



Cambridge International AS Level

ENVIRONMENTAL MANAGEMENT

8291/22

Paper 2 Management in Context

October/November 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.

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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)	2 / 2.03;	1
1(a)(ii)	<p><i>any four from:</i></p> <p>difficult to find a partner / low marriage rates; leads to low birth rate; leads to population decline;</p> <p>fewer jobs in rural areas; leads to abandonment of, rural areas / agricultural land; leads to urbanisation;</p> <p>less economically active people / fall in GDP;</p> <p>less people to purchase products / services, reduces economy of country;</p> <p>lack of available healthcare / supply of goods / accessing amenities due to large distances between people;</p> <p>people have to travel large distances / transportation more costly / not enough transport available;</p> <p>less technological advancement / create ideas to boost economy;</p> <p>reduction in tourism;</p> <p>AVP;</p>	4

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Question	Answer	Marks
1(b)	<p><i>any three from:</i> 1960–1973: increasing age dependency ratio / decreasing number of working age people / increasing number of dependents; 1973–1975: age dependency ratio plateaus / just above 100 / number of dependents exactly the same / slightly higher than number of working-age people; 1975–2010: decreasing age dependency ratio / increasing number of working age people / decreasing number of dependents; 2010–2018: increasing age dependency ratio / decreasing number of working age people / increasing number of dependents;</p>	3
1(c)	<p><i>any two from (for 1975):</i> narrower at old age / top; lower life expectancy; improved medical care in 2020;</p> <p>wider for young dependents / base; birth rate higher;</p>	2
1(d)	<p><i>any three from:</i> <i>winter</i> long; cold / snowfall; temperature between –2 to –14 °C; lower rainfall;</p> <p><i>summer</i> short; hot; low rainfall (higher than the winter); (moderately) warm summer; temperature between 21 to 26 °C;</p>	3

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Question	Answer	Marks
1(e)(i)	seeds / spores; carried by wind / insects / animals / birds / humans;	2
1(e)(ii)	<i>any two from:</i> fungi / lichen; high stress tolerance / hardy / withstands harsh environment; grow quickly; tough outer layer; adapted to conserve water, e.g. waxy outer layer / spiny leaves; short / shallow roots;	2
1(e)(iii)	<i>any two from:</i> adds organic matter / humus; adds nutrients through decomposition; reduces competition / free up space; increases water holding capacity;	2
1(f)(i)	0.677 / 0.68 / 0.7;	1
1(f)(ii)	<i>any two from:</i> landlocked; few existing water sources; increased temperatures / global warming; leads to drought; climate change alters rainfall patterns;	2

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Question	Answer	Marks
1(f)(iii)	<p><i>any four from:</i> reduced crop yield / crop failure; livestock death; leads to food shortages / malnutrition / famine; leads to poverty / increase in cost of food; farmers lose income from their crops; reduced water for industrial processes / loss of manufactured goods; disrupts education (particularly girls) as take time out to collect water; dehydration from lack of water to drink; limited access to clean drinking water / forced to drink contaminated water; leads to water related illnesses / cholera / typhoid / diarrhoea; migration / refugees;</p>	4
1(g)(i)	mirrors in space / stratosphere; reflect or reduce the amount of incoming solar radiation (reaching Earth); which reduces temperature of Earth's surface / reduces greenhouse effect / reduces global warming;	2
1(g)(ii)	<i>any one from:</i> we can continue to use fossil fuels / no changes needed to our way of life; hard to reduce combustion of fossil fuels;	1

Question	Answer	Marks
2(a)(i)	<p><i>any two from:</i> wood used for fuel / timber / export;</p> <p>increased human population; land cleared for agriculture / mineral extraction / hydroelectric or reservoir projects / homes / buildings / roads;</p>	2
2(a)(ii)	<p><i>any three from:</i> can become invasive;</p> <p>outcompetes / competition with other plants; example given, e.g. grows taller; so receives more sunlight;</p> <p>may not be edible to animals / contains toxins / toxic to animals;</p> <p>leads to loss of biodiversity;</p> <p>disrupts food web / chains;</p>	3
2(b)(i)	less or decreasing tropical forest / more tropical forest being destroyed;	1
2(b)(ii)	<p>M1 15.8 – 12 / 3.8; (M1 ÷ 15.8 × 100) 24.051 / 24.05 / 24.1 / 24;</p> <p>or</p> <p>M1 15.9 – 12 / 3.9; (M1 ÷ 15.9 × 100) 24.528 / 24.53 / 24.5 / 25;</p>	2
2(b)(iii)	<p><i>any one from:</i> increased awareness of importance of trees; international pressure; reforestation / afforestation initiatives;</p>	1

