Cambridge Assessment International Education

Cambridge IGCSE™

ENVIRONMENTAL MANAGEMENT **0680/21**

Paper 2 Management in Context **May/June 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 May/June 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U 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 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.

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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.

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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)	5.8 × 0.12; 696 000;	**2**
1(a)(ii)	*any two from in rural areas:* M1 not many jobs / risk of being unemployed; M2 only agriculture as available work / mechanisation of agricultural; M3 migration; M4 lack of services or infrastructure / fewer stated services e.g. medical care / education / communications;	**2**
1(b)(i)	commercial / arable / crops;	**1**
1(b)(ii)	4;	**1**
1(b)(iii)	*any two from:* M1 many wet days; M2 similar rainfall every month; M3 no dry season / rains all year; M4 suitable data quoted e.g. 70 mm every month, every month has between 7−89 mm, minimum of 11 wet days each month	**2**
1(b)(iv)	*any three from:* M1 waterlogging / flooding; M2 low oxygen or air in soil; M3 reduced crop yield; M4 salinisation; M5 loss of, fertility / fertiliser; M6 leaching (of nutrients); M7 leading to eutrophication; AVP; e.g. soil erosion / increased surface run-off	**3**
1(c)(i)	potassium phosphate;	**2**

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Question	Answer	Marks
1(c)(ii)	M1 both axes labelled: (nitrous oxide) emissions / 1000 tonnes AND year; M2 sensible linear scale with plotting that covers half the grid space; M3 correct plotting ± half small square tolerance; M4 bars of equal width;	**4**
1(c)(iii)	*any two from* (steady) decreases; constant (between year 17−21); relevant quoted data e.g. 25 to 18 (1000 tonnes) / stable at 16 (1000 tonnes);	**2**
1(c)(iv)	*any two from:* M1 farming always needed; M2 some fertilisers (always) needed; M3 NOx released from farm machinery; M4 M5 AVP; e.g. there will always be N compounds to break down / not possible to stop bacterial activity in the soil;	**2**

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Question	Answer	Marks
1(d)	*any four from:* M1 sea level rise; M2 flooding; M3 drought M4 loss of farmland; M5 loss of habitat / loss of biodiversity; M6 reduction in crop yield / new crops could be grown; M7 displacement of people / forced migration / loose their homes; M8 increased land prices; M9 transport routes cut / damage to infrastructure; M10 salinisation of water supplies; M11 extreme weather / changed weather patterns; M12 impact on energy costs; M13 M14 AVP;	**4**

Question	Answer	Marks
2(a)(i)	clay;	**1**
2(a)(ii)	*any three from:* M1 air; M2 water; M3 microorganisms / bacteria / fungi; M4 organic matter;	**3**
2(a)(iii)	crop grown, to be sold / for a profit;	**1**
2(b)(i)	more representative / larger sample / anomalies can be identified;	**1**
2(b)(ii)	*identifying trees:* give a number or letter to each tree; *random selection method*: number generator / numbers out of a bag / phone book / number table;	**2**

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Question	Answer	Marks
2(b)(iii)	M1 table drawn ; M2 headings: tree (number) **AND** number of apples (on tree); M3 9 to 10 cells for data ;	**3**
2(b)(iv)	*max three from either method:* M1 genetic, engineering / manipulation; M2 identify the gene for high yield (from a high-yielding tree); M3 extract the gene (from the high-yielding tree); M4 insert the gene (into a stock tree); **OR** M1 selective breeding; M2 select two suitable parent trees (e.g. high-yielding); M3 cross-breed the parents; M4 select the most promising offspring;	**3**

Question	Answer	Marks
3(a)(i)	all the living or biotic **AND** non-living or abiotic components (in an area);	**1**
3(a)(ii)	*any two from:* M1 selective logging / sustainable harvesting; M2 species, not made extinct / can recover; M3 replant native species; M4 protected **zones** in the forest;	**2**
3(a)(iii)	M1 calculation of volume = 18.75 (m^3); M2 ($\times$ 1.25 =) 23 (tonnes);	**2**

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Question	Answer	Marks
3(a)(iv)	*any two **comparative** differences from:* M1 *coal*: carbon dioxide emitted **AND** *wood*: carbon neutral or less carbon dioxide emitted; M2 *coal*: more energy dense (than wood); M3 *coal*: releases sulfur dioxide or NOx / leads to acid rain **AND** wood: does not;	**2**
3(b)(i)	max [5] **Note**: to gain 5 marks at least 1 mark must come from each section *max two from quadrats:* M1 quadrat of stated dimensions, e.g. 1 m^2; M2 quadrat placed at, regular intervals / stated intervals; M3 sample all (three) transects; *counting:* M4 <u>count</u> the number of <u>species</u> (in the quadrat); M5 description of how to deal with plants partially in an quadrat; *recording:* M6 record number in a table; *repeating:* M7 repeat same investigation; M8 repeating on different days;	**5**
3(b)(ii)	pooter;	**1**
3(b)(iii)	*any two from:* M1 same plant species / same type of plant; M2 same number of leaves; M3 same size of leaves; M4 same time of day; M5 same person; M6 same plant height; M7 examine each leaf for same period of time; M8 count / identify, the number of types of insect;	**2**

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Question	Answer	Marks
3(b)(iv)	*any two from end of transect or away from the road has:* more types; larger numbers; more biodiversity;	**2**
3(c)(i)	*any two from:* M1 photosynthesis; M2 chlorophyll absorbs light energy; M3 *reactants*: carbon dioxide and water; M4 *products*: glucose and oxygen; M5 light energy to chemical energy;	**2**
3(c)(ii)	*any two from:* M1 energy transfers when organisms eaten / stated example of feeding from food web e.g. plant eaten by rabbit; M2 lost as heat; M3 idea of only 10% of energy passed between levels / 90% is lost; *lost through:* M4 respiration; M5 digestion; M6 (excreted) waste (products); M7 movement; M8 death / decomposition; M9 maintaining body temperature / thermoregulation; M10 feeding / consumers do not consume the whole organism; M11 reproduction;	**3**

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Question	Answer	Marks
3(d)	(both) prevents extinction / protects endangered species; seeds / animals can be reintroduced into wild; *max five seed banks:* maintains genetic record / source of genes; development of new plants, e.g. drought-resistant wheat; development of medicines; AVP; *max five zoos:* allows (captive) breeding; reduces impact of, predation / hunting / poaching; prevents inbreeding / international cooperation; education / awareness; AVP;	**6**

Question	Answer	Marks
4(a)(i)	70 (cm) ;	**1**
4(a)(ii)	population likely to decline / overfishing; small mesh size catches young fish; not able to breed;	**3**
4(a)(iii)	*any three from:* M1 area or total size of net; M2 quotas; M3 closed seasons; M4 protected areas; M5 licenses; M6 international economic exclusion zone (EEZ); M7 M8 AVP; e.g. size of boats / number of boats / CCTV on boats / patrols / monitoring / tracking of boats / number of fishing days;;	**3**

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Question	Answer	Marks
4(b)	*any two from:* overfishing / will run out of fish / population of fish decreases; many species are caught that are not eaten / a lot of bycatch; lead to overproduction of farm animals; removing many species of fish impacts food chains;	**2**
4(c)	*any four (max three from one section):* *benefits* increased food supply; less work / less use of energy (than going to sea); safer (than going to sea); no bycatch; preserves wild stocks; allows harvesting all years / no seasons; not weather-dependent; *limitations* pollution from, organic matter / fish meal / oil / pesticides / waste / antibiotics; spreads disease; risk of escape; impact on food chain;	**4**

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