
ENVIRONMENTAL MANAGEMENT

8291/11

Paper 1

May/June 2016

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.

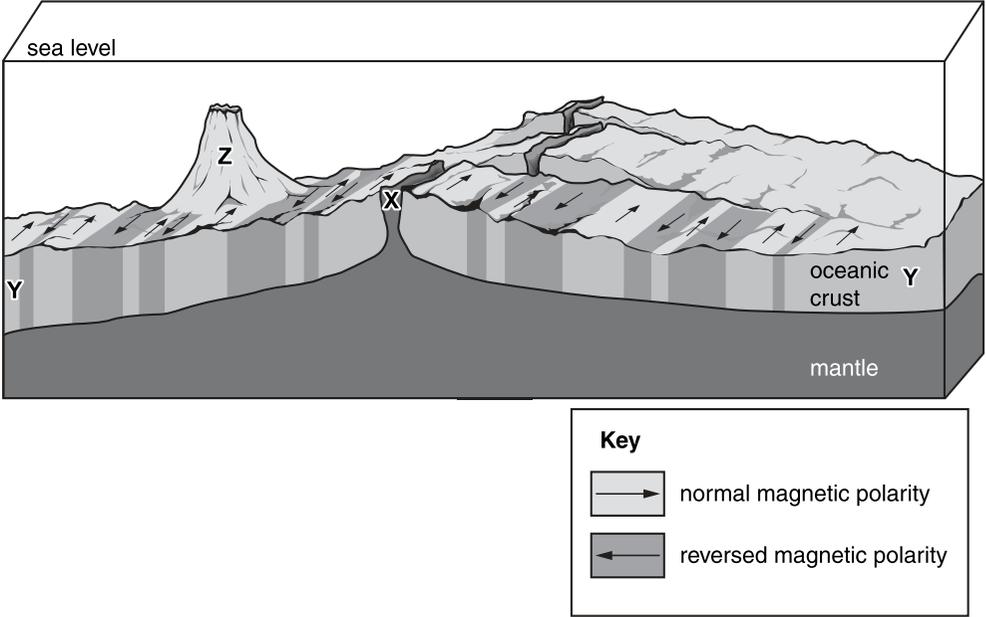
Cambridge will not enter into discussions about these mark schemes.

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Section A

| Question | Answer | Marks |
|-----------------|---|--------------|
| 1(a)(i) | Glossopteris; | 1 |
| 1(a)(ii) | the geometric fit of the continents/fit together like a jigsaw (puzzle); some developed detail (e.g. S. America and Africa); | 2 |
| 1(a)(iii) | continental drift/plate movement; constructive plate boundary; plates move apart/separate; as a result of convection currents/as a result of convection movements; in the magma; tension leads to the formation of fractures/formation of cracks; magma rises through cracks; sea-floor spreading; pushing plates/land masses apart; either side of a rift in the crust; upwelling of molten rock/upwelling of magma; to form new ocean floor; | 4 |

| Question | Answer | Marks |
|----------|--|-------|
| 1(a)(iv) | <p>understanding that land masses were once connected;</p> <p>may allow geologists to predict location of similar mineral resources today;</p> <p>coal forming in past areas of tropical climates;</p> <p>mineral resources found at either side of an original join;</p> <p>developed with named/located example of mineral resource;</p> <p><i>(Accept alternative wording.)</i></p> | 3 |
| 1(b)(i) |  <p><i>(One mark for each correct label. Accept Y in either position. Accept equivalent positions at other 3D depths.)</i></p> | 3 |

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| Question | Answer | Marks |
|-----------------|---|--------------|
| 1(b)(ii) | <p>alternating normal and reversed magnetisms;</p> <p>symmetrical pattern either side of ridge;</p> <p>varying width / varying volumes of rock in each stripe;</p> | 3 |
| 1(b)(iii) | <p>the pattern of the Earth's past magnetic fields shown in Fig.1.2 can be studied to suggest the date at which the rocks formed / solidified;</p> <p>confirming the idea of 'sea-floor spreading';</p> <p>the youngest rocks are at the centre of the oceans / the oldest towards the edge;</p> <p>provides evidence that the plates are moving apart;</p> | 4 |

