



Cambridge International AS Level

ENVIRONMENTAL MANAGEMENT

8291/13

Paper 1 Principles of Environmental Management

May/June 2022

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 May/June 2022 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

This document consists of **19** 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	<u>'List rule' guidance</u> For questions that require <i>n</i> responses (e.g. State two reasons ...): • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked <i>ignore</i> in the mark scheme should not count towards <i>n</i>. • Incorrect responses should not be awarded credit but will still count towards <i>n</i>. • 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 <i>n</i> 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)	1265.27; 1265;	2
1(a)(ii)	the (land) area of France is more than twice that of UK / ORA;	1
1(a)(iii)	environmental; land unfit for settlement; availability of fertile land / land suitable for agriculture; economic; move for employment; rural land is at a premium; migration rate; better standard of living e.g. better healthcare available / better education; social; cities have large populations; better infrastructure / amenities; political; disruption due to conflict; historical; prolonged drought;	4
1(b)(i)	UK bulges in the middle / ORA; Mozambique has wide base and narrow taper / ORA; UK pyramid shows an ageing population / ORA; because of the bulge above 50 / description / ORA; male : female ratio is almost identical for both; UK shows longer life expectancy / ORA; because much larger numbers reaching older ages / ORA;	4

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Question	Answer	Marks
1(b)(ii)	HIC: better health care; higher elderly population; increases life expectancy; lower death rate; better standard of living; LIC: ORA for each point.	4

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Question	Answer	Marks
2(a)(i)	methane CH ₄ oxides of nitrogen NO _x CFCs cattle farming / landfill / rice fields or paddy farms; vehicle exhausts; propellants from aerosols / refrigerators and freezers;	2
2(a)(ii)	reduced use of fossil fuels; waste disposal controls for cattle farms; reduction in landfill; oxides of nitrogen by catalytic converters; restricting vehicle use in urban areas; legislation; education;	4
2(a)(iii)	increased / more / extra carbon dioxide enters the atmosphere; carbon dioxide becomes trapped in the atmosphere; radiation / energy from the sun; passes through the carbon dioxide; the radiation is converted to longer wave energy; this energy is reflected back to the ground by the trapped carbon dioxide; increasing the temperature of the planet / global warming; leading to increasingly severe weather / climate effects / climate change;	5
2(b)	X = photosynthesis; Y = respiration; Z = decomposition;	2

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Question	Answer	Marks
3(a)(i)	temperature / humidity / oxygen / salinity / light / pH;	1
3(a)(ii)	lack of available water; low temperatures; thin soil layer; permafrost layer below the soil; soil lacks fertility; tundra is windswept; light is limited for large parts of the year / short growing seasons;	4
3(a)(iii)	<u>permafrost</u> ;	1
3(b)(i)	For biomass: desert is too dry; desert is too hot; to support much plant life; less plants means less animals; less food and shelter; For litter: less plants and animals mean less litter falling; less (animals) leave less wastes; less litter falling and wastes means less to decompose;	4

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Question	Answer	Marks
3(b)(ii)	<i>gross primary productivity</i> is the total amount of energy produced by plant productivity; <i>net primary productivity</i> is the stored energy / the energy left after the energy used for respiration is subtracted;	2

Question	Answer	Marks
4(i)	it provides a guaranteed source of energy; it is renewable; it adds extra source to the existing sources; variation in sources is more secure; it increases the supply; provides energy at an affordable price; it reduces the reliance on fossil fuels; Austria is landlocked so can't access sources such as from the sea;	4

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Question	Answer	Marks
4(ii)	fossil fuel depletion; fuel becomes in short supply / or more expensive / AW; inequality in global energy resources; access to fuel supply becomes limited; population growth; increased demand / demand outstrips supply; differing energy needs of countries in different income groups; political decisions; climate change; reduction in carbon emissions can affect your access to fossil fuels; supply disruption; leads to insecurity if you can't access fuel; named example e.g. natural disasters / piracy / terrorism / wars or conflicts;	4

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Question	Answer	Marks
4(b)	<i>Any two advantages to max two marks:</i> Advantages: controllable supply of electric power; renewable energy source; clean power source; creates jobs; creates leisure opportunities; <i>Any two disadvantages to max of two marks:</i> Disadvantages: alters / destroys habitats; could be affected by droughts / climate change; affects the river downstream of the dam / disrupts natural flow of water; can affect livelihoods downriver; causes the re-location of people; costly (especially construction); requires maintenance;	4

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Question	Answer	Marks
5(a)	dropped by people / littering / thrown from boats; blown from land / washed from landfill into water bodies; brought by ocean currents; difficult to prevent (it gets on the beaches);	3
5(b)	aesthetic; animals / birds get tangled in it; animals / birds ingest it; leading to death; enters the marine environment;	1
5(c)	NGOs organise litter picking / beach cleaning days; volunteers help clean the beach; totally reliant on volunteers / goodwill; have brief / short term effects; useless without challenging / tackling the causes;	4

