MARK SCHEME for the October/November 2014 series

8291 ENVIRONMENTAL MANAGEMENT

8291/12   Paper 1, maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2014 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

Section A

1 **(a)** **(i)** Rock fall / rockslide / landslide. **[1]**

(ii) Bright white colour of cliff and / or debris; suggests lack of weathering;
absence of vegetation; suggests insufficient time to colonise;
limited erosion of debris at cliff foot; suggests limited time for wave action;
smoothness / sharpness.

One mark for evidence plus one mark for detail for each piece of evidence. **[4]**

(iii) Largest fragments are heavier / denser; greater gravitational effect / roll further O.R.A. **[2]**

(iv) Pressure release; frost action; thermal expansion and contraction; solution; carbonation;
hydration; oxidation; biological weathering.

One mark for identifying, two marks for correctly explaining process. **[3]**

(b) **(i)** Undercutting; quarrying; road and site building may increase slope angle;
mining; pipe laying; blasting; traffic vibration;
adding a load such as spoil heap or buildings;
deforestation removes binding tree roots and promotes runoff;
inappropriate farming techniques; terracing; altering the slope angle;
Credit alternatives.

*One mark for identifying each relevant activity, additional mark for explaining how it
contributes to slope instability.* **[4]**

(ii) *Steep slope:* steeper the gradient, the more the gravitational effect
Rock type: more unconsolidated / weaker the rock
Structure: more heavily jointed / faulted / unfavourable dip of bedding planes
High water content: leads to high pore water pressure in porous rock / lubrication
Vegetation: bare slopes / no plant roots to bind, plant cover protects surface
Undercutting: agent of erosion at slope foot, e.g. river, sea, glacier
Credit alternatives.

Max. three marks for any one developed factor. Max. four marks if no explanation. **[6]**

[Total: 20]

2 (a) (i) There is a net flow from the atmosphere to the Earth's surface;
more CO_2 flows from the atmosphere to the ocean than emitted;
more CO_2 is absorbed by vegetation and soils than is emitted. O.R.A. **[2]**

(ii) 8 (billion tonnes) / 1.7 + 8.3 (billion tonnes). **[1]**

(iii) Deforestation; releases carbon sequestered / stored in timber; loss of storage by trees; used by trees;
intensification of agriculture; more mechanisation, fertiliser use etc. releases carbon dioxide;
industrialisation / urbanisation; rising emissions from building processes; vehicles; domestic activity; loss of carbon sequestered / stored in plants / soil.

Max. of two marks for each of two ways (do not credit repeat use of explanation). **[4]**

(iv) Releases greenhouse gases / or named gases into the atmosphere; absorption of greater percentage of outgoing solar radiation within atmosphere;
global warming / rising air temperatures;
alteration of global weather patterns;
examples such as increased frequency of tropical storms.
Credit other relevant pollutants' effects on climate if clearly explained. **[3]**

(b) (i) (Per person) emissions for Europe are greater than for Asia Pacific; O.R.A.
explanation could include reference to technology / motor cars / lighting and heating;
population of Asia greater than population of Europe; O.R.A.
total emissions for Asia Pacific are greater than for Europe; O.R.A.
explanation could include reference to population numbers / some less economically developed areas / less use of green and clean fuel technologies.

Max. three marks if no use of data. **[4]**

(ii) Africa less economically developed now; so in future expect:
more rapid economic growth; increasing affluence;
more rapid industrialisation / urbanisation; greater consumption of resources;
increasing development of infrastructure; faster population growth; intensification of farming; poorer access to green technologies; more likely to use higher efficiency finite fossil fuels.
Credit relevant alternatives.

Max. two marks for each developed reason. **[6]**

[Total: 20]

Section B

3 **(a)** In predicting location / magnitude / severity of impact (i.e. vulnerable areas):
- historic data might suggest which areas overdue for an earthquake
- urban population data shows where the most populous areas are
- potential magnitude data could be used to predict severity of next event

In planning disaster responses (i.e. allocation of resources):
- allow concentration of resources on most vulnerable areas
- credit details of appropriate response planning, e.g. building codes, drills, emergency evacuation plans, emergency service mobilisation etc.

> ***Please use level descriptors 1***

[10]

(b) *The question requirements are:*
- *to use recent case study material with a balance of LEDC and MEDC examples*
- *to show an appreciation that there are variations in loss of life / damage to property*
- *to show an assessment of the extent to which these are related to level of development*

Indicative content:

Financial and technological resources are more readily available to monitor, plan, predict, prepare and respond in MEDCs. Infrastructure and rescue resources likely to be better in MEDCs.
But other important factors may apply, e.g.:
- population density
- time of day / year
- magnitude of event

Conclusion needs to be based on evidence presented.