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| Question | Answer | Marks |
|-----------------|---|--------------|
| 2(a)(i) | May plotted; June plotted; | 2 |
| 2(a)(ii) | a monsoon climate / tropical climate (with wet and dry seasons); | 1 |
| 2(a)(iii) | dry winter months (Dec–Apr); sudden onset of rain (May–June / start of summer); wet season (Jun–Nov); use of data; | 3 |
| 2(a)(iv) | <u>cloud</u> associated with the arrival of the rain; may absorb and / or reflect; incoming solar radiation; reducing surface temperatures; | 2 |
| 2(b)(i) | differential heating of land / sea; creates a temperature gradient; resulting in advection / a large land-sea breeze develops; convection over the land; results in low pressure developing over the continent; | 3 |

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| Question | Answer | Marks |
|-----------------|--|--------------|
| 2(b)(ii) | evaporation occurs over the warm waters of the Indian Ocean; southwesterly winds carry the moisture on to the land; the humid air is forced to rise over land; cools and becomes saturated with water vapour; resulting in condensation; producing cloud and rain/ producing precipitation; | 3 |

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| Question | Answer | Marks |
|-----------------|--|--------------|
| 2(b)(iii) | <p>industrial activity / agricultural development / transport / burning fossil fuels / biomass burning;</p> <p>development, e.g. increased population / more transport / more deforestation / increased domestic energy demand;</p> <p>produces atmospheric pollution;</p> <p>named greenhouse gas;</p> <p>however increased greenhouse gas emissions may promote warming;</p> <p>leads to more intense rains / more extreme weather events / more intense monsoon;</p> <p>may cause flooding;</p> <p>release of particulates;</p> <p>may result in cooler land temperatures;</p> <p>if cooler land temperatures, there may be monsoon failures and delayed and / or less predictable rain;</p> <p>may cause drought;</p> <p><i>(Credit either, or both, of a warming or cooling approach. Maximum four marks if no ref. to change in Indian climate.)</i></p> | 6 |

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Section B

| Question | Answer | Marks |
|-----------------|--|--------------|
| 3(a) | <p>Although high income countries experience nearly half of the natural disasters, they experience relatively few deaths yet high economic losses. Vice versa, e.g. the lowest income countries experience 11% of the catastrophes but 30% of the deaths and 3% of the economic losses. Other manipulation of figures.</p> <p>Data should be referred to throughout answer.</p> <p>High frequency but fewer deaths could be explained due to relative wealth, better education, more preparation, e.g. high income countries can afford materials for earthquake-proof buildings, warning systems, rescue teams, disaster relief. Examples of countries could be given. ORA</p> <div style="border: 1px solid black; padding: 2px; width: fit-content;"> <p>please use level descriptors 1</p> </div> | 10 |

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| Question | Answer | Marks |
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| 3(b) | <p><i>The question requirements are:</i></p> <ul style="list-style-type: none"> • <i>to explain a variety of methods of monitoring and managing the impacts of volcanoes</i> • <i>to explain a variety of methods for monitoring and managing the impacts of earthquakes</i> • <i>make an assessment of the extent to which the impacts of volcanic hazards are more easily monitored and managed.</i> <p>Indicative content:</p> <p>Volcanic hazards can be monitored by: Gas analysis, ground mapping, satellite imagery, groundwater movements, seismic data, heat emissions, simple observation etc.</p> <p>Earthquake hazards can be monitored by: Seismometers, gas analysis, analysis of historic data and mapping of fault systems.</p> <p>Managing for both could include setting up monitoring stations, producing hazard maps, developing early-warning systems, preparing emergency response teams and supplies and evacuation plans. Education and drills. Specialised buildings. Use of social media.</p> <p>Candidates are likely to conclude that volcanoes are easier to monitor and manage as they provide more warning signs and the hazardous events unfold more slowly in general, whereas earthquakes tend to be more sudden and also less predictable in their location.</p> <div style="border: 1px solid black; padding: 2px; width: fit-content;"> <p>please use level descriptors 2</p> </div> | 30 |

