Cambridge Assessment International Education

Cambridge IGCSE™

ENVIRONMENTAL MANAGEMENT **0680/13**

Paper 1 Theory **May/June 2021**

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 2021 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 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)	**A** evaporation; **B** (surface) run-off;	**2**
1(b)	*any three from:* stores (geographically) inaccessible, e.g. underground, in mountains; population geographically inaccessible, e.g. widely-scattered; water may be frozen; inefficiency / expense, of distribution system; some (fresh) water sources, contaminated / polluted / unsafe to drink; reference to lack of treatment, facilities / infrastructure;	**3**

Question	Answer	Marks
2(a)	**A**; large base to pyramid / high birth rate / lower life expectancy;	**2**
2(b)	*any two from:* working age population decreases / people need to work to an older age / not enough people to fill jobs; need for migrant labour; increases, (relative) number of older dependants / need for carers; increases burden on medical system; increases, pension costs / need for taxes;	**2**
2(c)	*any one from:* tax relief for larger families; free schooling; better / subsidised medical provision, e.g. antenatal services, family healthcare; free / subsidised, housing for larger families; child benefit;	**1**
2(d)	*any two from:* war / conflict; famine / natural disaster / named disaster; (influx of) refugees / mass migration; disease, e.g. pandemic;	**2**

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Question	Answer	Marks
3(a)(i)	phytoplankton → zooplankton → (cormorant) → killer whale (orca) 1 correct; 3 correct;	**2**
3(a)(ii)	*either*: killer whale numbers will decrease; as fewer herring to eat; *or*: killer whale numbers will remain the same; as other food sources available / will eat more humpback whales;	**2**
3(b)	*any two named strategies with associated explanations, e.g.:* reduce the season for fishing; prevents fish being caught in breeding season; (introduce / decrease) quotas: limits the number of fish caught; increase size of mesh in nets; allows smaller / immature, fish to escape to breed; (introduce / increase) limits to net, sizes / types; prevents all the fish from being caught in the area; (introduce / increase) licensing (of boats); restricts number of vessels / time at sea; (introduce / increase) enforcement of laws: allows monitoring of catch / stops illegal fishing; (introduce / increase) marine reserves / no-fishing areas; provides undisturbed habitat for fish; (introduce / increase) fish-farming; reduce amount of wild fish caught;	**4**

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Question	Answer	Marks
4(a)	most / many, at plate boundaries / edges of plates; *plus any two further details, e.g.:* high concentration around northern edge of Pacific plate; high activity along west coast of America; relatively few in middle of Pacific plate; comparatively few on Antarctic plate; spread across whole world;	**3**
4(b)	*any three from:* plates move towards each other; subduction occurs / description of subduction; pressure / friction, occurs / builds up; idea of sudden, release / movement (causing quake);	**3**
4(c)(i)	*any three from:* use fewer floors / build lower buildings; use pyramidal shape; use reinforced, structure / materials; idea of using flexible building materials; idea of using rubber shock absorbers in foundations; idea of using counterweights on top of building;	**3**
4(c)(ii)	*any four from:* lack of medical help / death through injury; lack of clean water / poor sanitation; outbreak of, water-borne disease / cholera ; lack of food / starvation / malnutrition; risk of aftershocks / falling structures; crime; lack of shelter / exposure to weather;	**4**

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Question	Answer	Marks
5(a)(i)	four plots correct; straight lines joining plots;	**2**
5(a)(ii)	*any two from:* general increase in use over time; peak of use in 2011–2012 / decline after 2011–12; use of data to support trends given;	**2**
5(a)(iii)	change identified as 2.9; (2.9 ÷ 2.0 × 100 =) 145(%);	**2**
5(b)	*any three from:* increases yield; reduces loss in, growing crops / raising livestock; reduces loss in storage / preserves quality of stored produce; enables more efficient use of land; increases profit;	**3**
5(c)	*any two from:* pest-resistant crops / GM crops; hand removal / crop rotation / companion planting / other cultural controls; controlled environments / polytunnels / netting; biological controls;	**2**

