Cambridge Assessment International Education

Cambridge International AS Level

ENVIRONMENTAL MANAGEMENT **8291/22**

Paper 2 **May/June 2020**

MARK SCHEME

Maximum Mark: 80

Published

Students did not sit exam papers in the June 2020 series due to the Covid-19 global pandemic.

This mark scheme is published to support teachers and students and should be read together with the question paper. It shows the requirements of the exam. The answer column of the mark scheme shows the proposed basis on which Examiners would award marks for this exam. Where appropriate, this column also provides the most likely acceptable alternative responses expected from students. Examiners usually review the mark scheme after they have seen student responses and update the mark scheme if appropriate. In the June series, Examiners were unable to consider the acceptability of alternative responses, as there were no student responses to consider.

Mark schemes should usually be read together with the Principal Examiner Report for Teachers. However, because students did not sit exam papers, there is no Principal Examiner Report for Teachers for the June 2020 series.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the June 2020 series for most Cambridge IGCSE™ and Cambridge International A & AS Level components, and some Cambridge O Level components.

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.

Science-Specific Marking Principles

1	Examiners should consider the context and scientific use of any keywords when awarding marks. Although keywords may be present, marks should not be awarded if the keywords are used incorrectly.
2	The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored.
3	Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. ethane / ethene, glucagon / glycogen, refraction / reflection).
4	The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted.

5 'List rule' guidance (see examples below)

For questions that require ***n*** responses (e.g. State **two** reasons …):

- The response should be read as continuous prose, even when numbered answer spaces are provided
- Any response marked *ignore* in the mark scheme should not count towards ***n***
- Incorrect responses should not be awarded credit but will still count towards ***n***
- Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should **not** be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response
- Non-contradictory responses after the first ***n*** responses may be ignored even if they include incorrect science.

6 Calculation specific guidance

Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states 'show your working'.

For questions in which the number of significant figures required is not stated, credit should be awarded for correct answers when rounded by the examiner to the number of significant figures given in the mark scheme. This may not apply to measured values.

For answers given in standard form, (e.g. $a \times 10^n$) in which the convention of restricting the value of the coefficient (a) to a value between 1 and 10 is not followed, credit may still be awarded if the answer can be converted to the answer given in the mark scheme.

Unless a separate mark is given for a unit, a missing or incorrect unit will normally mean that the final calculation mark is not awarded. Exceptions to this general principle will be noted in the mark scheme.

7 Guidance for chemical equations

Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.

State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

Question	Answer	Marks
1(a)(i)	the surface area of open water; has reduced / is less; relative change such as reduced by over 50% / halved; less water is available; the ground at the margins of the reservoir is exposed / the margins are more visible;	**max 2**
1(a)(ii)	increased demand for water from Cape Town; for industrial and domestic use; population increase; waste of water; repairs not undertaken; unnecessary use of water; such as gardens / grass features / golf courses / car washing; demand for agricultural / aqua cultural use; puts extra pressure on supply; lack of rainfall; over time leading to drought; climate change; reduction of water flowing into the reservoir;	**max 4**
1(a)(iii)	habitat becomes drier as the lake disappears; margin soil more exposed; area has less green growth around the margins; soil quality changes as it dries; food chains disrupted; both on land and aquatic; example described e.g. fish eagles have reduced hunting options;	**max 4**

Question	Answer	Marks
1(b)(i)	reduce the amount people are allowed to use; ban non-essential use; examples e.g. don't wash taxis or buses; divert supply from agriculture and industry; education; reduce amount in toilets wtte; showers instead of baths; repair leaks quickly; turn off the taps and supply water from tankers / bowsers; consider long term alternatives such as desalination plants / water diversion from areas with surplus;	**max 4**
1(b)(ii)	advantages: water supply; potential for recreation; aesthetic appeal; provides habitats; potential to generate power; disadvantages: could be affected by long term climate change / drought; damages habitats when constructed; disrupts / displaces people during construction; noise pollution during construction;	**max 6**

Question	Answer	Marks
2(a)(i)	near the North Pole / top of the world; above 60 °N latitude; on or close to the Arctic circle; northern Canada, Alaska, northern Scandinavia and Siberia;	**max 2**
2(a)(ii)	temperature; moisture / rainfall / precipitation;	**2**

Question	Answer	Marks
2(b)(i)	the transfer of energy; from prey to predator / from one organism to another / through feeding;	**2**
2(b)(ii)	harsh environment; short summer means abundance is very short lived; means food chains are fragile; populations are (relatively) small; biodiversity is (relatively) low; Less energy available to higher levels	**max 2**
2(c)(i)	hunting / shooting; roads disrupt territories; risk of collisions; settlements disrupt prey animals' behaviour; populations decline / relocate; poisoning (deliberate / accidental); bioaccumulation;	**max 3**
2(c)(ii)	insects contain the poison; insectivores ingest this poison; passes along the food chain; becomes more concentrated; bioaccumulation; top predator gets lethal / damaging dose of insecticide; gyrfalcons die / have reduced reproduction;	**max 3**

Question	Answer	Marks
2(d)	water stored as permafrost released; leads to more water in rivers and streams; increasing likelihood of flooding; water runs into the oceans; leading to rising sea levels; causing flooding of coastal communities; increasing salinisation of coastal soils / land; melting of the permafrost releases carbon dioxide store / methane; this is no longer locked up / released into the atmosphere; extra carbon dioxide / methane leads to increase in greenhouse gases; contributes to global warming; more extreme weather patterns / global weather pattern is uncertain as could lead to feedback loops; computer models vary in their predictions of feedback loops; more storms leading to coastal damage; decrease albedo as permafrost melts;	**max 6**

