Cambridge Assessment International Education

# Cambridge International AS Level

**ENVIRONMENTAL MANAGEMENT** **8291/22**

Paper 2 **October/November 2020**

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 2020 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.





**[Turn over**

**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.

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| GENERIC MARKING PRINCIPLE 5:<br><br>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:<br><br>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) | fresh (water) | **1** |
| 1(a)(ii) | 0.63 (%); | **1** |
| 1(a)(iii) | increased flow of water into streams and rivers;<br>leads to increased flooding;<br><br>increased flow into seas from rivers;<br>raises sea-level;<br><br>increases risk of coastal flooding;<br>damage to communities;<br><br>loss of coastal areas / erosion;<br>loss of land / damage to infrastructure;<br><br>increased risk of salinisation of coastal soils;<br>loss of land for agriculture;<br><br>loss of annual melt waters;<br>affects some agricultural practices;<br>affects soil fertility;<br><br>**max 4** | **4** |

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(b)(i)</td><td>
<table>
<tr><th>description</th><th>type of aquifer</th></tr>
<tr><td>an aquifer which is found above the water table where an impermeable layer of rock or material lies above the regional water table</td><td>perched</td></tr>
<tr><td>an aquifer where the water from the ground above is prevented from seeping in by a layer of impermeable rock or material lying above the aquifer</td><td>confined</td></tr>
<tr><td>an aquifer where water from the ground directly above can seep into the aquifer</td><td>unconfined</td></tr>
</table>
<br>one correct;<br>all three correct;</td><td>2</td></tr>
<tr><td>1(b)(ii)</td><td>over-use / demand;<br>for domestic / industrial / agricultural use;<br><br>lack of rainfall / drought conditions;<br>due to climate change / natural cycles;<br><br>over-pumping could lead to salt intrusion in coastal aquifers reducing availability of freshwater;<br>max 2</td><td>2</td></tr>
</table>

| Question | Answer | Marks |
|---|---|---|
| 1(b)(iii) | education;<br>to reduce demand for water;<br>to encourage less wastage;<br><br>legislation;<br>to limit amounts that can be pumped for industrial / agricultural use;<br><br>public attitudes;<br>campaigns for reducing water use and waste;<br>named example, e.g. not washing cars;<br><br>use of grey water;<br>to irrigate plants and gardens;<br>to recycle / re-use water;<br><br>**max 4** | **4** |

| Question | Answer | Marks |
|---|---|---|
| 1(c) | population increases;<br>so greater demand for water;<br><br>change from agricultural use to domestic use;<br>as size of residential areas increases;<br><br>increase in use for non-essential purposes;<br>described, e.g. watering gardens / cleaning cars;<br><br>increase in waste of water;<br>larger population more likely to waste water than smaller rural population;<br><br>**max 5** | **5** |
| 1(d) | destruction of habitats;<br>noise during construction;<br>displacement of people / loss of traditional jobs;<br>disruption of river flow / annual flooding affected;<br>silting downstream of the dam;<br><br>**max 1** | **1** |

| Question | Answer | Marks |
|---|---|---|
| 2(a)(i) | The number of people (animals or crops) a region can support;<br>without degradation; | **2** |
| 2(a)(ii) | starts off with a gradual increase;<br>has a rapid growth rate / exponential;<br>levels off / plateaus;<br>**max 2** | **2** |
| 2(b)(i) | population continues to grow / rises / increases;<br>annual growth rate is falling / decreases; | **2** |

| Question | Answer | Marks |
|---|---|---|
| 2(b)(ii) | falling fertility rate / birth rate / birth control campaign;<br>increasing life expectancy / falling death rate / improved health service; | **2** |
| 2(b)(iii) | Malthus predicted a population catastrophe due to famine / war / disease;<br>this hasn't happened due to improved agricultural practices;<br>leading to better nutrition / greater availability of food;<br>improved medical facilities / availability;<br>leading to better health / life expectancy;<br>wars tend to be limited in size due to technology;<br>less deaths relatively;<br>more control over fertility;<br>**max 4** | **4** |
| 2(c)(i) | **Country A**<br>More like a column shape;<br>age groups are more even;<br>population is ageing;<br>people live longer;<br>females live longer than males;<br><br>**Country B**<br>more like a pyramid shape;<br>much greater population at younger age group;<br>people don't live as long;<br>no gender difference in longevity;<br><br>**max 4** | **4** |
| 2(c)(ii) | more young people / children in the population;<br>will reach reproductive age / mature;<br>at the same time;<br>produce children;<br>leading to population boom;<br>**max 4** | **4** |

