MARK SCHEME for the May/June 2014 series

8291 ENVIRONMENTAL MANAGEMENT

8291/22   Paper 2, 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 May/June 2014 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

General notes

Symbols used in Environmental Management mark schemes.

/	separates alternatives for a marking point – other valid ways of expressing the same idea are also credited
;	separates points for the award of a mark
[3]	indicates the number of marks available
italic	indicates that this is information about the marking points and is not required to gain credit italic text is also used for comments about alternatives that should be accepted, ignored or rejected
ora	or reverse argument – shows that an argument from an alternative viewpoint will be credited
AW	alternative wording, sometimes called 'or words to that effect' – AW is used when there are many different ways of expressing the same idea
( )	the word / phrase in brackets is not required to gain marks but sets the context of the response for credit e.g. (nuclear) waste – nuclear is not needed but if it was described as a domestic waste then no mark is awarded
<u>volcanic</u>	underlined words – the answer must contain exactly this word
ecf	error carried forward – if an incorrect answer is given to part of a question, and this answer is subsequently used by a candidate in later parts of the question, this indicates that the candidate's incorrect answer will be used as a starting point for marking the later parts of the question

Section A

1 (a) Run-off: water which is not absorbed into the soil / flows over the surface of soil into streams, lakes and rivers;
Groundwater: store of water / water held by soil and bedrock;
Infiltration: movement of water down through the soil / water draining into ground water.

Award one mark for each term. **[3]**

(b) Interception by plant;
roots; by increasing infiltration into soil; increase groundwater store;
roots absorb water from the soil; water is stored in the plant;
water moves through plants to the leaves; transpiration;
water vapour creates a humid atmospheric store.

Award a max. of four marks for description of the vegetation role only. **[6]**

(c) Change in state described and explained;
evaporation; condensation; freezing, melting; sublimation.

Award one mark for each description of the change e.g. liquid water to water vapour and one mark for each explanation.

Award one mark where the state of water in the water store is identified but no change in state.
e.g. liquid in: soil, groundwater / rivers / lakes / sea
gas in: atmosphere / clouds
solid ice in: ice caps / glaciers. **[4]**

(d) (i) Increase in temperature;
melting of ice; decrease in ice caps / polar ice / glaciers;
rise in sea level;
increase in evaporation; increase in atmospheric water; increase in precipitation;
increase in run-off; increase groundwater; flooding.

Expect reference to change in data from Fig. 1.2 (percentages), if no data, max. of four marks. **[5]**

(ii) For example:
Deforestation; decrease in evapotranspiration;
extraction of groundwater from aquifers; reduce groundwater flow. **[2]**

[Total: 20]

2 (a) Climate: high temperature; humidity and precipitation;
high productivity / large biomass; large amount of leaf litter;
rapid rate of decomposition; decomposers / named decomposers;
rapid nutrient cycling; efficient uptake of nutrients; large biomass store; nutrient poor soils;
very little loss in run-off / leaching; absorption by roots.
Award one mark for each of five linked points. **[5]**

(b) Stage 1 cutting and burning;
stage 2 planting crops;
stage 3 harvesting crops;
stage 4 re-colonisation of forest;
stage 5 time to re-establish forest to climax;
Award one mark for each stage. **[5]**

(c) The consequences of slash-and-burn techniques for ecosystems are almost always destructive;
as population size and density increase there is increased demand;
for more land and resources;
e.g. biomass is extracted and even after one harvest of wood or charcoal, the residual soil value is heavily diminished for further growth of any type of vegetation;
there may be several cycles of slash-and-burn within a few years;
the fallow period declines; nutrient-poor soil becomes degraded;
without the trees, the soil quality soon becomes too poor to support crops;
there may be a change in agricultural practice;
farming becomes more intensively practiced / agricultural improvements;
or move on to a virgin forest and repeat the process;
resulting in large-scale erosion;
since there are no roots or temporary water storage in nearby canopies to arrest the surface run-off, any small remaining amounts of nutrients are washed away;
resulting in desertification.

> **Please use level descriptors 1**

[10]

[Total: 20]

Section B

3 **(a)** Initial correlation 1970 to 1985; with increase in oil trade and oil spills to 1975; decrease in both to 1985;
after 1985, there is a steady increase in oil trade; an overall decrease in oil spills; fluctuations.
Explanation of the trends in the increase of oil trade and decrease in oil spills: e.g. greater safety measures, improved navigation.

A balance between description of trends and explanation is required.

