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CAMBRIDGE
International Education

Cambridge IGCSE™

ENVIRONMENTAL MANAGEMENT **0680/12**

Paper 1 Theory **February/March 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.

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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.

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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	<u>'List rule' guidance</u> 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)	geothermal circled ; biogas circled ;	**2**
1(b)(i)	*any three from:* as tide comes in, the tidal basin fills with water ; turns (blades of) turbine ; turbine turns a generator ; electricity generated as water flows both ways ;	**3**
1(b)(ii)	allows the basin to be filled with water / controls tidal flow / prevent strong tides damaging the turbine ;	**1**
1(c)	*benefit:* uses an available resource / relatively inexpensive to run / long-lasting equipment / predictable electricity generation / no pollutants released / renewable; *limitation:* need large area / need deep water / suitable locations are scarce / not all countries have oceans / disrupts shipping / expensive to build / cables might break / unknown environmental impacts long-term /visual pollution/ named environmental impact e.g. silting / disrupt marine ecosystem ;	**2**

Question	Answer	Marks
2(a)	nitrate ; phosphate ; water ;	**3**
2(b)(i)	water **and** carbon dioxide ; glucose **and** oxygen ;	**2**
2(b)(ii)	chlorophyll ;	**1**

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Question	Answer	Marks
3(a)(i)	 **X** marked on the arrow shaded black ;	**1**
3(a)(ii)	arrows drawn clockwise in the North Pacific ;	**1**
3(b)	*any four from:* *currents: (max 3)* bring food supply (for consumers) ; bring in nutrients (for producers) ; upwellings (bring nutrients) from the bottom ; (cold and warm) currents mix ; *continental shelves: (max 3)* shallow so light penetrates ; so (rapid) photosynthesis ; nutrients from rivers ; phytoplankton / plants, form base of food chain / are producers ; fisheries are more accessible;	**4**

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Question	Answer	Marks
4(a)	destructive ;	**1**
4(b)(i)	*any three from:* *benefits max 2* volunteers are local so committed to monitoring ; educates the community about the risks ; community given early warning of eruption ; people trust volunteers as they are local ; *limitations max 2* data may not be, reliable / valid / scientific ; requires lots of volunteers ; requires volunteers to be trained ; could be dangerous ;	**3**
4(b)(ii)	*any four from two reasons:* fertile soils ; increased crop production ; extraction of minerals ; can be sold for profit ; geothermal energy resource ; used to, heat homes / provide electricity ; volcano brings in tourists ; job opportunities / income ; traditional home ; can't afford to move/ so not want to move / tied to local employment ; suitable land for a town ; flat land ; trust on the monitoring systems ; perceived to be low risk ;	**4**

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Question	Answer	Marks
4(c)(i)	troposphere ;	**1**
4(c)(ii)	*any three from:* (sulfur dioxide) reacts with water ; forms sulfuric acid ; precipitation is acidic / acid rain ; (acidic) run-off enters lakes ;	**3**

Question	Answer	Marks
5(a)(i)	*any one from:* small scale ; other crops visible / banana crops visible / mixed crops ; crops grown around the home ;	**1**
5(a)(ii)	*any two from:* irrigation ; wide spacing of crops ; weeds have been removed ; crops grown on a slope facing the sun plants not shaded/ open site ; taller crops shelter other crops / shelter belt ;	**2**
5(b)(i)	*any one from:* adding fertilisers based on one mineral ion, gives a very small increase in crop yield / no difference in crop yield ; organic manure is nearly as effective in increasing crop yield as NPK fertilisers ; no fertiliser gives the lowest yield ;	**1**
5(b)(ii)	to act as a control / so it can be compared to the yields with fertiliser added ;	**1**
5(b)(iii)	crop residue / vegetation ; (animal) manure ;	**2**

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Question	Answer	Marks
5(c)	*any four from:* mineral ions leach into lakes and rivers ; mineral ions cause, an algal bloom / algae population to increase ; algal bloom reduces light ; so plants die / cannot photosynthesise ; bacteria decompose dead plants ; decomposition uses oxygen ; other organisms cannot respire/ lack oxygen ;	**4**

