



**General Certificate of Education
June 2010**

Environmental Studies 1441

ENVS2

Unit 2 The Physical Environment

Mark Scheme

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Set and published by the Assessment and Qualifications Alliance.

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

Question 1

		Answers				Mark
1	Gas	Normal % of gas in dry air	One natural process that releases gas	One human activity that causes release of the gas	Presence of gas in early atmosphere before life evolved	
	Nitrogen	78	Denitrification of nitrates	Use as a low temperature refrigerant	Yes	
	Oxygen	21	Photosynthesis	Hospital breathing gases	No	
	Carbon Dioxide	0.038	Respiration	Fossil fuel combustion/ deforestation/ ploughing	Yes	
	Methane	0.00017	Anaerobic decay/bacterial action/ permafrost melting	Coalmine ventilation	Yes	
	Oxides of Nitrogen	0.00005	Forest fires	Named combustion process/use of named N fertilisers [A location of combustion eg power station, car engine]	No	
	Chlorofluorocarbons	Trace	Not produced naturally	Old aerosols and refrigerators	No	
	Ozone	0.00007	Photolytic reactions involving oxygen	Water sterilisation	No	
Total						5

Question 2

	Answers	Mark
2(a)	Process;; impact on movement/amount in reservoir;; eg (evapo)transpiration uptake, reduced soil moisture, increased atmospheric humidity interception increased evaporation, atmospheric humidity, reduced soil moisture humidity beneath canopy increased/reduced wind dispersal soil infiltration increased soil moisture food for detritivores infiltration rate 2+2	4
2(b)	Volume/mass; flow/transfer rate/per unit time;	2

2(c)	<p>Up to 2 named sources;; [R if no quality factor/or required process] up to 3 named quality factors;;; up to 2 named treatment processes <u>related</u> to source/quality factor;;</p> <p>eg</p> <ul style="list-style-type: none"> river high turbidity sedimentation high pesticides activated carbon treatment bacteria, sewage, pathogens sterilisation reservoir low turbidity less sedimentation low pathogen content less sterilisation aquifer low turbidity less sedimentation high mineral content softening seawater salinity desalination, RO, distillation 	MAX 4
Total		10

Question 3

	Answers	Mark
3(a)(i)	Named/described topographical feature; impact on suitability; eg valley shape, steep sides, narrow exit for dam effect on volume, evaporation rate, land loss	2
3(a)(ii)	Named/described geological feature; impact on suitability; eg permeability speed of flow into/out of bedrock stability/seismic activity/faults collapse risk stability/strength subsidence risk	2
3(b)	Store surplus (to prevent flooding); release later (to increase flow);	2
3(c)	Barrier to migration; splits territories; colonisation problems; change in habitat area/length; low flow rate; changed turbidity; changed nutrient flow; changed light penetration; changed temperature; changed oxygenation; changed river/reservoir bed features; changed pollutant concentration; up to 2 named taxa (to illustrate separate points);	MAX 4
Total		10

Question 4

	Answers	Mark
4(a)(i)	(Increase in) named greenhouse gas; [A cirrus clouds] absorbs IR/long wave radiation; [R heat]	2
4(a)(ii)	CFC/named ODS/ozone depleting substance; ozone depletion; reduced absorption;	MAX 2
4(a)(iii)	<u>Increased</u> cloud cover/smoke/dust/smog; <u>increased</u> albedo/reflection/absorption/scattering;	2
4(b)	Balanced processes; named energy processes that balance;	2
4(c)	Named consequence of initial warming (that may cause cooling); effect to reduce warming; eg <u>increased</u> photosynthesis less carbon dioxide (in atmosphere) <u>increased</u> cloud cover increased reflection/albedo/less light reaches ground	2
Total		10