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| Question | Answer | Marks |
|-----------------|---|--------------|
| 4(a) | <p>dirty: Long-term problems of radioactive waste and reprocessing, transport of waste, requirement for processing waste.</p> <p>dangerous: Dangers of technical failure, human error, natural disaster, terrorism/protest issues, human health issues.</p> <p>expensive: Huge capital investment, long delays and cost overruns, decommissioning costs.</p> <p>Accept valid counter arguments, e.g. not dirty because no production of carbon dioxide.</p> <p>Answers should include reference to examples (either those cited in Fig. 4.1 or others).</p> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-top: 10px;">please use level descriptors 1</div> | 10 |

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| Question | Answer | Marks |
|----------|---|-----------|
| 4(b) | <p><i>The question requirements are:</i></p> <ul style="list-style-type: none"> • <i>to make an evaluation of alternative energy resources that can be exploited</i> • <i>to make reference to examples.</i> <p>Indicative content:</p> <p>Fossil fuels could be considered to have the following advantages: They are abundant, the technology is well proven, often inexpensive, and they have a high energy yield.</p> <p>Fossil fuels could be considered to have the following disadvantages: They contribute to environmental pollution and climate change by producing greenhouse gases, often involve environmental damage in extraction and have finite reserves.</p> <p>Renewables could be considered to have the following advantages: They produce fewer carbon emissions, and are generally 'cleaner'.</p> <p>Renewables could be considered to have the following disadvantages: They are often expensive, use unproven technologies, are reliant on subsidies, can cause environmental damage at manufacture, are seen as eyesores, and have relatively low energy yields. They may also be reliant on weather conditions.</p> <p>Examples are likely to range across a variety of fossil fuels and renewables and include real-world examples of their use.</p> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-top: 10px;">please use level descriptors 2</div> | 30 |

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| Question | Answer | Marks |
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| 5(a) | <p>Effects may include: The flooding of residential areas and consequent homelessness creating climate refugees, loss of vital infrastructure such as the ferry port and severance of main roads, economic damage in terms of jobs and income, environmental damage with coastline retreat and the loss of mangrove habitat (itself a natural defence against the sea), increase in salination.</p> <p>Specific reference can be made to the information provided about Banjul’s vulnerability.</p> <p>please use level descriptors 1</p> | 10 |
| 5(b) | <p><i>The question requirements are:</i></p> <ul style="list-style-type: none"> • <i>to demonstrate an understanding of the causes of global warming</i> • <i>to demonstrate an understanding of the different options – adapt/prevent/reverse</i> • <i>to make use of relevant examples.</i> <p>Indicative content:</p> <p>The exact causes of global warming (whether entirely man-made or natural) are proving very difficult to control. The costs, political and technical difficulties of preventing global warming may make mitigating its effects or adapting a more viable long-term option.</p> <p>Answers may explore strategies and legislation for reducing greenhouse gas emissions such as carbon capture and storage, afforestation, reducing energy demand and the problems associated with them. They may also cite attempts to adapt to global warming by improving coastal defences, changing farming methods etc. They may also conclude that both options are possible.</p> <p>please use level descriptors 2</p> | 30 |

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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 |

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Section B descriptor levels:

level descriptors 1

Level one, 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

Level two, 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

Level three, 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

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Section B descriptor levels:

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 poor balanced of content
- may not contain evaluations
- make limited use of relevant vocabulary

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Section B descriptor levels:

Level five, 1–5 marks

- fulfil a few 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