Cambridge Assessment International Education

Cambridge International AS Level

ENVIRONMENTAL MANAGEMENT **8291/21**

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.

Cambridge International is publishing the mark schemes for the October/November 2022 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.

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.

Question	Answer	Marks
1(a)(i)	8108(.108108);	**1**
1(a)(ii)	*any three from:* limited land area to accommodate people / not enough houses; overcrowding; leads to spread of disease / named disease (more quickly); limited land area for infrastructure / roads; leads to increased house prices / land prices / negative economic impact on population; not enough jobs available; high level of car use / factory emissions; leads to congestion; leads to <u>air</u> pollution / acid rain / global warming / smog; effect of stated air pollution, e.g. acidification of lakes / climate change; limited green spaces / limited agricultural land / high level of urbanisation; leads to food shortages; leads to water shortages / water pollution; waste management; AVP;	**3**
1(b)(i)	*any four from:* (approximately) equal numbers / same trend; more females in older age / more females aged 70+ / woman live longer; more females in, working age / 15–39 age; no males in 100+ age range;	**4**

Question	Answer	Marks
1(b)(ii)	*any two from:* high life expectancy / people live a long time / taller (than LIC); high(er) number of older dependents (than LIC); low(er) number of young dependents (than LIC); high(er) number of economically active (than LIC); indicates low birth / death rate;	**2**
1(c)	*any two from:* island / surrounded by sea; at risk from flooding; change in ocean / wind circulation; increased ocean temperatures lead to extreme weather events; high population density / limited land area: food / energy / water insecurity;	**2**
1(d)(i)	(small amounts of) inbound sunlight are <u>reflected</u> back (into space); cools planet / reduces global temperatures / reduces speed of climate change;	**2**
1(d)(ii)	*any two from:* combustion of fossil fuels produces, greenhouse gases / carbon dioxide; idea that SRM: does not reduce greenhouse gases / only deals with symptom not the problem / may only work for a short period / not a long-term solution; SRM: untested theory / might have negative effect, e.g. effect on ozone layer / health impact;	**2**

Question	Answer	Marks
2(a)(i)	*any two from:* wood used for fuel / timber / export; increased human population; land cleared for: agriculture / mineral extraction / hydroelectric or reservoir projects / homes / buildings / roads; fire break; habitat loss; AVP;	**2**
2(a)(ii)	*any three from:* habitat loss; alters growing conditions, e.g. temperature / moisture / light / wind; increases isolation / separation between forest communities; movement of plants and animals is inhibited / some will migrate; trees are producers so less energy enters food chains; restricts breeding / gene flow; increase in invasive plants;	**3**
2(b)	*any three from:* by photosynthesis; chlorophyll (in leaves) / in chloroplasts; captures light energy / uses sunlight; carbon dioxide + water → oxygen + glucose **OR** $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$;	**3**
2(c)(i)	M1 – 1000 − 23 000 **OR** 24 000; ((M1 ÷ 1000) × 100 =) 2400;	**2**
2(c)(ii)	*any one from:* conifer **AND** absorbs / stores more carbon (dioxide); conifer **AND** grows all year round;	**1**
2(d)(i)	suitable linear scale; axis labels **AND** units; bars not touching **AND** of equal width; correct plotting of bars;	**4**

Question	Answer	Marks
2(d)(ii)	more land space / lower population density / more concerned about climate change / wealth / more suitable conditions / AVP; grow trees for food;	**1**

Question	Answer	Marks
3(a)(i)	*any one from:* oil; natural gas; uranium / nuclear;	**1**
3(a)(ii)	*any two from:* idea of inequality in global energy resources / more reserves in some countries than others; requires import of energy resource or electricity; limited alternatives of fossil fuels / reduction in a natural energy resource / some countries rely heavily on fossil fuels / main energy source; cost of energy will go up;	**2**
3(a)(iii)	*advantage:* existing resources last longer; *disadvantage:* does not solve the problem of finding an alternative; difficult to police / manage rationing strategy;	**2**

Question	Answer	Marks
3(b)(i)	*any five from:* reference to where sampling will take place / mapping sampling points / random or systematic sampling stated or described; (small) hole for snail to fall into; count all (Mount Augustus) snail in trap; mark shells; with, e.g. correction fluid, nail varnish, marker pen; release back to same location; repeat (after at least 24 hours); repeat for different locations;	**5**
3(b)(ii)	*any two from:* all members of the population mix randomly; marks are not lost between samples; the mark does not harm the animal, e.g. making it more obvious to predators; the marks do not affect the chances of recapture; the animals are active;	**2**
3(c)(i)	4077;	**1**
3(c)(ii)	*any one from:* initially population increased; general decrease in population; since 2012;	**1**
3(c)(iii)	(30% mortality) 15 (dead); (50 – 15 =) 35;	**2**

Question	Answer	Marks
3(c)(iv)	*any two from:* to protect from predators; to have a genetic record / for research or study; to ensure species does not become extinct; breeding programme;	**2**
3(d)(i)	earthworm;	**1**
3(d)(ii)	*any one from:* rats become resistant to the poison; may affect non-target species / may poison other animals that eat the rat; builds-up in food chain / biomagnification;	**1**
3(e)(i)	negative value / – symbol; 2;	**2**
3(e)(ii)	6.6 / 7;	**1**
3(e)(iii)	*any one from:* anomalous result; snail has disease / illness;	**1**
3(e)(iv)	diet **B** is better because the snails increase more in mass (than A);	**1**

Question	Answer	Marks

4(a)(i)	*any three from:*
	high(est) 1981;
	low(est) 1994;
	(rapid) decreasing from 1981 to 1994;
	(from mid-1990s) plateaus;
	(since mid-1990s) gradual increase / fluctuates;
	unusually high in 2002;
		3

Question	Answer	Marks
4(a)(ii)	*any two from:* CFC use; reference to ozone destruction; CFC ban / phasing out; reference to CFCs staying (in stratosphere) for long time / ozone takes a long time to recover; fluctuation is part of a normal cycle;	**2**
4(a)(iii)	11;	**1**
4(a)(iv)	*any two from:* cataracts; skin cancer; sunburn;	**2**
4(b)(i)	constant or steady concentration (of CO_2) until 1800; rapid increase after 1800;	**2**
4(b)(ii)	*any three from:* limited historical data (to base future predictions on); different variables used (by different models); model is only as good as the data it uses; climate feedback mechanisms are not fully understood; time delay between cause and effect;	**3**
4(b)(iii)	same shape as carbon dioxide drawn;	**1**

Question	Answer	Marks
5(a)	*any three from:* reduces / prevents contamination of drinking water; (contaminated drinking water) leads to diseases / cholera / diarrhoea; leads to lost time at work / reduction in earnings; less health issues reduces need for medical care / economic considerations; no cleaning up of open area required / money saved can be used to fund other projects;	**3**
5(b)(i)	reduces water scarcity / water insecurity / conserves water; saves water for other uses, e.g. drinking / bathing / not wasted; saves time collecting water;	**2**
5(b)(ii)	reduces mass of waste / reduces odour / easier to store / transport waste; can be used as a source of energy (biomass);	**1**
5(b)(iii)	*any two from:* solid waste has to be removed by hand; cultural practices / lack of awareness may stop people using it; not enough EcoSan to meet need / may not have access to one; lack of cleanliness;	**2**
5(b)(iv)	compost / fertiliser / on the fields / fuel;	**1**