Cambridge International AS Level

ENVIRONMENTAL MANAGEMENT **8291/12**

Paper 1 Principles of Environmental Management **October/November 2023**

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 2023 series for most Cambridge IGCSE, Cambridge International A and 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 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)	*any three from:* limited forest (and low vegetation) furthest N; dense and limited distributed fairly equally / forest and grass covers small<u>est</u> area; distributed in bands running E to W / distributed in bands by latitude; forest and grass land restricted to SW/S / or close to US border; limited forest in the central part of Canada;	3
1(a)(ii)	*any three from:* as you move N the average temperatures decrease / ORA; limited forest tolerates colder temperatures; grass requires warmer temperatures; idea that land becomes less populated (in north) / idea less urbanised / ORA; AVP; e.g. grasslands have been cultivated; variation in soil types / poorer soils in north (linked to underlying geology); water not available in northern Canada (permafrost / frozen ground) / ORA; centre of country much colder in winter so forest further;	3
1(b)(i)	meet the needs of the present; without compromising the ability of future generations to meet their own needs;	2
1(b)(ii)	*any three from:* managed forest regeneration / trees replanted / reforestation / afforestation; quotas for harvest/selective logging / heli-logging; legislation / harvesting under licence / law that harvested areas must be replanted; follow accredited schemes / Sustainable Forestry <u>Initiative</u>® (SFI®) or Forest Stewardship Council® (FSC®); protected areas; AVP; e.g. local planning decisions for development so land use does not change from forest to urban;	3

Question	Answer	Marks
1(c)(i)	*any two from:* uses technology; large amount of data / complex data; collected rapidly; computer analysis;	**2**
1(c)(ii)	*any two from:* people can rely too heavily on the data; computer analysis not perfect / data may not be reliable; limited human input; large amount of data takes long time to process; cost of technology (for analysis);	**2**

Question	Answer	Marks
2(a)(i)	*any three from:* evolutionary distinct <u>species</u> / no close evolutionary relatives / limited number of similar species; unusual physical characteristics / unusual features; unusual behaviour; population, low / threatened / endangered; only lives on one island;	**3**
2(a)(ii)	*any three from:* raise profile / awareness of EDGE species; promote conservation / education; monitor species / to prevent extinction; support conservation projects / breeding projects; award fellowships;	**3**

Question	Answer	Marks
2(b)	*any three from:* hunting; logging / deforestation / habitat loss; introduction of invasive species; more predation (e.g. cats); outcompeted; disease; lack of prey / shortage of food; climate change;	**3**
2(c)	*any five from:* legislation to protect the species; ban hunting; control invasive species; captive breeding programme; legislation to protect the habitat; projects to improve the habitat; conservation zone (national parks, bioreserves) / protected areas; raise profile of the species / ecotourism;	**5**

Question	Answer	Marks
3(a)(i)	*any two from:* when people <u>do not</u> have access <u>at all times</u>; to, sufficient / safe / nutritious food; for, dietary needs / healthy life; affordable;	**2**

Question	Answer	Marks
3(a)(ii)	*any four from:* disease, reduces crop growth / lowers crop yield; less plant-based food available; crop maybe, a staple / the basis of the diet; less fodder for animals / animals starve; food prices increase / only rich can afford food; less money available to purchase other, foods / goods / services;	**4**
3(b)	*any five from:* *positive (max 3):* can produce large yields (per unit area) / increases food production; less crop pest / disease; produces crops, all year / longer growing season; can produce high value crops; therefore, more money for buying other foods; reduced water demand compared to traditional methods so food security maintained despite limited water; controlled application of fertiliser / no run-off; does not require soil / can grow crops in areas of infertile land; *negative (max 3):* requires, infrastructure / investment; so not available for everyone; does not tend to produce staple foods; high energy costs to run; requires technology / expertise / requires monitoring;	**5**

Question	Answer	Marks
4(a)	*any three from:* populations almost equal up to 40–64; slightly more males to females in lower age groups OR named age group; more females than males over 65 OR named age group / much more females than males in the highest age groups; comparative data quote e.g. 0.4% males 90–94 compared to 1.0% females / e.g.2% males 0–4 compared to 1.8% females; largest age group is 45–49 for both genders;	**3**
4(b)(i)	pyramid becomes narrower near base;	**1**
4(b)(ii)	*any three from:* improved availability of contraception; improved education on contraception; improved education and opportunities for women; anti-natalist policy; family planning; cost of living / general change in attitudes / rise of materialism;	**3**
4(c)	*any four from:* Haiti is LIC / Japan is HIC; *Japan:* lower birth rate ; may have greater availability of contraception; more women in, education / work; higher proportion of older people / longer life expectancy; better, healthcare / social care; *Haiti:* may have higher infant mortality therefore higher birth rate to compensate; may be a cultural tradition to have large family; may need more children, to work / earn money for family; lower life expectancy; poorer healthcare / housing / diet / sanitation;	**4**

Question	Answer	Marks
5(a)	surface fresh water / named example e.g. lake; sub-surface fresh water / named example e.g. soil moisture, aquifer; atmospheric water / named example e.g. clouds, rain;	**3**
5(b)(i)	3200 km^3 from agriculture **and** 4600 km^3 total / 3200 km^3 / 4600 km^3 × 100; 69.57% **and** 2 sig. figs = 70;	**2**
5(b)(ii)	*any two strategies from*: improved irrigation techniques e.g. drip/trickle, sub-surface, localised; drought resistant crops / GM crops; only growing crops in the most suitable season / available rainfall; hydroponics / aeroponics; mulching; irrigation at night; *developed:* accurate placement of water near crop; pulse/intermittent application of water; reduces water evaporation or loss of water; growing crops less dependent on high water supply; recycling water / greywater; cooler less evaporation;	**4**

Question	Answer	Marks
6	**'Reducing water usage will provide water security for all countries by the year 2040.'** **To what extent do you agree with this statement?** **Give reasons and include information from relevant examples to support your answer.** The question requirements are to: • show an understanding of water security • describe threats to water security • describe ways of reducing water wastage • evaluate the statement with particular consideration for 'all countries by 2040' **Indicative content** Candidates may use specific examples of individual, local and national schemes to reduce water use, including case studies. **Generic levels of response**	**20**

Level	AO2: 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

Question	Answer			Marks
6	**Level**	**AO3: 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	
	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	

Question	Answer	Marks
7	**Evaluate habitat conservation and creation as methods of conserving biodiversity.**	**20**
	Give reasons and include information from relevant examples to support your answer.	
	The question requirements are to:	
	• show an understanding of the importance of biodiversity	
	• show an understanding of habitat conservation and creation including rewilding, extracted reserves, protection of habitats, nature reserves, protected areas, conservation zones and national parks	
	• describe successful and less successful examples	
	• evaluate the statement on a local, country and global level	
	Indicative content	
	Candidates may provide a definition of biodiversity along with an understanding of its importance. The importance should highlight ecological, economic, recreational, cultural and scientific reasons.	
	Candidates may use specific examples of individual, local, national and international methods, including case studies. The examples should be balanced and show successful and less successful methods.	
	Candidates may describe the limitations of the methods.	
	Candidates are likely to be split over their conclusion but their answer should be balanced. Answers should be supported by case studies / relevant examples where this provides balanced evidence.	

Question	Answer	Marks
7	**Generic levels of response**	

Level	AO2: 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

Question	Answer			Marks
7	**Level**	**AO3: 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	
	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	