Cambridge International AS Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary Level

ENVIRONMENTAL MANAGEMENT **8291/22**

Paper 2 **October/November 2019**

MARK SCHEME

Maximum Mark: 80

Published

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 International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Marks
1(a)(i)	decomposition / decay;	**1**
1(a)(ii)	(gross primary production) is all the production; minus the energy used in respiration;	**2**
1(a)(iii)	temperature; moisture / water; sunlight; carbon dioxide; **max 2**	**2**
1(a)(iv)	photosynthesis;	**1**
1(a)(v)	tropical rainforest;	**1**
1(b)(i)	(snowshoe) hare;	**1**
1(b)(ii)	the mass of organism / species; at each trophic level; the amount of energy available; at each trophic level; the transfer of energy; between trophic levels; **max 2**	**2**
1(b)(iii)	only energy stored; is transferred; energy is lost; as heat / due to respiration / other wastes; **max 2**	**2**

Question	Answer	Marks
1(b)(iv)	red foxes would increase; because of less predation; snowshoe hares would suffer more predation; population would decrease; resulting in more grass; **max 4**	**4**
1(c)(i)	absorption;	**1**
1(c)(ii)	large amount of stored biomass lost / reduced; as trees are felled; less input / flow into the litter; litter store will decrease; run-off will increase; less flow from litter to soil; less flow from soil to biomass; weathering of soil increases; **max 3**	**3**

Question	Answer	Marks
2(a)(i)	ocean;	**1**
2(a)(ii)	1 377 024.7(arbitrary units); correct working ;	**2**
2(a)(iii)	closed system does not lose water; local hydrological cycle loses / gains water; run-off into rivers; flows away from the region; groundwater can flow into rivers; water evaporates and can be blown away by winds; animals can migrate away from the region; effects of storms / climate change; **max 4**	**4**
2(a)(iv)	increased carbon emissions; lead to climate change; weather patterns change; agricultural practices change evapotranspiration rates; drainage of land; increased urbanisation increases run-off; increased industrial / domestic use / overuse of boreholes and aquifers reduces stores; building of dams for reservoirs / HEP; leads to increased evaporation; **max 4**	**4**
2(b)(i)	Increased carbon dioxide / methane emissions; lead to global warming / climate change; because heat is trapped / reflected back to Earth; increased melting of arctic ice / glaciers; increases volume of water in oceans / seas; **max 4**	**4**

Question	Answer	Marks
2(b)(ii)	reduce emissions of carbon dioxide / methane; example e.g. factory scrubbers / catalytic converters / electric cars; move away from fossil fuels; increase reliance on renewable energy forms; named example; traffic management schemes / car pool / public transport; improve coastal defences; prepare / educate population; build levees / dykes; treat increased salinity of coastal soils to sustain agriculture; **max 5**	**5**

Question	Answer	Marks
Section 3		
3(a)	Subsistence farming: Methods lead to loss of fertility of soils and loss of local habitats through clearance of land for crops, slash and burn, reduction of available water as land becomes more arid. Mechanised farming; Large areas of land cleared for monoculture removes habitats, soil compacted by machinery, fertility maintained artificially but can lead to problems such as eutrophication of water resources. **please use level descriptors 1**	**10**

Question	Answer	Marks
3(b)	The question requirements are: • to demonstrate understanding of the different pressures to maintain food supply sustainably • to demonstrate understanding of the issues faced by countries with different levels of economic development • to assess the methods used to provide food sustainably. Indicative content: Different levels of economic development present different problems with regard to the sustainable production food. Also, population size is a factor linked to economic development. Lack of money means a lack of commercial fertiliser and poorer quality seed or crop plants available to purchase, e.g. cloning of date palms leads to cheaper plants with a guaranteed product. Subsistence level farming is risky and very prone to changes in weather patterns such as drought – leading to poor harvests and lack of money to buy livestock fodder and nothing left over to buy the requirements for next season. Declining soil means the need to destroy more habitat to grow sufficient produce to survive. Such countries lack the infrastructure to transport materials easily. Farming methods could be described as traditional. In more economically developed countries farming is industrial and mechanised. Overproduction can be an issue. Money means quality seeds and crops can be purchased and the infrastructure is in place to easily transport goods and produce. There is also the potential for farming to co-exist with natural habitats because of productivity, e.g. organic farming, maintaining hedgerows and wildlife strips. **please use level descriptors 2**	**30**

Question	Answer	Marks
4(a)	Arid and semi-arid areas have low biodiversity and poor soils in general making life difficult. Tend to have subsistence living if low level of economic development. Traditional lifestyles vary from nomadic to settled pastoral. Crop plants are adapted to such conditions as are livestock but continuing arid conditions limit productivity. Fertilisers and drought resistant seeds are expensive, as are irrigation schemes. People face increasing drought, possible salinisation of soil water and further loss of soil fertility because of climate change. **please use level descriptors 1**	**10**
4(b)	The question requirements are: • to demonstrate understanding of the different problems arising from different levels of natural water supply • to describe different methods of water supply • to assess the relative success of the different strategies used to supply potable water. Indicative content: Lack of water as a result of increasing aridity, climate change alters local precipitation patterns. Local agricultural practices reduce soil water content. Loss of glaciers reduces annual melt flow into areas reliant on this water. Appropriate technology used, e.g. wells, boreholes, gravity fed schemes using natural slopes, harvesting rainwater, waste management (use of grey water), reduction of evaporation techniques, improved irrigation and use of drought tolerant crops. Relative merits and success assessed. Where infrastructure is available water supply still must be both sufficient and safe (disease free) so sanitation is also an issue. Ground water stores need preserving, e.g. aquifers. Dams to provide water reservoirs. Desalination an option if affordable. **please use level descriptors 2**	**30**

Question	Answer	Marks
5(a)	Abiotic factors such as light, temperature and moisture influence the tolerance of species determining the limits of where they can survive and as a result the different biomes are formed. These can also be considered limiting factors. Biotic factors include supply of food, competition through predation, for space and resources. Humans have a large effect including agricultural practices, building and introducing species to new areas. **please use level descriptors 1**	**10**
5(b)	The question requirements are: • to show knowledge of ecosystems • to show knowledge of different methods of conservation methods relative to maintaining biodiversity • to assess the relative success of such methods. Indicative content: Selection of relevant ecosystem. The different methods of conservation could include National parks, nature reserves, SSSIs, zoos and safari parks. Breeding and release programmes. Education and involvement of local population, ecotourism, controlled hunting including bans and seasons, and use of legislation. Appropriate descriptions of the methods chosen and assessment of relative success. Issues raised could include problems of poaching, loss of land to local people unless they are involved, economics of protection, difficulties of enforcement, political will and education. **please use level descriptors 2**	**30**

***Section B* 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

Section B descriptor levels

***Section B* (part (a)):**

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 contains errors
- shows limited understanding of the question
- shows little or no use of data or the information, where appropriate
- lacks balance

Section B descriptor levels

***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

***Section B* descriptor levels**
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