> ***Please use level descriptors 2***

[30]

[Total: 40]

4 (a) Europe has a longer history of urbanisation with stable low birth and death rates relative affluence and high cost of living.
Africa and Asia have large growing populations with improving death rates and need increased urbanisation for future development and growth. Although the problems of slum dwelling, overcrowding and relative poverty need to be faced urban growth here is a result of greater birth rates rather than migration.

> *Please use level descriptors 1*

[10]

(b) *The question requirements are:*
- *to describe and explain the nature of the pressures placed on the resources of the lithosphere*
- *to demonstrate knowledge and understanding of a variety of managing strategies*
- *to illustrate their answer with examples from both LEDCs and MEDCs*
- *to make an evaluation of the success of strategies employed*

Indicative content:

Urban expansion results in pressures on land, energy and soil resources – including demand for space for dwelling and industry with a consequent loss of agricultural land. It will result in increased environmental damage, both atmospheric and to the lithosphere.
Mining for minerals and fossil fuels will increase with potential environmental damage from the extraction process.
Increased demand for groundwater resources (both domestic and leisure).
References to re-use, recycling and conservation of resources.

> **Please use level descriptors 2**

[30]

[Total: 40]

5 (a) Methods of transferring energy in the atmosphere include conduction, convection, latent heating, advection and radiation. If we consider the planet as a whole, the Earth exchanges energy with its environment (the solar system) via radiation.

As we look at the radiation balance of the planet, it is achieved by the reflection from different surfaces; absorption and radiation.

In order to remain in balance the amount entering has to be matched by the amount lost.

> *Please use level descriptors 1*

[10]

(b) *The question requirements are:*
- *to identify a range of alternative sources of energy*
- *to explain how these might contribute to a reduction in atmospheric pollution*
- *to make a clear assessment of the extent*

Indicative content:

Alternative energy resources should include solar, wind, HEP, tidal, wave, biomass, geothermal and nuclear.

Candidates are likely to explain the merits of these in terms of their low impact on atmospheric pollution and the best answers will provide a variety of relevant examples.

Many alternatives sources of energy are however very limited in their ability to provide large quantities of energy continuously. An exception being nuclear but nuclear might, in the event of an accident, contribute dramatically to atmospheric pollution and of course has the long-term issue of the waste. Candidates may refer to Fukushima and other incidents.

> *Please use level descriptors 2*

[30]

[Total: 40]

Section B, (part a)

Descriptor	Award Mark
Consistently meets the level criteria	Mark at top of level
Meets the criteria, but with some inconsistency	Middle, mark to just below top mark
Meets most of level criteria, but not all convincingly	Just below middle, mark to just above bottom mark
On the borderline of this level and the one below	Mark at bottom of level

Level descriptors 1

8–10 marks
The response:
- contains few errors
- shows a very good understanding of the question
- shows a good use of data or the information provided, where appropriate
- provides a balanced answer

5–7 marks
The response:
- may contain some errors
- shows an adequate understanding of the question
- shows some use of data or the information provided, where appropriate
- may lack balance

1–4 marks
The response:
- may contain errors
- shows limited understanding of the question
- shows little or no use of the data or information, where appropriate
- lacks balance

Section B, (part b):

Level descriptors 2

Responses:

Level one, 25–30 marks
- fulfil all the requirements of the question
- contain a very good understanding of the content required
- contain a very good balance of content
- contain substantial critical and supportive evaluations
- make accurate use of relevant vocabulary

Level two, 19–24 marks
- fulfil most of the requirements of the question
- contain a good understanding of the content required
- contain a good balance of content
- contain some critical and supportive evaluations
- make good use of relevant vocabulary

Level three, 13–18 marks
- fulfil some requirements of the question
- contain some understanding of the content required
- may contain some limited balance of content
- may contain brief evaluations
- make some use of relevant vocabulary

Level four, 6–12 marks
- fulfil limited requirements of the question
- contain limited understanding of the content required
- may contain poorly balanced of content
- may not contain evaluations
- make limited use of relevant vocabulary

Level five, 1–5 marks
- fulfil a few of the requirements of the question
- contain a very limited understanding of the content required
- are likely to be unbalanced and undeveloped
- evaluative statements are likely to be missing
- make no use of relevant vocabulary