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Question	Answer	Marks
6(a)	*one from each section, plus any other two:* *digester:* food waste / human waste / sewage / organic material, put into digester; biogas / methane, produced by, microorganisms / bacteria / digestion process; anaerobically / in an anaerobic process; *power station:* biogas burnt to produce heat; heat turns water into steam; (steam) rotates / turns, turbine; (turbine) rotates / turns, the generator (which produces electricity);	**4**
6(b)	fertiliser / soil improver;	**1**
6(c)	*any three from:* human waste is, not in open areas / collected in one place; human waste does not contaminate local, water sources / fields; named disease caused by poor sanitation / cholera; processed (organic) waste is free of disease / anaerobic digestion process breaks down disease;	**3**

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Question	Answer	Marks
6(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 the statement. Level 2 [3–4 marks] **Development and support of the conclusion is evident, though the response may lack some coherence and/or detail.** Irrelevant detail may be present. Indicative content and subject-specific vocabulary are used but may lack some precision and / or accuracy. 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]	**6**

Question	Answer	Marks
6(d)	*Indicative content for:* Anaerobic digesters are a bad investment because they cannot dispose of all types of waste. More electricity can be generated by burning waste. *advantages of anaerobic digesters:* (still) good for organic waste can be set up locally waste does not need to be transported far does not require a large technical knowledge to operate can generate electricity reduce spread of disease reduces local contamination due to sewage processed waste can be used as fertiliser relatively cheap to set up *disadvantages of anaerobic digesters:* can only be used for organic items needs careful sorting of waste other waste still a problem limited generation of electricity *advantages of incineration:* can use most waste heat used to generate (more) electricity minimise the need for landfill *disadvantages of incineration:* more technical to operate efficiently risk of toxic gases / air pollution not all waste needs to be burnt – metals could be recycled ash might be toxic	

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Question	Answer	Marks
7(a)(i)	*any two from:* heavy rainfall / one province received 70% of annual rainfall fell in one day; lack of proper drainage systems; increase in building / development of land / urbanisation;	**2**
7(a)(ii)	81(%);	**1**
7(b)(i)	*any four from:* improve weather, forecasting / prediction; improve early warning systems / sirens; evacuation, plans / procedures / rescue teams / emergency drills and education; emergency, shelters / supplies; better, infrastructure / drainage; restrictions on building / planning permission / land zoning / building on stilts; flood defences / levees / embankments on riverbanks; increase number of dams; dredge / widen / straighten, rivers; planting trees / afforestation / restore wetlands;	**4**
7(b)(ii)	idea that there are more water bodies for mosquitoes to breed in, so number of mosquitoes and therefore spread of malaria will increase;	**1**
7(c)	*any four from:* idea of contrasting lengths of time (drought occurred over long period of time whereas rainfall was short); not all water could be stored for later use; most water ran off land; no time to infiltrate; flooding can cause soil erosion; drought has caused, desertification / loss of crops / vegetation / fertility; leading to, food shortage / loss of wildlife / livestock;	**4**

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Question	Answer	Marks
8(a)(i)	*general trend identified:* (overall) decrease; *plus one further detail:* by 0.9%; from 31.62% to 30.72%; with a reduction in the rate of decline from 1999 / 2000;	**2**
8(a)(ii)	*any three from:* increase in population; increased demand for timber; requirements of land for, food production / fuel / mining; urbanisation / description of urbanisation / building of infrastructure; climate change / increasing desertification;	**3**
8(b)	*any five descriptions of:* legislation; use of quotas / managed extraction; afforestation / reforestation; agroforestry; education; investment into other fuel sources; national parks / reserves; ecotourism; policing / wardens, to protect forest; increase recycling of, paper / cardboard;	**5**

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