Question 5

	Answers	Mark
5(a)	Feature;; advantage/disadvantage;; eg hard difficulty mining loose, uncompacted landslides, more removed deep increased cost permeable drainage problems chemical composition pollution risk	 2 + 2 4
5(b)	Method to reduce problem 1; detail of method 1; method to reduce problem 2; detail of method 2; eg water sprays for dust settling baffle mounds/trees for noise absorption/deflection timing/routing of traffic avoid sensitive times/areas choice of quieter transport method rail replaces lorries change of fuel to reduce spillage problems (biofuel) biodegradable	 2 + 2 4
5(c)	Add water and suspend/shake; allow to settle; measure proportions; OR dry; (shake through) sieve; weigh;	 MAX 2
Total		10

Question 6

	Answers	Mark
6(a)	<p>Increased quantity that must be mined; increased land take;</p> <p>increased waste production; named problem caused by waste;</p> <p>increased energy use; named problem of energy use;</p> <p style="text-align: right;">2 + 2</p>	MAX 4
6(b)	<p>Named new and replaced materials; named use/property; eg plastic replaces steel/chromium bumpers/body panels/lower density/cheaper</p> <p>plastic replaces copper fibre optics/light/total internal reflection</p> <p>plastic replaces copper/lead lighter/cheaper/glueable/piping</p> <p>plastic replaces aluminium reduced use of fossil fuels</p> <p>biodiesel replaces fossil fuels renewable</p>	MAX 2
6(c)	<p>Up to 3 named methods;;; up to 2 features of how methods work;; eg remote sensing/airborne surveys gravimetry scintillometry magnetometry resistivity submarines/ROV radar GPS soil/rock chemical analysis</p>	MAX 4
Total		10

Question 7

	Answers	Mark
7(a)(i)	Highest sand content;	1
7(a)(ii)	Highest water content;	1
7(a)(iii)	Low pH/high organic matter;	1
7(a)(iv)	Crumb peds;	1
7(b)(i)	Random/systematic/stratified sampling; how sampling sites are located; eg grid/random numbers number of samples; sample size; depth of samples; timing of samples; standardised collection method; explanation of why samples are representative;	MAX 3
7(b)(ii)	Weigh; heat to high temperature/500–800°C/use Bunsen burner; burn off/oxidise organic matter; constant mass; calculate mass drop/difference/percentage;	MAX 3
Total		10

Question 8

	Answers	Mark
8(a)	Nitrogen/N/N ₂ ; nitrates/NO ₃ ⁻ ; ammonium/NH ₄ ⁺ /ammonia/NH ₃ ;	3
8(b)	Activities;; eg ploughing planting of legumes/named legume fertiliser use biomass removal – harvesting impacts;;; eg reduced N in biomass nutrient removal (in harvesting) (more) aerobic soil (more) nitrification/nitrogen fixation (linked to aerobic conditions) (less) denitrification (more) rapid decomposition (less) DOM in soil (less) nitrification (linked to less DOM) (fewer) detritivores (less) excretion (more) leaching	MAX 4
8(c)	Tullgren funnel; heat/light; downward movement; collection; OR detergent/irritant/alternative material; collection area; worms come to surface; detail of timing; OR measured area; measured depth; dig up soil; hand sort/count worms;	MAX 3
Total		10

Question 9

	Answers	Mark								
9(a)	Changes in: current direction; current speed/distance moved; temperature; salinity; density; named dissolved material;	MAX 2								
9(b)	Natural fluctuations/trends; (inaccuracy of) measuring small changes; regional differences; other causes of climate change; lack of historical data; feedback mechanisms (mask/exaggerate effect); lack of understanding of natural processes; use of secondary data; uncertainty of future human activity; eg of problem;	MAX 3								
9(c)	Changes in abiotic factors;;; <u>reason</u> it affects wildlife;;; changed survival rate; ease of colonisation; displacement; changes in migration patterns; interspecies relationships;;; named taxa;;; <i>Quality of Written Communication</i>	MAX 8 + 2								
	<table border="1"> <thead> <tr> <th>Mark</th> <th>Descriptor</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>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.</td> </tr> <tr> <td>1</td> <td>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.</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> </tbody> </table>		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.
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