CAMBRIDGE
International Education

Cambridge International AS Level

ENVIRONMENTAL MANAGEMENT **8291/22**

Paper 2 Management in Context **October/November 2024**

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 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

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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 descriptions 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:* increasing global temperatures / global warming; extreme or severe weather; examples of extreme weather, e.g. drought / flooding / hurricanes; rising sea levels; (leading to) loss of land (for crops or agriculture); non-optimum conditions for crop growth (due to climate change); crop failure / reduced crop yield / less food;	**3**
1(a)(ii)	*any three from:* seaweed act as carbon sinks / stores / shellfish act as carbon sinks / stores; seaweed absorbs or uses carbon dioxide during photosynthesis; seaweed is fast growing so large volumes of carbon dioxide removed; provide an alternate food source other than meat based diet; (acts as raw ingredient in many products so) reduces need to extract other raw ingredients; (biofuels) reduce need for fossil fuels;	**3**

Question	Answer	Marks
1(a)(iii)	*any one from:* habitat for marine wildlife; storm-surge protection; improved food security; high (aquatic) crop density or yield;	**1**
1(b)(i)	*any three from:* overall increase; 1978 to (1987–)1990 no change or little change / stable; decrease (2005–)2006 to 2007; relevant quoted data trend;	**3**
1(b)(ii)	*any one from:* extreme weather or description, e.g. storms / hurricanes; disease; unfavourable growing conditions or description; outcompeted by other species; competition from other ocean activities / industries;	**1**

Question	Answer	Marks
1(c)	*any two from:* large area of ocean needed; limits (other) activities that can take place in ocean; competition with fishing / traditional marine harvesting; concern over impact on native species; increase in pollution (from boats);	**2**
1(d)	*any three from or developed:* legislation / international agreement; sustainable harvesting; protected areas; stated fisheries regulation: quotas / catch limits / closed seasons; changes to net size (protects juveniles) / changes to fishing method such as pole and line (reduces bycatch);	**3**

Question	Answer	Marks
1(e)(i)	*any three from:* ice sheets; glaciers; lakes; rivers / streams; swamps; marshes; permafrost;	**3**
1(e)(ii)	*any three from:* nitrogen; oxygen; carbon dioxide; argon / noble gases;	**3**

Question	Answer	Marks
1(f)	*any three from:* temperature; humidity; oxygen; carbon dioxide; salinity; (sun)light; pH;	**3**

Question	Answer	Marks
2(a)(i)	idea of a comparison with a control / identify anomalous results;	**1**
2(a)(ii)	No **and** peak bat activity has low insect numbers / ORA;	**1**
2(a)(iii)	data is only for bat activity / no information on number of bats / same bat could be counted numerous times or not counted at all;	**1**
2(b)	*any two from:* fit tracking devices to the bats; monitor by GPS; use radio tracking; put electronic (motion) detectors at different distances from the cave;	**2**

Question	Answer	Marks
2(c)	*any three from:* international agreement or cooperation; to ensure international trade in bats does not threaten the survival of the species / cause extinction; prevents illegal trade / poaching; provides information / updates on endangered status of species; raise awareness / education (of bats);	**3**
2(d)	*max four:* *max three benefits:* quicker than using other methods e.g. sweep net; a lot of insects collected; low skill level needed to operate; could survey a wide area; *max three limitations:* cost of equipment; insects may be killed or harmed; only collects insects where suction device is pointed; equipment might be heavy to use; requires fuel or battery (unlike a sweep net);	**4**

Question	Answer	Marks
3(a)	*any four from:* dissolves in water in the atmosphere; falls as wet deposition, e.g. snow, rain, hail, fog; absorbed by dust or gases; falls as dry deposition; intercepted by leaves on trees; leaves fall onto soil as litter;	**4**
3(b)	axis labels: *y*-axis **and unit** (mercury) concentration / μg per g **and** *x*-axis country; sensible linear scale with data that occupies at least half the grid; bars equal width **and** not touching; 4–5 correct plotting;	**4**

Question	Answer	Marks
3(c)	*any four from:* road built through the forest; deforestation; fragmentation; leaching from ponds; water or soil pollution; piles of waste / overburden; (leading to) habitat loss; loss of biodiversity / food chain disruption; atmospheric pollution from vehicles / machinery;	**4**
3(d)(i)	*any two from:* those who produce the pollution should pay (for the cost of managing its impacts); implemented through taxation or fines; incentive not to pollute;	**2**

Question	Answer	Marks
3(d)(ii)	*any two from:* gold mine is illegal; polluter may refuse to pay; difficulty in finding the polluter; difficulty in monitoring the pollution; not all countries agree to the principle; difficult to measure the amount of pollution made particularly if it is a gas; money collected from polluters could be spent elsewhere / not on this location affected by mining;	**2**
3(e)(i)	ability to meet the needs of the present; without compromising the ability of future generations to meet their own needs;	**2**
3(e)(ii)	*any two from:* licences for extraction; quotas for extraction; recycle / reuse / reduce; limits on export; charge high prices for gold;	**2**

Question	Answer	Marks
4(a)	north of Tropic of Cancer / northern hemisphere; Arctic circle; named location e.g. Arctic, Siberia / northern Russia, **northern** North America, northern Europe, northern Asia, Alaska, northern Canada, Greenland ;;	**3**
4(b)(i)	line drawn between points;	**1**
4(b)(ii)	31;	**1**
4(b)(iii)	1 : 8;	**1**
4(b)(iv)	lichen **and** moss;	**1**
4(b)(v)	*any four from:* presence of permafrost / frozen ground; thin layer of soil; cold temperatures; slow rate of photosynthesis; short growing season; limited water supply or rainfall; limited hours of sunlight / windy;	**4**
4(c)(i)	divide area into grids / coordinates; using a random number generator (for a grid reference / coordinates);	**2**

Question	Answer	Marks
4(c)(ii)	5 sample positions shown with X; (5) sample positions are equal distances apart **and** cover at least half of the line;	**2**
4(c)(iii)	*any three from:* only one location selected / not representative; only one day sampled / anomalous results not identified / data sample too small; 5 quadrats are not representative of the whole biome; no repeat of investigation; no mean determined; no information recorded on climatic conditions or weather;	**3**
4(d)(i)	16; $U = (0.125)^2 = 0.015$ $V = (0.565)^2 = 0.316$ $W = (0.0625)^2 = 0.0039$ $Y = (0.1875)^2 = 0.035$ $Z = (0.0625)^2 = 0.0039$; 0.374; 0.6(2538);	**4**
4(d)(ii)	rainforest value will be higher **and** as more diverse / more plant species;	**1**