samples;
no repetition/replicates (to calc $\bar{x}$);
path sample inappropriate;
samples not same size/depth;
sample 5 influenced by pond;
sample 6 influenced by hedge; MAX 3

(b) Pestle and mortar;
weigh soil;
dry in oven/90–130 °C;
[**R** bunsen burner]
cool;
reweigh;
constant weight;
difference/original mass ×100;
percent; MAX 5

(c) Moisture content does not increase as invertebrates increase/the 20% and 30% figures do not support this;
no evidence for causality;
direction may be opposite/moisture content may determine invertebrates/invertebrate numbers may be affected by another factor (eg pH or OM);
moisture content may be affected by another factor (eg OM or texture);
insufficient data/samples; MAX 2

Total marks = 10

Question 4

(a) Clay;
silt;
sand; 3

(b) (i) Production of organic substances/acids/amino acids;
by plants/microorganisms/decomposition/humification;
acids attack clays/make nutrients eg iron more available (to plants);
to form organic-metal compounds;
increases solubility of some minerals/named metals/enables minerals to be translocated;
reduces toxicity of some metals/named metals; MAX 2

(ii) Movement/removal/loss/OWTTE;
[**A** outwash]
of soil particles/clays/fines/humus/minerals/ions/nutrients;
in suspension; MAX 2

(c) Drainage/infiltration/porosity/water holding capacity OWTTE;
allows translocation of nutrients/minerals;
water needed for nutrient uptake/turgidity/transpiration/named process;
aerobic respiration;
movement of biota/root penetration;
decomposition/humification/nitrogen fixation;
specific heat capacity/soil temperature; MAX 3

Total marks = 10

Question 5

(a) Landscape/scenery/visual beauty – protection of;
(encourage) quiet recreation/leisure;
support local/rural economy; MAX 2
[**R** AONBs, habitats, natural environments]

(b) (i) Difficult for NPA to impose aims/manage/stewardship/achieve consensus;
land owners have different objectives from National Park Authority;
credit 1 mark for correct example of conflicting adjacent land owners/ref to Countryside and Rights of Way Act/ right to roam issues and Ramblers Association; MAX 2

(ii) Look un-natural;
alien/exotic species/unsuitable for native species/reduces biodiversity;
may be fenced/difficult access;
safety issues/noise/heavy vehicles;
felling may change/scar landscape; MAX 2

(iii) Creation may flood areas/destroy habitats;
named downstream changes;
recreational use may lead to pollution;
conflicting/noisy/dangerous water sports; MAX 2

(c) Habitat destruction/land take;
access/aesthetics/scarring/visual pollution;
noise/blasting;
dust;
traffic congestion/R.T.As/named air pollutants;
vibration;
water table/aquifer problems;
turbidity;
landslips;
impact on tourist economy; MAX 2

Total marks = 10

Question 6

(a) (i) Ref lithification (of phosphate-rich sediments);
uplift/mountain forming/tectonic activity/falling sea level;
quarrying/mining;
OR
bird/fish eats shellfish;
bird excretes on land/at nest site/fish caught;
guano mining/fish or fertiliser;
OR
seashell dissolved;
uptake by seaweed;
seaweed for fertiliser; MAX 2

(ii) Absorbed by plants/photosynthesis;
plant eaten;
death/accumulation/burial;
anaerobic decomposition;
compaction/pressure/heat; MAX 3

(b) *Quality of Written Communication is assessed in this answer.*

Nitrogen gas/N_2 in atmosphere;
volcanic/industrial/transport emissions;
lightning/Haber process/fertilisers;
fixation/conversion to ammonia (NH_3);
rhizobium/legumes/azotobacter/clostridium/nostoc/cyanobacteria/blue-green algae;
conversion to ammonium (NH_4^+);
nitrification/conversion of ammonium (NH_4^+) to nitrites (NO_2^-) and then nitrates (NO_3^-);
nitrosomonas/nitrobacter;
plants absorb ammonium/nitrates;
proteins/DNA/named organic molecules etc in plants;
animals eat plants/consumption;
excretion/egestion;
death/decomposition;
leaching;
formation of sediments;
uplift/extraction;
weathering;
denitrification releases NO_x/N_2;
pseudomonas/thiobacillus;
NO_x dissolve in moisture/water/ocean;
acid rain;
release of ammonia from swamps/anaerobic decomposition; MAX 8
[**R** respiration]

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