Question	Answer	Marks
2(c)	<p><i>any four from:</i></p> <p>CO₂ removal; by photosynthesis; by growing trees;</p> <p>CO₂ storage; by mature trees;</p> <p>reduction in global warming / climate change;</p> <p>reference to water cycle, e.g. increases interception, increases infiltration, decreases run-off;</p> <p>idea that young forests remove more CO₂ than existing or mature forests;</p> <p>tree (roots) improve soil (structure); reduces changes of mass movement / landslides; reduces soil erosion;</p> <p>increases biodiversity / provides habitat;</p>	4
2(d)(i)	<p>suitable linear scale; axis labels and units; bars of equal width and not touching; correct plotting / correct height of bars;</p>	4
2(d)(ii)	<p>8042.857;</p> <p>8043 (answer given to nearest whole number);</p>	2

Question	Answer	Marks
2(d)(iii)	<i>any three from:</i> southern Africa; south of equator / along tropic of Capricorn; north of tropic of Cancer; coastal Australia;	3
2(d)(iv)	<i>any three from:</i> climate change / <u>enhanced</u> greenhouse effect; leads to extreme weather / high temperatures; leads to drought; increased lightning (strikes); controlled fires getting out of control;	3

Question	Answer	Marks
3(a)	identify location to sample; use of a net; opening of net facing upstream / against the direction of flow; kick stream bed in front of net (opening); for set period of time; count organisms collected in net; repeat (for same location / different time) and average; repeat for different location;	5
3(b)(i)	0.54;	1
3(b)(ii)	0.0144 / 0.01; 0.014 (answer given to two sig. figs);	2
3(b)(iii)	<i>yes or no with any two reasons:</i> data only shows diversity / value of 1 represents complete diversity / value of 0 represents complete uniformity; data shows stream is more diverse in 2020 than 2019; organism in stream in 2020 might be better suited to lower pH or acidic water;	2
3(b)(iv)	<i>any two from:</i> acid deposition; emissions from combustion of fossil fuels or car (exhausts) / SO ₂ or NO _x in atmosphere; run-off from fields; due to fertiliser; industrial pollution / chemicals from factories; sewage waste;	2

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Question	Answer	Marks
4(a)	<p><i>any three from:</i> less open spaces (for privacy to open defecate);</p> <p>more people living in an area / increased population density; leads to increased risk of disease; from contaminated water / from contact with faeces;</p>	3
4(b)(i)	decomposer / decomposition;	1
4(b)(ii)	<p><i>any two from:</i> high ground water level / high water table (result in flooding); area prone to floods; area prone to drought / dry conditions; no access to water / not enough water to flush;</p>	2
4(b)(iii)	<p><i>any one from:</i> kills the tiger worms; leaches into soil; products would kill bacteria and fungi which aid the decomposition;</p>	1
4(c)(i)	<p>random; (random) number generator / draw names out of a 'hat';</p> <p>OR systematic; assign everyone a number; e.g. every third house / every nth person;</p>	2
4(c)(ii)	<p><i>any one benefit:</i> (type 1) easier to process / less data to process / less time consuming;</p> <p><i>any one limitation:</i> limited by question asked / no idea of their opinion;</p>	2

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Question	Answer	Marks
4(c)(iii)	<p><i>suitable yes / no question:</i> Is the TWT easy to use? Would you recommend the TWT to other people?</p>	1
4(d)	<p><i>any one advantage:</i> cheaper / worms not needed; no need for water after use; familiar technology; easier or simpler to build;</p> <p><i>any one disadvantage:</i> needs to be moved once full / faeces is not digested or broken down; increased risk of disease as faeces is left in the ground; difficult to dig a hole if ground rocky; pit must be deeper than TWT;</p>	2