



Cambridge International AS Level

ENVIRONMENTAL MANAGEMENT

8291/22

Paper 2

October/November 2021

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 2021 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

This document consists of **14** 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.

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

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.

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Question	Answer	Marks
1(a)(i)	240 000;	1
1(a)(ii)	75; 2500 / 2.5 = 1000; 75 000 / 1000;	2
1(a)(iii)	large scale use of water; reduction in ground water stores; diversion of natural water flows; (groundwater depletion) leads to salt water intrusion / salinisation; land subsidence;	4
1(b)(i)	most cotton producing countries have some water stress; no pattern to ranking and stress level; Uzbekistan has extremely high water stress; Brazil has the lowest water stress; cotton production is not the main cause of water stress ;	3
1(b)(ii)	21.059 / 21.06 / 21.1;	1
1(c)(i)	any number between 20 and 35%;	1
1(c)(ii)	loss of fishing industry; salinisation / desertification of soil; can't grow crops; poverty related illness; migration away;	2

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Question	Answer	Marks
1(c)(iii)	cost; silting of river lower down / reduced flow; environmental damage during building; displacement of people; noise / visual pollution; loss of habitat; leads to loss of biodiversity; will flood some areas;	3
1(d)	loss of insects; <u>beneficial</u> insects affected; biomagnification - increased concentration the higher the animal is in a food chain; bioaccumulation - accumulation of chemical in a particular species affects non-target species as alternative to loss of insects; harms other species; pollution risk to water stores / air;	3

Question	Answer	Marks
2(a)(i)	between 7 and 9 degrees;	1
2(a)(ii)	between 310 and 320 mm;	1
2(a)(iii)	large areas of rainforest lost; from the East; areas showing gaps between rainforests; largest remaining in north / north-east; coastal areas have disappeared first;	4

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Question	Answer	Marks
2(a)(iv)	forest clearing; for subsistence farming; logging; for timber; urban development; roads; airport; global warming; due to loss of vegetation / desertification; forest fires;	4
2(a)(v)	temperature; increases rates of activity; e.g. photosynthesis; water; maintains high humidity; nutrient rich soil; high biodiversity; high level of plant growth / primary productivity; rapidly recycled minerals and organic matter;	2
2(b)	loss of nutrients; named example; plants grow less well; loss of structure; roots have less structure to hold; litter layer reduced even further; less water available; disruption of local hydrological cycle;	4

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Question	Answer	Marks
2(c)	education; encourage people to respect the environment; legislation; fines for deforestation; licensing to control logging / mining; farmers given support to fertilise existing land; protected area; encourage ecotourism; locals earn a living from the biodiversity;	4

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Question	Answer	Marks
3(a)	<i>Advantages:</i> The education of the people allows for the preservation of wildlife because it is in their interest to protect the environment as it provides jobs. Tourists get to see the environment in its natural state and are also educated to consider how they affect the environment. Species are protected within the natural state. <i>Disadvantages:</i> Disruption due to the infrastructure needed by tourists, changes to native lifestyles and pursuits which might disrupt the natural environment, the creation of artificial conditions and pollution from tourist activities. Creates resentment between those who benefit and others who don't. please use level descriptors 1	10
3(b)	<i>The question requirements are:</i> • to recognise the need for conservation • to demonstrate understanding of a National Park and provide named examples • to demonstrate understanding of the relative success of National Parks. <i>Indicative content:</i> Candidates could provide details of a range of conservation strategies used in National Parks. They are expected to be able to describe these different methods with named examples. Candidates should demonstrate an understanding of the concept of declaring an area a national park, providing legislation to protect the environment, the provision of rangers and tourist facilities. A balanced argument should describe the pressures on a National Park from increasing urbanisation, demands for access, potential issues from mining, quarrying and other industrial pressures. Enforcement to combat a range of issues from littering, logging and poaching. A balanced assessment of the relative success of different methods in conserving the natural environment within a National Park, and a comparison between different examples. please use level descriptors 2	30

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Question	Answer	Marks
4(a)	The estimates of the past are broad and relatively flat, because they are based on little evidence and taken from journals and amateur observations. Hence, they are rather generalised. The instrumental record is narrower in range because they are based on scientific records gathered using specialised recording instruments which, as time progresses, are more accurate so the band narrows. The projections for the future are based on educated calculations but as time increases, they become less accurate so the band broadens. Overall the trend is upwards. please use level descriptors 1	10
4(b)	<i>The question requirements are:</i> • demonstrate knowledge of the international protocols • show understanding of the difficulty in achieving and monitoring the protocols • assess the relative success of chosen examples. <i>Indicative content:</i> Candidates should use a range of examples which could include Montreal, Kyoto and Paris. More recent declarations are also valid. Understanding the need to reduce carbon dioxide and methane releases as well as other related policies in order to slow the climate change resulting from these emissions. Candidates need to refer to rising sea levels and other influences such as melting glaciers and polar ice. The difficulties in getting agreement between countries of differing levels of economic development, environmental policies and political ideologies as well as the problems of monitoring and enforcing these between borders and countries. Assessment of the relative success should be made. please use level descriptors 2	30

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Question	Answer	Marks
5(a)	All areas except Europe (-9%) have projected increases. Falling birth and death rates plus lifestyle choices contribute to this. Whereas other areas have small, predicted increases Africa (+242%) has a huge predicted rise. Oceania (+77%) and North America (+51%) were the next highest. Whilst having emerging economies there are still high birth and death rates in Africa where some areas lack the facilities to treat illness, lack access to health care and contraception and are also affected by political and religious issues. Candidates will refer to the one child policy in China though this has been abandoned. The projected population growth map suggests the problems to come as the huge growth in Africa is not compensated by losses anywhere other than in Europe. This means that continued stress on resources is to be expected. There needs to be a more sustainable approach to resources to avoid worldwide problems and potential conflicts please use level descriptors 1	10
5(b)	<i>The question requirements are:</i> • demonstrate an understanding of the population growth and its impact on resources • understand the problems of improving agricultural practices in order to provide food for a growing population in a sustainable way • be able to describe and assess the methods used and the problems faced by countries with different levels of economic development. <i>Indicative content:</i> An understanding that an increasing population needs more food. Agricultural methods to improve this are based on intensive use of fertilisers, increased mechanisation and repeat cropping of land without a fallow period. Land is sometimes cropped twice a year. Livestock farming brings huge issues especially the intensive farms which result in global issues of pollution. Modern intensive agriculture has a huge logistic infrastructure to get produce to consumers. In low income economies there is likely to be subsistence level farming relying on clearing new land and lacking the resources to buy fertiliser and good quality seed. Aid to purchase these and developments such as genetically modified and cloned plants providing a better, more guaranteed product can be utilised. please use level descriptors 2	30

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Question	Answer	Marks										
	Section B descriptor levels: <table><tr><th>Descriptor</th><th>Award Mark</th></tr><tr><td>Consistently meets the level criteria</td><td>Mark at top of level</td></tr><tr><td>Meets the criteria, but with some inconsistency</td><td>Middle, mark to just below top mark</td></tr><tr><td>Meets most of level criteria, but not all convincingly</td><td>Just below middle, mark to just above bottom mark</td></tr><tr><td>On the borderline of this level and the one below</td><td>Mark at bottom of level</td></tr></table> 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 contains errors - shows limited understanding of the question - shows little or no use of data or the information, where appropriate - lacks balance	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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On the borderline of this level and the one below	Mark at bottom of level											

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Question	Answer	Marks
	Section B (part b), 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 poorly balanced of content • may not contain evaluations • make limited use of relevant vocabulary	

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Question	Answer	Marks
	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	