> **Please use level descriptors 1**

[10]

(b) *The question requirements are:*
- *to consider marine pollution hazards*
- *to describe the difficulties in controlling marine pollution*
- *to describe and evaluate measures to control pollution*
- *to use examples*

Indicative content:

Difficulties include:
lack of control; although there is legislation it is not enforced;
accidental spillages, intentional dumping; illegal dumping;
dispersal due to winds and ocean currents;
polluting rivers carrying industrial, domestic and agricultural waste run through different countries; all nations are responsible but agreement is difficult;
air masses disperse gases and particulates that are deposited at sea.

Measures include:
legislation to reduce pollution; e.g. The International Convention for the Prevention of Pollution from Ships prescribes the minimum distances from shore that pollutants can be dumped; often ineffective as it cannot be rigidly enforced;
decomposition by bacteria; but the process is slow; some form of direct clean-up is needed;
oil spills are contained by floating booms then removed by pumps;
slicks can be sprayed with chemical dispersants or by burning the oil;
dispersants although effective on the surface cause the oil to sink and pollute the seabed;
time is the main factor in ecological recovery.

> **Please use level descriptors 2**

[30]

[Total : 40]

4 (a) *Advantages;*
support a larger population; supply a wider area;
provide clean / fresh drinking water;
irrigation; increased yields;
wider range of crops grown;
greater area under cultivation;
prevent famines;
economic prosperity.

Disadvantages:
not sustainable;
disruption of desert communities;
increased salinity of soil / salinisation;
water losses in transport;
risk of contamination / water-related diseases;
cost of maintenance.

A balance between advantages / disadvantages is required together with use of data from Fig 4.1 or reference to a similar project.

Please use level descriptors 1

[10]

(b) *The question requirements are:*
- *to consider ways of achieving a sustainable supply*
- *to assess the sustainable supply of water in both MEDCs and MEDCs*
- *to use examples*

Indicative content:

The answer should contain an assessment of the nature of supply and demand, the volume and quality of the water supply, water as a scarce commodity, how present supplies are obtained; the impact of future demand, resulting from increases in population; urbanisation, climatic change on how it might be supplied.
The main difference between LEDCs and MEDCs is largely a matter of the scale of the demand and ability of nations to meet their demand, actual methods are not always unique to one group of nations.
Current sources, e.g. river, groundwater, recycled water, desalinisation,
Future supplies that would include expanding current methods and adopting new methods.

Please use level descriptors 2

[30]

[Total: 40]

5 (a) Changes: slow increase up to 1960; fluctuations;
rapid increase after 1960; peak 1970;
rapid decline in 1970s;
short lived recovery in 1980s; since 1992 no recovery;
reference to the data on the total catch of cod in tonnes.

Explanations: reference to type of net; improvements in technology; size of fishing vessel; overfishing; loss of breeding stock.

A balance between description of changes and explanation is required.

Please use level descriptors 1

[10]

(b) *The question requirements are:*
- *to consider the threats to marine ecosystems*
- *to describe and evaluate conservation measures*
- *to use examples*

Indicative content:

These threats can include:
Overfishing, e.g. North Sea, Grand Banks, S.E. Pacific. Fishing for herring, cod, etc. disrupts the local marine chains, anchovies, local bird life (albatross);
fish netting, contributes to accidental catches (e.g. dolphins, porpoise, shark),
oil spillage contaminates the whole food webs, marine and terrestrial, e.g. Exxon Valdez,
industrial spillage can contaminate fishing grounds,
coral reefs damaged through blasting, overfishing, tourism, coral mining, pollution, sediment from agriculture, mineral dredging,
global warming can affect sea temperatures and have a knock-on effect in increasing the strength of storms causing reef erosion.

For the second part of this question candidates need to choose schemes that are aimed at the conservation of marine ecosystems.

Coral reefs:
ecotourism in which tourists are advised, escorted and educated in limited numbers,
park designation,
visitor controls (honey-pot sites and restricted zones),
restrictions on fishing (catch, net size, bans),
legislation on extractive activities, e.g. mining and dredging.

Continental shelf ecosystems can be conserved by:
surveys of vulnerable fish and setting up protected areas,
preserve natural habitats by establishing marine parks,
prevent and control pollution along urbanised and industrialised coasts,
restore habitats which are deteriorating and recreate sites of ecological interest,
no catch zones,
scuba diving.

Please use level descriptors 2

[30]

[Total: 40]

Section A and Section B, part (a) descriptor levels:

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

6–8 marks / 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

3–5 marks / 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

1–2 marks / 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

R

Section 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