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Question	Answer	Marks
6	This question assesses A02 and A03 skills. The question requirements are to: • To show understanding of the causes of wildfires • To demonstrate knowledge of global climate change • To provide a balanced discussion about the statement with relevant examples Indicative content A balanced response will include arguments for and against the statement with the candidate making a conclusion. Arguments against could include the fact that wildfires are a normal part of the cycle in Australia, that there is a wildfire season and some species of plants and trees rely on this cycle to regrow and re-populate the bush area. They could argue that the absence of the rains and the prolonged drought were simply a variation in the normal pattern and not reflective of a greater, global effect. Arguments for should include the widespread evidence for growing climate change, increased severe weather phenomena, rising sea temperatures and the connection to increased human release of carbon dioxide and methane from various activities. Although a description of global warming is relevant it should not form the bulk of the response – the question requires analysis of the evidence. Candidates may refer to the el Niño / la Niña effects. Australia specific evidence is directly related to heat and drought. Prolonged higher than average temperatures linked with a prolonged drought created the perfect conditions for the wildfires to be so intense and widespread. In recent decades the lowest rainfall and highest average temperatures have been recorded.	20

Question	Answer		Marks
6	Generic levels of response		
	Level	A02: Information handling and analysis	Marks
	3	- Responses contain reasoned explanations with knowledge that indicates a strong conceptual understanding of the topic. - Incorporates frequent use of directly relevant examples.	7–8
	2	- Responses contain explanations with some gaps or errors in the reasoning. - Explanations may lack detail or accurate knowledge. - Examples are included but some opportunities to include relevant examples are missed.	4–6
	1	- Responses contain a few general points, which are mainly descriptive, comprising a few simple points, - Knowledge is basic and understanding may be poor and lack relevance to the question set. - Irrelevant or no examples are given.	1–3
	0	No creditable response.	0
	Level	A03: Investigation skills and making judgements	Marks
	4	- Clearly presents and develops both sides of the argument. - Judgements are fully supported with relevant qualitative and / or quantitative information - Clear balanced conclusion which is consistent with the question and candidate response.	10–12
	3	- One side of the argument is better developed than the other. - Judgements are partially supported with qualitative and / or quantitative information - Conclusion is consistent with the question and candidate response.	7–9
	2	- Describes only one side of the argument. - Judgements have minimal support; qualitative or quantitative information lacks relevance. - Conclusion may be inconsistent with the question and candidate response.	4–6

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Question	Answer			Marks
6	Level	A03; Investigation skills and making judgements	Marks	
	1	• Response is descriptive. • Minimal judgement is made, unsupported by qualitative or quantitative information, • Conclusion is inconsistent with the question and candidate response, or no conclusion made,	1–3	
	0	• No creditable response	0	

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Question	Answer	Marks
7	This question assesses A02 and A03 skills. The question requirements are to: • To demonstrate understanding of strategies to manage habitats • To demonstrate awareness of the problems • To show knowledge of a specific, chosen location • To provide a balanced evaluation of the strategies Indicative content The statement is from a landowner who is very supportive of rewilding as a conservation method in particular to increase biodiversity and reducing flooding. It is clear that such conservation methods benefit people through enrichment of the environment, well-being and protection from flooding. Conserved habitats can be available for tourism which also improves mental well-being. Candidates should understand these benefits and those derived from conservation methods which benefit both the habitat and the biodiversity within. Methods discussed and evaluated should include some of the following: rewilding, extracted reserves, protection of habitats, nature reserves, protected areas, conservation zones and national parks.	20

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Question	Answer			Marks
7	Level	A02: Information handling and analysis	Marks	
	3	- Responses contain reasoned explanations with knowledge that indicates a strong conceptual understanding of the topic. - Incorporates frequent use of directly relevant examples.	7–8	
	2	- Responses contain explanations with some gaps or errors in the reasoning. - Explanations may lack detail or accurate knowledge. - Examples are included but some opportunities to include relevant examples are missed.	4–6	
	1	- Responses contain a few general points, which are mainly descriptive, comprising a few simple points, - Knowledge is basic and understanding may be poor and lack relevance to the question set. - Irrelevant or no examples are given.	1–3	
	0	No creditable response.	0	
	Level	A03: Investigation skills and making judgements	Marks	
	4	- Clearly presents and develops both sides of the argument. - Judgements are fully supported with relevant qualitative and / or quantitative information - Clear balanced conclusion which is consistent with the question and candidate response.	10–12	
	3	- One side of the argument is better developed than the other. - Judgements are partially supported with qualitative and / or quantitative information - Conclusion is consistent with the question and candidate response.	7–9	
	2	- Describes only one side of the argument. - Judgements have minimal support; qualitative or quantitative information lacks relevance. - Conclusion may be inconsistent with the question and candidate response.	4–6	

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Question	Answer			Marks
7	Level	A03; Investigation skills and making judgements	Marks	
	1	• Response is descriptive. • Minimal judgement is made, unsupported by qualitative or quantitative information, • Conclusion is inconsistent with the question and candidate response, or no conclusion made,	1–3	
	0	• No creditable response	0	