Question	Answer	Marks
6(a)	*line graph with:* both axes labelled including unit for emissions ; linear scale on both axes with data occupying at least half of the grid ; data points plotted to within ± half of a small square ;; point-to-point lines drawn with no extrapolation ;	**5**
6(b)	*any three from:* CFCs enter stratosphere ; CFCs unreactive / stay in atmosphere for a long time ; CFCs broken down by (ultraviolet) light ; releases chlorine atom ; (chlorine atom) reacts with ozone ; chlorine atom regenerated so reaction continues / chain reaction ;	**3**

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Question	Answer	Marks
6(c)	*any five from (max four from each section):* *benefits:* ozone preserved ; ozone layer will return to original levels ; ozone prevents UV light reaching Earth ; reduces cataracts / skin cancers ; reduces damage to plant tissues ; most countries follow international policies ; AVP; *limitations:* many appliances, still use CFCs / require disposal ; alternatives are not as efficient as CFCs ; not all countries can afford alternatives ; policies require all countries to participate ; difficult to, enforce / monitor policies ; CFC replacements contribute to the enhanced greenhouse effect ; CFCs remain in atmosphere for a long time ; AVP ;	**5**

Question	Answer	Marks
7(a)(i)	15 000 ; cubic kilometres / km^3 ;	**2**
7(a)(ii)	1 : 196 ;;	**2**
7(a)(iii)	permafrost ;	**1**
7(b)	*any two from:* eat a diet low in meat / eat more plant-based foods / vegetarian diet ; comparative data quoted ;	**2**

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Question	Answer	Marks
7(c)	*any three from:* boil drinking water ; chlorinate drinking water ; don't use contaminated water to prepare food ; don't swim in rivers that may be contaminated ; cover cuts / wounds ; wash hands frequently / good personal hygiene ; improve sanitation ;	**3**

Question	Answer	Marks
8(a)	*any two from:* most of Asia ; most of Europe ; West coast of South America ; some parts of Oceania ; AVP ;	**2**
8(b)	*any two from:* both involve planting trees ; afforestation is on ground that was not previously forest whereas reforestation is on previously cleared forest land ; afforestation allows additional area to be forested/ whereas reforestation only covers the same area of land ;	**2**
8(c)(i)	*any two from:* *For 1900–2020:* percentage of mature forest decreases ; percentage of young forest increases ; total area decreases ; small increase in mature forest from 2000 to 2020;	**2**
8(c)(ii)	M1 13 **and** 38 seen / 25 ; M2 correct use of M1 in percentage calculation / 65.79 / 65.8 / 66.0 ;	**2**

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Question	Answer	Marks
8(d)	*Level of response marked question:* Level 3 [5–6 marks] **A coherent response is given that develops and supports the candidate's conclusion using relevant details and examples.** Indicative content and subject-specific vocabulary are generally used precisely and accurately. Good responses are likely to present a balanced evaluation of both statements. Level 2 [3–4 marks] **Development and support of the conclusion is evident, though the response may lack some coherence and/or detail.** Indicative content and subject-specific vocabulary are used but may lack some precision and/or accuracy. Irrelevant detail may be present. Responses contain evaluation of the statement, but this may not be balanced. Level 1 [1–2 marks] **The response may be limited in development and/or support. Contradictions and/or irrelevant detail may be present.** Indicative content and subject-specific vocabulary may be limited or absent. Responses may lack structure or be in the form of a list. Evaluation may be limited or absent. No response or no creditable response [0 marks] Indicative content for *"Extracting timber from a forest has more benefits than negative effects"* *agree:* (harvesting will) create jobs provide money for landowners, family / healthcare / education create land for agriculture / livestock timber can be used for construction / fuel / sold allows growth of young trees creates new habitats	**6**

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Question	Answer	Marks
8(d)	*do not agree:* destroy important habitats effect on biodiversity qualified impact on climate / global warming / carbon dioxide concentration no plan for reforestation affects the planet / not just a local impact	

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