| Question | Answer | Marks |
|---|---|---|
| 3(a) | The areas of coast highlighted are in either areas where a large population concentrated in cities has been passed by large rivers draining the wastes into the coastal areas or in particularly narrow and sheltered areas of sea such as around Denmark and Sweden and the Irish Sea.<br><br>The hypoxic (dead zone) areas are mostly found at the mouths of rivers or river estuaries whereas the eutrophic areas are found in the more sheltered bays or enclosed seas or areas like the Venetian lagoon.<br><br>The reasons for the coastal conditions include the large amount of sewage and agricultural waste from intensive cattle farms entering the rivers as they flow through eastern and western Europe and past the large cities along the way, as well as excess nitrogen and phosphate containing fertilisers running-off from the farmland.<br><br>These accumulate in the mouths and estuaries of the rivers and the build-up leads to the conditions shown on the maps. Particularly vulnerable are sheltered areas<br><br>**please use level descriptors 1** | **10** |
| 3(b) | The requirements of the question are:<br><br>• to describe the causes of eutrophication and hypoxic (dead zone) water<br>• to discuss the international nature of these events<br>• to describe strategies to control the release of the pollutants causing these conditions<br>• to assess the relative success of the strategies.<br><br>Indicative content:<br>A brief description of the causes of eutrophication and hypoxia (dead zone) in coastal waters.<br><br>A description of the different types of pollution involved, especially raw sewage, waste from intensive cattle farms, excess fertiliser run-off (rich in nitrate and phosphate), chemical and industrial waste.<br><br>Some mention of point and non-point sources in connection with difficulty of monitoring. International nature of the problem as the rivers flow through several countries, highlighting a need for international cooperation and agreement (role of EU environmental legislation for example). Role of NGOs such as Surfers against Sewage. | **30** |

| Question | Answer | Marks |
|---|---|---|
| 3(b) | Strategies to include education of people to prevent dumping through ignorance, legislation to control release of raw sewage and cattle wastes, and to monitor the use of septic tanks in more rural areas, to control the excessive use of fertilisers. Fines for breaches of legislation. Build more and better treatment plants to prevent the present ones being overwhelmed and releasing raw sewage.<br><br>Candidates should assess the relative successes of the different strategies described.<br><br>**please use level descriptors 2** | |

| Question | Answer | Marks |
|---|---|---|
| 4(a) | The rainforest started to disappear from the margins of the whole area though hung on in the east. The rate accelerated from 1985 through to 2010. Candidates should be aware of the date intervals shortening. From 2000 the rainforest shrank from the south towards the north. By 2020 the rate of disappearance appears to have slowed down though now the eastern area has gone.<br><br>Agricultural practices are the largest contribution to the loss of rainforest with clearances for logging and pulp plantations being a big factor.<br>Subsistence farming comprises 30% and this is reflected in the need for fertile soil so they move on and slash and burn new areas to grow their crops.<br><br>Logging, mining and infrastructure have a small effect relatively – however there is no mention of illegal logging which probably has a significant contribution.<br><br>**please use level descriptors 1** | **10** |

| Question | Answer | Marks |
|---|---|---|
| 4(b) | The question requirements are:<br><br>• to describe the causes and effects of deforestation<br>• to discuss the need for local, national and international agreements to control deforestation and the inherent difficulties<br>• to assess the different strategies used to control deforestation.<br><br>Indicative content:<br><br>The effects are those of drying of soil, increased erosion and run-off and loss of fertility. The atmosphere changes and local climate is altered. Many species of animal and plant lose their habitat. Increased carbon dioxide as a result will contribute to global warming and climate change.<br><br>A range of strategies to combat deforestation could be mentioned, with acknowledgement of the difficulties in obtaining agreements.<br><br>Local strategies could use education, the provision of better methods of farming and soil fertility maintenance such as fertilisers, provision of seeds with guaranteed results – all to make subsistence farmers use the soils better. Encourage ecotourism with local involvement so they see the value in conserving the rainforest.<br><br>National strategies include legislation and enforcement as well as supporting the local initiatives. There will be a role for NGOs in this. Cattle ranching is the largest contributor so needs to be regulated by national government, though it is hard to control.<br><br>International agreements are difficult to achieve and to enforce for many political and geopolitical reasons.<br><br>**please use level descriptors 2** | **30** |

