CAMBRIDGE
International Education

Cambridge International AS Level

ENVIRONMENTAL MANAGEMENT **8291/22**

Paper 2 Management in Context **May/June 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.

Cambridge International is publishing the mark schemes for the May/June 2024 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 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.

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 <u>Calculation specific guidance</u> 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 <u>Guidance for chemical equations</u> 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)	*any three from:* highest fertility rate in Africa; west coast of Americas higher than east coast; higher numbers for LICs compared to HICs; relevant quoted data for a continent; e.g. all of Europe has 1–2 child per woman; relevant quoted data for a country; e.g. Niger has 6–7 children per woman; AVP;	**3**
1(a)(ii)	*any three from:* (fewer people so) less stated (e.g. food) resources used / needed; less energy consumption / less fossil fuels combusted; less carbon dioxide produced / methane / greenhouse gas; reduction in (enhanced) greenhouse effect / global warming;	**3**
1(a)(iii)	*any three from:* (availability or cost) of contraception; education about contraception; improved education / opportunities for women; availability or improved or cost of health care; (local, national, global) policies; cultural reasons;	**3**
1(b)	*any two from:* more working age people / more 15–64 people; migration of working age people into country; change in birth rate; reduction in life expectancy / death rate of older people increases;	**2**
1(c)	*any two from:* water level rise; extreme weather / flooding; (surface) erosion; will need to build a bridge / find a different route across the river / divert river;	**2**

Question	Answer	Marks
1(d)(i)	correct plotting; bar same width and not touching and shading to match key;	**2**
1(d)(ii)	2019 and 2020 and 2021;	**1**
1(d)(iii)	6;	**1**
1(d)(iv)	*any two from:* (in 2021 the) cost to build has decreased; less public objections; more expertise to build; greater demand; increased technology / research; greater economic development;	**2**
1(e)	*three from:* (carbon dioxide in the atmosphere is captured and) compressed; transported via pipelines / roads / ships; pumped; into rocks / stored underground / stored in (natural) saline aquifers; an impermeable layer of rock above the store;	**3**
1(f)	*any two from:* albedo enhancement; space reflectors; stratospheric aerosols;	**2**

Question	Answer	Marks
2(a)(i)	*max two justifications:* year 0 to 20: higher than average tree ring width; year 50 to 80: higher than average tree ring width; idea of significant fluctuations; *max two conclusion:* (no impact from factory because) more years with higher than average tree ring width / more years with above average growth; other factors impact tree growth / factor named e.g. drought / fire / temperature / disease;	**3**
2(a)(ii)	ice cores; historical accounts;	**2**
2(b)(i)	*any two from:* for both concentrations mass increases with time; increased ozone concentration decreases plant mass / the longer the plants are exposed to ozone the greater the difference in mass between 20 and 120 ppm; little effect in first year; relevant quoted comparative data e.g. after 3 years 25 g different;	**2**
2(b)(ii)	*any three from:* total number of plants; species of plant; stated growing conditions ;;; e.g. soil pH, amount of light, volume of water, spacing, temperature, organic content of soil AVP;	**3**
2(c)(i)	troposphere;	**1**
2(c)(ii)	in the presence of sunlight; *any two from reaction of ozone with:* oxides of nitrogen ; particulates; volatile organic compounds / VOCs;	**3**

Question	Answer	Marks
2(c)(iii)	*any two from:* eye irritation; respiratory irritation;	**2**
2(d)(i)	axes labelled with units; time / hour AND concentration / ppm sensible linear scale with plotted points that cover at least half of grid; plotting 7–8 correct; plotting all 9 correct; straight line drawn with ruler between each point connecting AND not extrapolated beyond 24 hours;	**5**
2(d)(ii)	0.82;	**1**
2(d)(iii)	no AND *any one from:* do not know concentration between hours 15–18; data is not repeated; concentration at 15 could be anomalous;	**1**

Question	Answer	Marks
3(a)(i)	to get representative data;	**1**
3(a)(ii)	anomalous result circled;	**1**
3(a)(iii)	*any one from: (*number of birds can be predicted using sound recordings because) songs per minute increases as number of birds increases; positive correlation between number of birds and songs per minute;	**1**

Question	Answer	Marks
3(a)(iv)	*any two from:* time consuming / 3 days of recordings to listen to; difficult to identify the song of the European bee-eaters compared to other birds; other sounds other than birds might interfere with the recording; birds all singing at once; same bird could be counted more than once; AVP;	**2**
3(a)(v)	*any one from:* birds not disturbed; recordings can be left for a long time to run / automated; idea of permanent record / data can be checked; big data that can be analysed by computer; eliminates error if analysed by computer; AVP;	**1**
3(b)(i)	(250 × 235) ÷ 124 / 473.79; 474;	**2**
3(b)(ii)	decreases AND *any one from:* lower proportion of marked birds in total population; greater mixing of marked released birds with total population; lower recapture of marked birds in second sample;	**1**
3(c)(i)	*any three from:* reintroducing species; reducing active management of wildlife; allowing natural forest regeneration; idea of letting nature manage itself / idea an area reverts back to natural state;	**3**

Question	Answer	Marks
3(c)(ii)	*any two from:* decrease in competition; decrease in predation; more food; ban on hunting; climatic conditions; (seasonal) migration; AVP;	**2**
4(a)(i)	the inability to access sufficient quantities of clean water; *any two from:* (to maintain adequate standards of) food; manufacturing goods; sanitation; (sustainable) health care;	**3**
4(a)(ii)	*any three from:* reduced crop yield / crop failure; livestock death; food shortages / malnutrition / famine; illness due to drinking contaminated water;	**3**
4(b)(i)	40;	**1**
4(b)(ii)	500 000 000 / 500 million / 5×10^8;	**1**
4(c)(i)	*any four from:* large amounts of energy are needed; water needs to be pumped from sea to plant; cost of pipelines; membrane must be **replaced** every 3 years; cost of disposing of wastewater; cost of maintenance; large area of land needed; AVP; e.g. low efficiency	**4**

Question	Answer	Marks
4(c)(ii)	*any two from:* impact on future desalination of sea water / sea water becomes more salty; costs more to remove the salt from sea water; becomes toxic to marine organisms; disrupts food chains / reduces biodiversity; alters abiotic component of ecosystem; AVP;	**2**
4(d)	*any two from:* location / land-locked; cost; lack of expertise; limited availability of fossil fuel to run the desalination; existing availability of fresh water supplies e.g. lakes; AVP;	**2**
4(e)	*any one from:* people unwilling to leave homes; people have to leave jobs; AVP;	**1**
4(f)	dam / reservoir;	**1**
4(g)	ice sheets / glaciers / lakes / rivers / marshes / permafrost;	**1**