Cambridge Assessment International Education

Cambridge International AS Level

ENVIRONMENTAL MANAGEMENT **8291/21**

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)	**P** temperate forest (taiga); **Q** desert; **R** tropical rainforest;	**max 2**
1(a)(ii)	precipitation / rain(fall);	**1**
1(a)(iii)	decomposition / decay;	**1**
1(a)(iv)	biomass store reduced; due to removal of trees; litter store reduced; no leaves to fall; surface run-off increases; no trees to act as flow reducers; reduction in rainfall; due to reduction in evapotranspiration; soil moisture reduces; soil erosion increases; loss of canopy causes reduces phosphorus levels; less CO_2 taken up by photosynthesis; less organic nitrogen (due to erosion and leaching);	**max 4**
1(b)(i)	near the equator; (almost entirely) between the tropics; Africa / South America / India / Australia;	**max 2**
1(b)(ii)	temperature; rainfall / water;	**2**

Question	Answer	Marks
1(b)(iii)	advantages: destroys excessive growth; clears / creates space for growth; increases biodiversity; adds nutrients; destroys harmful insects / disease causing species; disadvantages: threatens human habitation; affects livestock; reduces soil litter layer; can spread out of control (catastrophic wildfire); can alter the soil surface structure which increases the chance of flash flooding; haze/smog; affects breathing;	**max 4**
1(b)(iv)	sustainable methods are used in order to protect the environment; improved conservation education programmes for local communities and farmers; harvesting branches rather than whole trees to prevent deforestation, soil erosion and desertification; crop rotation to keep a varied supply of nutrients in the soil and prevent soil erosion and desertification; stone lines along the soil contours keep it in place, prevent erosion and improve crop yields; managing grazing land to avoid overgrazing, soil erosion and desertification; decreasing livestock – solves the problem of overgrazing but requires people to adapt if they rely on cattle or goats for their livelihoods; establish protected areas; encourage indigenous species / discourage use of introduced species; encourage ecotourism; local people employed by conservation and tourism schemes;	**max 4**

Question	Answer	Marks
2(a)(i)	industry;	**1**
2(a)(ii)	growing population; greater consumer demands; increasing industrialisation; growing economy; increasing manufacture for export;	**max 2**
2(a)(iii)	build reservoirs; use desalination methods; improve infrastructure; establish water grid system to move water to places in need; import water; reduce waste; education;	**max 4**
2(a)(iv)	severe shortage predicted; domestic use affected; (less) for drinking / washing / valid example; Industrial use affected; (less) for use in cooling / manufacturing processes / valid example; Agricultural use affected; (less) for watering crops / livestock / valid example;	**max 4**
2(b)(i)	increased release of greenhouse gases; accumulate in upper atmosphere; absorb infra-red / heat; emitted back to Earth; increasing temperatures;	**max 2**

Question	Answer	Marks
2(b)(ii)	affect the supply of drinking water / irrigation water; could lead to drought conditions; due to loss of annual melt flow; leads to rising sea levels; coastal and low-lying areas at risk; loss of reflective areas / decrease in albedo affects global temperatures; contributing to global warming;	**max 3**
2(b)(c)	named pollutant e.g. fertiliser / nutrient enrichment / sewage / named chemical; relevant method of pollution e.g. farming run-off / sewage pipes into the sea / chemical spills; relevant environmental impact or impacts; relevant health impact or impacts;	**4**

Question	Answer	Marks
B3(a)	Advantages: International cooperation, joint projects, involvement of local population, improved economy / employment, expansion of tourism and nature tourism, conservation of species extends beyond borders, allows joint protection forces to combat poaching. Disadvantages: Bureaucracy can delay decisions, communication issues, law enforcement across borders can be difficult, management of livestock and animal diseases is problematical, wildlife corridors to connect areas may lead to spread of diseases and vectors, local populations might disagree about methods / limits on movement and traditional activities **Please Use Level Descriptors 1**	**10**

Question	Answer	Marks
B3(b)	The question requirements are: • to show understanding of the needs for conservation • to describe a range of conservation strategies • to evaluate the relative success of individual strategies. Indicative content: A range of schemes considered to include national parks, conservation areas, SSSI, wildlife parks, marine parks, ecotourism and ecological islands. 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. 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. **Please Use Level Descriptors 2**	**30**

Question	Answer	Marks
4(a)	Plastics in the form of bottles, bags (look like jellyfish to a turtle), fishing nets and lines and plastic pellets are the main types. Death caused by ingesting plastics, accumulating in the digestive systems, reducing the ability to feed, or reducing the amount eaten, plastic becomes entangled around limbs impeding mobility. Plastics accumulate in huge masses in the centre of ocean gyres making passage difficult and interfering with migration routes. Plastics interfere with reproduction. Plastics can reduce visibility and reduce the chances of successful predation and reproduction. **Please Use Level Descriptors 1**	**10**
4(b)	The question requirements are: • to show understanding of the range of marine pollutants both point and non-point in origin • to suggest strategies to reduce the pollution of the marine environment • to evaluate the success of such strategies. Indicative content: Point sources can be traced and are usually factories, oil refineries, paper mills and farms discharging waste into water bodies or via sewage treatment plants. Also, there is direct dumping from vessels. Non-point sources are harder to trace and are usually the result of run-off water from rainfall or snow melt collecting pollutants as they flow into the water ways. Plastics and chemicals from landfill sites. Strategies for point sources include regulation and legislation with sources expected to use technology to clean effluent before it enters the water. Licensing schemes exist to control release of pollutants. Fines for breaches of regulations. Strategies for non-point include education to encourage people to not allow accidental spills of the pollutants and to discourage illegal dumping. Controls over landfills to ensure the plastics are dealt with and not allowed to leach into the waterways and hence the seas Encouraging the reduction in packaging in consumer goods, the charging for plastic bags at supermarkets, encouraging people to cut up plastics such as those rings from a six pack of cans. Encouraging the removal of plastic micro-beads from cosmetics and related products. Making oil tankers more secure from spills such as double hulls, and increasing legislation with regards to safety in the off-shore oil industry. Organising clean-up campaigns, NGOs have campaigns and publicity to educate and inform. Named examples such as Greenpeace and Surfers against sewage. **Please Use Level Descriptors 2**	**30**

Question	Answer	Marks
5(a)	Overgrazing is responsible for most soil degradation except for North and South America. Next most responsible is deforestation particularly significant in Asia, South America and Europe. Differences are due to the nature of the lands available, the increasing aridity of the areas and the growing populations putting particular pressures on the lands in some areas, whether or not legislation and enforcement protects areas from e.g. clearance / burning etc. The difference in pressures from subsistence and mechanised industrial-level farming. **Please Use Level Descriptors 1**	**10**
5(b)	The question requirements are: • to show understanding of the need to increase agricultural production • to demonstrate how this impacts on soil quality and local habitats • to suggest how this can be managed in countries with differing levels of financial development. Indicative content: Subsistence farming in countries with low economic development leads to loss of habitats. As soil quality falls farmers who can't afford to use fertilisers clear new land instead (slash and burn) and destroy habitats. Increasing degradation of soil promotes desertification, as soil becomes increasingly arid farming becomes increasingly difficult. Such countries lack the money for infrastructure projects such as irrigation schemes and may come to rely on funding from elsewhere increasing debt. As a consequence, despite legislation the environment is not protected very successfully. Countries with higher levels of income can farm intensively and afford the fertilisers to maintain the soil quality. As a result, they are less likely to destroy local habitats through encroachment and have the luxury of infrastructure and to be able to support environmental protection schemes. **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:

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 poor 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 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