Question	Answer	Marks
B3(a)	The demographic transition model describes what has happened to birth and death rates in MEDC's since 1800. It has five stages. Not all countries go through the five stages as is the case with many LEDC's. Most countries can be allocated to a stage of the model and this can also indicate the countries state of development. As well as economic development, other important influences affecting population growth include social, religious, political and environmental factors. **Stage 1** High birth rates and high death rates, so low natural increase and little population growth. Very few, if any populations are in stage 1 now – may be rainforest tribes **Stage 2** High Birth rates but as death rates fall population grows rapidly. Main reasons include: No birth control High infant death rates More children to work on farms Religious beliefs Improved medical care More vaccinations, hospitals etc Cleaner water supplies/sewage Improved Food supplies **Stage 3** Lower death rates and the birth rates start to fall. The population growth rate starts to slow down. The birth rate starts to fall because of family planning, improved medical care and women marrying later. **Stage 4** Low birth and death rates. A low natural increase and steady population. Most MEDC's are at this stage. **Stage 5** The birth rate falls below the death rate and the population decreases. Rapidly growing population at stage 2 means huge demand for resources which need to be met by improved agricultural productivity. Likely high move to cities leading to urban sprawl and pressure on resources. Water stress could be another issue **Please Use Level Descriptors 1**	**10**

Question	Answer	Marks
B3(b)	The question requirements are: • to understand the reasons for controlling population • to show understanding of population control strategies • to discuss why countries with different levels of economic development may have different requirements and employ different strategies Indicative content: The pressures to control population increase are greater in countries with developing economies than those developed ones. In fact, some developed countries are alarmed by declining population and are introducing policies to boost growth such as tax breaks for marriage and for having children. Most effective methods for control to reduce growth can be listed as follows: • Delayed Marriages shorten reproductive time • Medical Facilities improve health and survival • Legislative Actions to incentivise smaller families • Providing Incentives such as free schooling for single children • Spread Awareness of the problems • Women Empowerment to control their fertility • Eradicate Poverty means less need to have lots of children • Education • Increased availability of cheap contraception • Improve development in terms of infrastructure, jobs, housing, hospitals etc. China has abandoned the one child policy and is striving to counteract an increasingly ageing population with not enough tax payers to support them by encouraging marriage and having children through incentives. Some western European countries are encouraging birth rate increase as population falls due to women making choices about fertility. **Please Use Level Descriptors 2**	**30**

Question	Answer	Marks
B4(a)	In 1985 a single pair of lionfish were released into the Atlantic coastal waters off Florida having outgrown their tank. In a decade the population had grown in this area and begun to spread northwards. Another decade and the spread was much further up the coast and starting to move south and towards the offshore islands. By 2010 the population had spread throughout the Gulf of Mexico and the Caribbean islands and along the central American coastlines. By 2014 there was further spread around the shores of the Gulf of Mexico and increasing numbers in all previously affected areas. (Invasive species like the lionfish outcompete the local native fish for food and space. They are voracious feeders and can consume many juvenile fish and destroy key species on the offshore reefs). **Please Use Level Descriptors 1**	**10**
B4(b)	The question requirements are: • to understand the problems caused by invasive species in a range of habitats • to outline different strategies to control invasive species • to assess the success of strategies to control invasive species Specific methods for the lionfish are to report sightings, remove them, eat them, and encourage sharks to eat them. The continued spread suggests that these methods were too late to prevent the spread and should now be focussed on containment and reduction. The shark method in Belize is controversial as it might lead to sharks targeting humans. Candidates should refer to a range of different examples and each will have specific strategies and levels of success. Examples could be Burmese python, grey squirrel, cane toad, Japanese knotweed, Kudzu (mile a minute vine), snake-head fish and Asian Tiger mosquito. Candidates should assess the relative successes of the strategies. **Please Use Level Descriptors 2**	**30**

Question	Answer	Marks
B5(a)	The four zones pictured are intended to work in the same way as a land-based biosphere reserve. The no-use zone has a complete ban on all human activities with the possible exception of scientific research and conservation activities. This restores the area to it's natural and undisturbed state. All species are able to breed and the healthy balance of the ecosystem is undisturbed by human activity. The main problem is enforcement and keeping marine pollutants out. The no-take zone has limited activities which don't involve hunting, fishing and collecting activities so as to maintain the populations and to protect breeding grounds and spawning areas. Diving and mooring should be controlled especially anchoring which could physically damage reefs. The buffer zone is the transition from the protected areas to the normal activities zone. Here activities are increasingly allowed with regulated fishing and diving and the encouragement of tourist and leisure activities. The multi-use zone is the normal situation which occurs in non-protected areas. **Please Use Level Descriptors 1**	**10**

Question	Answer	Marks
B5(b)	The question requirements are: • to describe the problems caused by marine pollution • to demonstrate a knowledge of different causes of marine pollution • to outline and assess strategies to manage both the causes and the effects of marine pollution Indicative content: Candidates should suggest a range of different marine pollutants which can be from point and/or non-point sources. Examples could include: litter including losses from vessels / fishing gear plastics sewage oil chemical spills fertilisers solutions could include: legislation including on land to prevent loss into the seas and maritime to include the activities of boats, shipping and oil rigs clean-up operations including ngo activities such as WWF and Greenpeace education fines for point source pollution reduction in untreated sewage release reduction in nitrate release to prevent red tides, eutrophic and hypoxic and dead zones occurring Candidates should provide assessment on the success or otherwise of the methods outlined **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

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

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

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