Cambridge Assessment International Education

Cambridge IGCSE™

ENVIRONMENTAL MANAGEMENT **0680/22**

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)	M1 wide(r) at base / narrow(er) at top / triangle shape; M2 similar shape for males and females;	**2**
1(a)(ii)	M1 7 400 700 – 3 258 200 **or** 4 142 500; M2 98 631;	**2**
1(a)(iii)	*any three from:* M1 Laos is an LEDC; M2 economic growth (of country or for people); M3 lack of, contraception / family planning resources; M4 improved or good healthcare; M5 improved or good, access to safe drinking water / sanitation; M6 improved or good, infrastructure / access to electricity; M7 migration (into Laos) / immigration; M8 job opportunities; M9 pronatalist policies / policies to encourage large families / no antinatalist policies / financial incentives to have children	**3**
1(b)(i)	*any three advantages of HEP:* M1 does not produce, carbon dioxide / greenhouse gases; M2 does not contribute to global warming / (enhanced) greenhouse effect / climate change; M3 does not produce sulfur dioxide / oxides of nitrogen; M4 does not contribute to acid rain / smog; M5 renewable resource; M6 less visual pollution (due to less mining); M7 idea of sustainability / reserves of coal left (for future generations)	**3**
1(b)(ii)	M1 idea of suitable sites for building dams / mountainous / steep sided valleys/ terrain is suitable; M2 many rivers / large quantities of (natural) water stores or sources; M3 rainy season / high volume of rainfall;	**3**

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Question	Answer	Marks
1(b)(iii)	*any three from economic benefit from:* M1 employment; M2 tourism opportunities; M3 improved infrastructure; M4 reduced flooding (so less damage to farms / crops / homes); M5 stated economic benefit **to farmers** e.g. silting so no need to buy fertilisers / idea of improved or high crop yield (due to better irrigation)	**3**
1(c)(i)	*any three from:* M1 people live / densely populated, near dam; M2 **large area** flooded / large volume of water; M3 no early warning / no disaster plan; M4 dam was poorly constructed; M5 bridges / roads / power supply / infrastructure, destroyed; M6 homes destroyed / people left homeless; M7 people could not evacuate / happened at night / people were asleep / no evacuation plan; M8 no medical help / aid could not reach area / no rescue teams; AVP e.g. mountainous terrain (so difficult to evacuate)	**3**
1(c)(ii)	*any four from:* M1 lack of adequate shelter / exposure; M2 poor sanitation / lack of **clean** water; M3 spread of (water related) diseases / named disease; e.g. cholera, typhoid M4 lack of access to, medicines / medical facilities / hospitals / medical treatment; M5 loss of crops or food or farmland / starvation / famine / land underwater so cannot crops cannot be planted; M6 loss of jobs / loss of income / no money to pay for flood recovery; AVP;	**4**
1(c)(iii)	369 / 370 (MW);	**1**

Question	Answer	Marks
1(d)(i)	*any four from:* M1 idea of difficult to extract due to geology: e.g. depth or hardness of surrounding rock / overburden / terrain; M2 accessibility (to site) e.g. lots of rivers to cross M3 legislation / taxes / licences / permits; M4 availability of workers / idea of hourly rate paid to workers; M5 type of extraction or mine or mining / whether it is surface or subsurface M6 use of machinery; M7 waste disposal; M8 quality of rock / grade of rock / how much of the rock contains the mineral / amount of mineral present in the rock / ore contains unwanted material or toxic material	**4**
1(d)(ii)	*any four from:* M1 idea of filling pit using, mining waste / overburden / rocks; M2 cover with (top)soil; M3 improve soil / add organic matter / add manure or fertiliser; M4 bioremediation / cleaning of polluted soil; M5 plant, grass / vegetation / trees / seeds; M6 irrigate or water vegetation;	**4**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(a)(i)</td><td>M1 axes correctly labelled and unit: x-axis: country and y-axis: (annual) fish consumption AND person / kg;
M2 suitable linear scale with plots cover at least half the grid;
M3 bars correctly plotted;
M4 bars of equal width;