| Question | Answer | Marks |
|---|---|---|
| 5(a) | The issue with an arid area is the lack of water in a long-term situation so strategies are needed to conserve and use what is available in the best possible way. Arid areas tend to have poor soil so any crops need to be irrigated which is an issue when water is short.<br><br>Cities by their nature have a huge demand and pressure on water supply and education in conservation is necessary to avoid having to turn the taps off.<br><br>Industrial demands for water are also a stress to the supply and regulation and control is needed and especially the use of waste (grey) water needs consideration.<br><br>An increase in population adds pressure to the system of supply and demand and exacerbates the problem.<br><br>**please use level descriptors 1** | **10** |

| Question | Answer | Marks |
|---|---|---|
| 5(b) | The requirements of the question are:<br><br>• to describe the problems of water supply within countries at different levels of economic development<br>• to discuss different methods of water supply and conservation methods<br>• to assess the relative success of the different methods of supplying water for industrial, domestic and agricultural use.<br><br>Indicative content:<br><br>Countries with good natural water supplies may also have well developed economies and can afford the infrastructure to provide adequate water supplies including the water pipe and drainage system, reservoirs and dams and have a population hopefully educated in water conservation. Industrial and agricultural use will be monitored and legislation in place to impose controls where necessary.<br><br>Countries with poor and limited water supplies may have weak economies and will not have the money to support a significant infrastructure or to build expensive systems such as reservoirs and dams.<br><br>A rich supply of water means plenty of water to collect and store. Arid conditions mean water is limited and hard to collect and store.<br><br>Reference to desalination plants can be made but must mention the expense involved in building them and the need for a coastline to access the seawater.<br><br>Similarly dams and reservoirs are expensive to build and need suitable rivers with reasonable flow rates and natural valleys to form the reservoir. These can be subjected to losses during periods of drought leading to extraction outstripping supply.<br><br>**please use level descriptors 2** | **30** |

| Question | Answer | Marks |
|---|---|---|
| | **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 (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

| Question | Answer | Marks |
|---|---|---|
| | **5–7 marks**<br>The response:<br>• may contain some errors<br>• shows an adequate understanding of the question<br>• shows some use of data or the information provided, where appropriate<br>• may lack balance<br><br>**1–4 marks**<br>The response:<br>• may contains errors<br>• shows limited understanding of the question<br>• shows little or no use of data or the information, where appropriate<br>• lacks balance | |
| | **Section B (part b):**<br>**Level descriptors 2**<br><br>Responses:<br>**Level one, 25–30 marks**<br>• fulfil all the requirements of the question<br>• contain a very good understanding of the content required<br>• contain a very good balance of content<br>• contain substantial critical and supportive evaluations<br>• make accurate use of relevant vocabulary<br><br>**Level two, 19–24 marks**<br>• fulfil most of the requirements of the question<br>• contain a good understanding of the content required<br>• contain a good balance of content<br>• contain some critical and supportive evaluations<br>• make good use of relevant vocabulary | |

| Question | Answer | Marks |
|---|---|---|
| | **Level three, 13–18 marks**<br>• fulfil some requirements of the question<br>• contain some understanding of the content required<br>• may contain some limited balance of content<br>• may contain brief evaluations<br>• make some use of relevant vocabulary<br><br>**Level four, 6–12 marks**<br>• fulfil limited requirements of the question<br>• contain limited understanding of the content required<br>• may contain poorly balanced of content<br>• may not contain evaluations<br>• make limited use of relevant vocabulary | |
| | **Level five, 1–5 marks**<br>• fulfil a few of the requirements of the question<br>• contain a very limited understanding of the content required<br>• are likely to be unbalanced and undeveloped<br>• evaluative statements are likely to be missing<br>• make no use of relevant vocabulary | |