
ENVIRONMENTAL MANAGEMENT

8291/21

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.

This document consists of **15** printed pages.

PUBLISHED**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)	temperature; water;	2															
1(a)(ii)	appropriate description of chosen factor (from water, sunlight, oxygen, or temperature) on desert soil; effect of chosen factor on desert soil;	2															
1(a)(iii)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">characteristic</th> <th style="width: 30%;">present in desert soil</th> <th style="width: 40%;"></th> </tr> </thead> <tbody> <tr> <td>very little leaf litter</td> <td style="text-align: center;">✓</td> <td rowspan="2">;</td> </tr> <tr> <td>high soil moisture content</td> <td></td> </tr> <tr> <td>silt and clay layers</td> <td></td> <td rowspan="3">;</td> </tr> <tr> <td>thick dry horizon over parent rock</td> <td style="text-align: center;">✓</td> </tr> <tr> <td>thick humus layer</td> <td></td> </tr> </tbody> </table>	characteristic	present in desert soil		very little leaf litter	✓	;	high soil moisture content		silt and clay layers		;	thick dry horizon over parent rock	✓	thick humus layer		2
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very little leaf litter	✓	;															
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1(b)(i)	scorpion – secondary consumer; desert plant – producer; kangaroo rat – primary consumer;	3															
1(b)(ii)	fewer scorpions; due to less food; large lizards have less food; large lizards prey more on small lizards; leading to fewer small lizards; max 2	2															
1(b)(iii)	hawks / desert foxes / top predators;	1															
1(b)(iv)	decomposers;	1															

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Question	Answer	Marks
1(b)(v)	expansion of agricultural land; destroys original habitats; over-use of agricultural land; destroys the soil structure / affects soil fertility; poor irrigation practices; causes aridity; deforestation; disrupts local water cycle / destroys habitats / leads to soil aridity; over-grazing; loss of plants leads to aridity; max 4	4
1(b)(vi)	<u>increasing</u> urbanisation / <u>increasing</u> human activities, e.g. logging; <u>increasing</u> global warming; climate change leading to <u>increasing</u> weather extremes; <u>increasing</u> drought / <u>reduced</u> precipitation; max 3	3

Question	Answer	Marks
2(a)(i)	industrial use rises / increases threefold / use of figures; agricultural use falls / decreases / use of figures; domestic shows a slight rise / use of figures; max 2	2
2(a)(ii)	increasing economic development increases demand for goods / services; leads to more industry / manufacturing; which use water for products / cleaning machinery; hence increasing demand;	4
2(b)(i)	global warming / climate change; leads to less snow melt into the basin; higher temperature increases evaporation; increasing drought in the area; dam reduces flow; leads to silting / increased evaporation; increasing populations in large cities; increased demand for water; max 4	4
2(b)(ii)	pipelines; to supply water; maintenance; to prevent leaks; water transfer by canals / aqueducts; from areas of plenty / to drought areas; education in water saving strategies; named examples; use of natural aquifers; max 4	4

Question	Answer	Marks
2(b)(iii)	<p><i>Advantages</i> water supply increased; recreation possibilities; power generation; aquatic environment enhanced / created;</p> <p><i>Disadvantages</i> cost; silting of river lower down / reduced flow; environmental damage during building; loss of habitats; displacement of people;</p> <p>max 6</p>	

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Question	Answer	Marks
Section B		
3(a)	<p>Causes Increased release of greenhouse gases such as carbon dioxide and methane lead to increased global temperature, which causes the arctic temperature to rise and thus reduces sea ice formation. The loss of ice reduces the albedo effect so more absorption increases sea temperature and increases the effect. Increased soot deposition also has a similar effect. As the volume of ice decreases ocean currents and climate are affected hastening the changes.</p> <p>Effects Reduction in volume and thickness of ice as well as the area of ocean covered by ice. Loss and change of habitat affecting species, e.g. polar bears. Spread of diseases between species previously separated is also an issue. Human activities affected by change in traditional lifestyles, access to sea passages and potential for mineral deposits including oil. Rising sea levels led to coastal inundation, salinization, flooding and disruption.</p> <div data-bbox="353 687 842 751" style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>please use level descriptors 1</p> </div>	10