<table><tr><th>country</th><th>annual fish consumption per person / kg</th></tr><tr><td>Brazil</td><td>9</td></tr><tr><td>Iceland</td><td>91</td></tr><tr><td>India</td><td>7</td></tr><tr><td>Laos</td><td>25</td></tr><tr><td>South Africa</td><td>6</td></tr><tr><td>USA</td><td>22</td></tr></table></td><td>4</td></tr>
<tr><td>2(a)(ii)</td><td>any three from:
M1 availability of, fish / other food sources / land-based protein;
M2 high cost / tax on fish / ora other food;
M3 cultural reasons / traditions / fashion / trends;
M4 idea of ease of storage e.g. availability of refrigeration;
M5 idea of fish is not safe to eat / polluted waters;</td><td>3</td></tr>
<tr><td>2(b)(i)</td><td>52;</td><td>1</td></tr>
</table>

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Question	Answer	Marks
2(b)(ii)	M1 largest and smallest identified; M2 remaining fish in correct order; African (catfish) shark (catfish) common (carp) snakehead bighead (carp)	**2**
2(b)(iii)	*any four from:* M1 may not tolerate or be adapted to local conditions / local conditions not suitable; M2 large or heavy so difficult to handle / need large space; M3 may require, a lot of food / specialist food / lack of usual diet; M4 low reproductive success / difficult to breed; M5 risk of disease (from or to other species); M6 compete with wild population / disrupt food web / have no natural predators / become invasive (if they escape); M7 cost of, importing / transport;	**4**
2(b)(iv)	*any two from:* *catching wild fish less sustainable as can lead to:* M1 overfishing / stock depletion / (wild) fish population increases; M2 reduction in breeding; *fish farming more sustainable as:* M3 higher-yielding / can harvest all year round; M4 less bycatch / reduces risk of catching juveniles;	**2**
2(c)(i)	M1 use a, systematic / random, sampling method; M2 method described: *random*: number generator / names in hat *systematic*: every nth person;	**2**
2(c)(ii)	*any three from:* M1 only half the people eat / fish demand for fish is, low or equal; M2 demand for fish is not increasing / people do not eat more fish (in 5 years); M3 most people won't, try new species / change ways; M4 farmer would lose income / not many people would buy (new) fish;	**3**

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Question	Answer	Marks
2(c)(iii)	*any three from:* M1 temperature; M2 water; M3 oxygen (level); M4 salinity; M5 light (intensity); M6 pH (water);	**3**
2(c)(iv)	*any two from:* M1 *plant-eating fish:* at lower trophic level / eat producers / are primary consumers; M2 energy is lost / 90% energy lost / 10% energy transferred, between trophic levels M3 energy lost as heat / movement / respiration other named process;	**2**

Question	Answer	Marks
3(a)(i)	terracing;	**1**
3(a)(ii)	*any four from:* M1 maintaining vegetation cover / planting vegetation; M2 adding, organic matter / manure; M3 mixed cropping / intercropping / crop rotation; M4 wind breaks; M5 contour ploughing; M6 **improved** irrigation or named example e.g. trickle drip; M7 bunds; M8 reduction in grazing;	**4**
3(b)	*surface run-off:* reduced or slowed **AND** due to reduced gradient / less slope; *evaporation:* increased **AND** due to, large surface area / open to the sun;	**2**

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Question	Answer	Marks
3(c)	**A** transpiration; **B** precipitation;	**2**
3(d)(i)	1.8 (m);	**1**
3(d)(ii)	as a control / for comparison;	**1**
3(d)(iii)	*idea that:* M1 group B or weed removal, is the best treatment / trees tallest; M2 group C or adding fertiliser, increases growth / trees 2nd tallest / 2nd best treatment; M3 group D or using tree guards, has no effect / least successful / trees shortest;	**3**
3(d)(iv)	*any three from:* *repeat:* M1 same experiment; M2 greater number of trees / more than 5 trees; M3 different tree species; M4 different, soils / locations; M5 continue over longer time period / carry on over more years; AVP;	**3**
3(e)	*any five from:* M1 increasing number of trees; M2 trees photosynthesise; M3 **reduces** concentration of (atmospheric) CO_2 / trees capture carbon M4 more trees **reduces** impact of (enhanced) greenhouse effect / global warming; M5 trees act as carbon sink or store; M6 trees trap particulate matter;	**5**

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