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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Environmental Studies 1441

ENVS2 The Physical Environment

Mark Scheme

2009 examination – June series

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 meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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Environmental Studies

June 2009 **ENVS2**

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

Question 1

	Answers	Mark
1	Carbon dioxide – <u>combustion</u> of named carbon fuel/fossil fuel/carbonate heating**;** methane – anaerobic digestion/anaerobic respiration**;** oxides of nitrogen – urea spray/catalytic converter/<u>named</u> law/<u>named</u> scheme/ Kyoto Protocol**;** CFCs – disposal of refrigerator/foam plastics/use of aerosols/solvents**;** Montreal Protocol/named alternative material eg HCFCs, HCs/ named alternative process eg trigger packs**;**	5
Total		**5**

Question 2

	Answers	Mark
2(a)	Melting land ice/named location of land ice**;** expansion/increased volume**;** [**R** water molecules expand]	2
2(b)	Migration/displacement**;** (local) extinction**;** colonisation**;** specific environmental change/requirement eg salinisation,flooding,turbulence, period of immersion,light levels,temperature,food chain effect**;;;** named species/taxa**;** salinisation**;** named habitat lost**;**	MAX 4
2(c)	Named current/North Atlantic drift/conveyer/El Nino/La Nina**;** change in current velocity**;** change in current direction**;** change in wind speed**;** change in wind direction/prevailing wind change**;** freshwater input**;** salinity change**;** temperature change**;** density change**;** [**R** consequences of current change]	MAX 4
Total		**10**

Question 3

	Answers	Mark
3(a)	Increased**;** [**R** increased profitability of area mined]	1
3(b)	Chemical form**;** depth**;** shape of ore deposit**;** total quantity**;** overburden quality**;** drainage problem**;** land costs**;** transport costs/distance to market/consumers**;** machinery costs**;** labour costs**;** restoration costs/pollution prevention costs**;** processing costs**;** energy costs**;** [**R** public opposition]	MAX 3
3(c)	Problem 1**;** solution to problem 1**;** problem 2**;** solution to problem 2**;** eg noise**:** baffle mounds/trees dust**:** water sprays turbid drainage**:** sedimentation lagoon seismic surveys**:** avoid sensitive ecosystems land take/habitat loss**:** named site restoration technique loss of amenity/aesthetic impact**:** trees/landscaping (2+2)	4
3(d)	Method**;** development**;** eg use of low grade ores**:** increased reserves increased exploration**:** named method recycling**:** extend use/reduced mining exploit protected areas**:** named example substitution/alloy dilution**:** eg	2
Total		**10**

Question 4

	Answers	Mark
4(a)	Peak at 4 °C**;** decline at temps below peak**;**	2
4(b)	Ice floats**;** prevents water below from freezing**;** enzyme action**;** allows organisms to survive**;**	MAX 2
4(c)	1450**;**	1
4(d)	named balancing processes**;**	1
4(e)	Sealed since collected**;** remove stones/visible organisms**;** weigh**;** 80 – 130 °C/suitable justified temperature**;** dessicator to cool**;** reweigh**;** constant weight**;** mass difference**;** express results as percentage/proportion**;**	MAX 4
Total		**10**

Question 5

	Answers	Mark
5(a)	Up to 4 qualified factors**;;;;** 1 descriptive point for each factor**;;;;** eg site topography large storage volume/small surface area/large deep basin narrow exit to valley smaller dam large water supply volume large catchment area/high rainfall/regular rain/large catchment area impermeable rock reduced water loss low pollution risk named pollutant/source of pollutant low turbidity (of inflow water) reduced sedimentation (in reservoir) low land use conflict named low importance land use/named high importance land use easy access ease of dam construction/length of pipeline rock stability/seismic activity land slides/subsidence/dam burst	MAX 4
5(b)	Activated carbon/carbon filtration/charcoal filtration**;** removal of large/floating objects/named objects**;** Sedimentation/settling**;** (electrical) charges neutralised/particles stick together/coagulate**;**	4
5(c)	Named process**;** description of process**;;** eg reverse osmosis high pressure partially permeable membrane **OR** distillation evaporation/boiling condensation [**R** desalination]	MAX 2
Total		**10**

Question 6

	Answers	Mark
6(a)	Ionising processes/lightning/meteor trails/combustion/bacterial fixation**;** Ammonium/ammonia**;**	2
6(b)(i)	Fewer anaerobic/denitrifying bacteria/reduced denitification**;** more aerobic nitrifying bacteria/increased nitrogen fixation/nitrification**;** more decomposers/increased decomposition**;** increased nitrate levels**;** [**A** named organisms]	MAX 2
6(b)(ii)	More nitrogen fixation**;** Rhizobium/root nodules**;** increased nitrate concentration**;**	MAX 2
6(c)	Sewage effluent/named source/leaching/runoff**;** increased algal growth/algal bloom**;** shading of macrophytes**;** death of algae/macrophytes**;** decomposition**;** deoxygenation (caused by decomposition)**;** death of fish/insects/named taxon**;** release of toxins**;**	MAX 4
Total		**10**

Question 7

	Answers	Mark
7(a)(i)	Absorption of IR/long wavelength**;** from Earth/below**;**	2
7(a)(ii)	Absorption of UV/short wavelength**;** from Sun/above**;**	2
7(b)(i)	Named activity/use of CFCs/ozone depleting substance eg aerosols/air conditioning/solvents/electrical insulators/foam plastics**;** CFCs/named ODS**;** UV absorption**;** chlorine/named halogen (release)**;** correct reaction (of ODS) with ozone/monatomic oxygen**;;** ref to dynamic equilibrium**;** stratospheric NO_x**;** aircraft exhaust/engines**;** [**R** CFC reaction with O/O_3]	MAX 4
7(b)(ii)	More UV reaches Earth's surface/organisms**;** named tissue/organism damage/physiological change eg DNA mutation cancer/cataracts/leaf damage/skin damage/crop damage/reduce photosynthesis**;**	2
Total		**10**

Question 8

	Answers	Mark
8(a)	Awareness of waste/conservation/financial restrictions**;** agricultural use issue**;** industrial use issue**;** climate issue**;**	MAX 2
8(b)	Up to 4 named methods**;;;;** 1 mark for description of how method works**;;** eg toilet cistern bag dual flush toilet push taps shower instead of bath low use appliances mulching leakage control grey water re-use low water-requirement plants	MAX 4
8(c)	Explanation of effect on**:** health**;;** agriculture**;;** time spent collecting water**;;** type of industry**;;** amount of industry**;;** domestic uses**;;** drought causing migration/refugees**;;**	MAX 4
Total		**10**

Question 9

	Answers	Mark
9(a)	Remove litter**;** add water**;** shake allow to settle**;** measure layers**;** reference to positions of sand/silt/clay/particle sizes described**;** **OR** Remove litter**;** dry**;** sieve**;** weigh samples**;** reference to positions of sand/silt/clay/particle sizes described**;**	3
9(b)(i)	15 30 55**;**	1
9(b)(ii)	Correct position**;**	1

Question 9 continued

9(c)

Sample location
before and after field**;**
influence of other areas(land use/activity)**;;**
in/into reservoir**;**

Sample timing
all samples at similar time**;**
regular sampling to minimise variation**;**
reference to ploughing**;**
reference to precipitation**;**

Standardised samples
repeats (at some point)**;**
different sampling points**;**
size**;**
methodology**;;**
eg distance from bank/depth/current/named river feature/work upstream

Safety**;** 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

10

Total **15**