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Question	Answer	Marks
3(b)	<p>The question requirements are:</p> <ul style="list-style-type: none"> to show understanding of international protocols to describe how international protocols are agreed and why they are needed to assess the success of named international protocols. <p>Indicative content:</p> <p>The main agreement is the united nations framework convention on climate change (UNFCCC) which was adopted at Rio in 1992. Kyoto followed to establish a period of reduction and this was extended by the Doha amendment. Paris followed in 2015.</p> <p>Pollution crosses international boundaries so cooperation and agreement are needed to control the effects – climate change. The impact of climate change varies from country to country, e.g. changing sea levels. The contribution to climate change is connected to level of economic development including reliance on fossil fuels or renewable resources for power. International protocols are hard to agree and enforce. The first agreements only applied to developed countries and had little of the desired effect regarding climate change reduction. Later agreements included the developing countries but didn't require signing, e.g. Kyoto which wasn't signed by the USA. Subsequent agreements are under pressure, e.g. USA may pull out of Paris. Monitoring is a politically sensitive issue.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>please use level descriptors 2</p> </div>	30

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Question	Answer	Marks
4(a)	<p><i>Advantages</i> Move water from areas of plenty to areas of need, which enables arid regions to support large populations and in turn become productive. Encourages water conservation through education as people learn of the project. Ability to respond to drought resulting from climate change and pollution.</p> <p><i>Disadvantages</i> Environmental damage including during building of the canals and loss of habitats afterwards. Pollution from Yangtze river enters the Han river. Expensive (more than three gorges dam). Relocation of people and their settlements. Loss of aquatic wildlife populations.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">please use level descriptors 1</div>	10
4(b)	<p>The question requirements are: to show understanding of the variability of water supply and quality around the world to understand that different levels of economic development affect ability to manage water supply to assess the different strategies for managing a sustainable water supply.</p> <p>Indicative content: Understanding of the hydrological cycle is important especially the effects of global climate change on the components. Water supply is affected by drought, changes in snow melt and annual precipitation patterns.</p> <p>We are generally expert in managing surface water and run-off to provide stored water but are less informed regarding aquifers and groundwater stores.</p> <p>Countries with low levels of economic development have problems affording the infrastructure required to access and supply water compared with those with a higher level of economic development who can build reservoirs, pipelines and maintain the quality of supply.</p> <p>Strategies to include capture and storage of surface run-off are tried and tested as are extraction from groundwater sources such as aquifers. More innovative schemes include desalination of salt water (expensive) and water recycling, reduction of waste and water re-use (require education). Rainwater harvesting at source and cloud seeding are other techniques being used (requires wealth).</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">please use level descriptors 2</div>	30

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Question	Answer	Marks
5(a)	<p>Two types of succession are primary (from bare soil and rock) and secondary (after an environmental event such as flood or volcano activity). The origin of the succession is also a factor leading to hydrosere, xerosere or lithosere, for example.</p> <p>Answer should include the appropriate stages of succession for the choice made and provide some explanation of the causes of the changes at each stage, such as formation of litter to improve fertility leading to more advanced species which then outcompete the pioneer species before further development leads to climax community</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>please use level descriptors 1</p> </div>	10
5(b)	<p>The question requirements are:</p> <ul style="list-style-type: none"> to understand that conserving habitats at different stages of succession is important such as wetlands to demonstrate understanding of different methods of conservation to assess the success of the different strategies. <p>Indicative content:</p> <p>Some plagioclimax habitats are key habitats for rare species especially wetlands and marshes or have key roles such as coastal sand dunes. As a result it is important for these to be conserved at these stages of succession to preserve the habitats and the species biodiversity.</p> <p>A range of schemes considered to include national parks, conservation areas, SSSI, wildlife parks, marine parks, ecotourism and ecological islands.</p> <p>Details of the individual schemes and how they operate to include legislation, education, staffing and the nature of work carried out. The principles behind the schemes and methods used plus the potential problems.</p> <p>Assessment of the relative success of each scheme described linked to the effects on the habitats and species therein as well as the balance between conservation and the use by the human population.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>please use level descriptors 2</p> </div>	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 contain 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****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