CAMBRIDGE
International Education

Cambridge IGCSE™

ENVIRONMENTAL MANAGEMENT **0680/02**

Paper 2 Environmental Management in Context **For examination from 2027**

MARK SCHEME

Maximum Mark: 80

Specimen

This document has **12** pages.

Generic Marking Principles

All examiners must apply these general marking principles when marking candidate responses. Examiners must apply them alongside the specific content of the mark scheme or generic level descriptions for a question. Each question paper and mark scheme must 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 descriptions for the question
- the specific skills defined in the mark scheme or in the generic level descriptions 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 descriptions.

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 descriptions 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.

mark scheme abbreviations

;	separates alternative responses to the question
/	separates alternative wording within the same response
accept	a less than ideal answer which should be marked correct
allow	identifies an answer that will be allowed if no other marking point is awarded
and	indicates that two or more parts of a response are required for the mark
AVP	any valid point
AW	alternative wording (where responses vary more than usual)
ignore	indicates an incorrect response which is irrelevant and does not cause a contradiction
reject	reject
not	indicates an incorrect response that would contradict another otherwise correct alternative
or	separates possible variants in a response which are mutually exclusive (award marks for one **OR** the other, **not** parts of each)
owtte	or words to that effect
underlined	underlined words must be included to gain credit for a response
ecf	credit a correct statement that follows a previous wrong answer
M	marking point (with relevant number)
ora	or reverse argument
( )	the word/phrase in brackets is not required but sets the context

Question	Answer	Marks	Guidance
1(a)(i)	August ;	**1**	
1(a)(ii)	7 ;	**1**	
1(a)(iii)	**M1** 17 **and** –7 (°C) ; **M2** correct subtraction of M1 values ;	**2**	**M2** expected answer: 24 (°C) = 2
1(a)(iv)	*any two from:* **M1** growing season is too short ; **M2** seeds would only start to grow in June, July and August ; **M3** only June, July and August are warm enough for growth of plants / only 3 months warm enough ;	**2**	
1(a)(v)	*four from any two limitations and matching explanation:* **M1** *limitation*: data is not representative of all of Finland ; **M2** *explanation*: data is for one location only / data is not for all of Finland ; **M3** *limitation*: temperature / precipitation, might vary each year ; **M4** *explanation*: not all years are the same / due to climate change ; **M5** *limitation*: data values are means ; **M6** *explanation*: take into account more than one year ;	**4**	
1(b)(i)	*any three from:* **M1** silting of rivers ; **M2** desertification ; **M3** mass movement / landslides / rockslides / mudslides ; **M4** loss of habitats ; **M5** loss of biodiversity ; **M6** displacement of people ; **M7** malnutrition / famine ;	**3**	**ignore** answers relating to crop yield
1(b)(ii)	*any two from:* **M1** reduces surface run-off / increases infiltration ; **M2** reduces water erosion / prevents soil from being washed away ; **M3** reduces wind speed ; **M4** reduces wind erosion / prevents soil from being blown away ;	**2**	

Question	Answer	Marks	Guidance
2(a)(i)	**M1** measured distance = 2.5 cm ± 0.1 cm ; **M2** distance = **M1** × 75 ;	**2**	**M2** expected answer: 187.5 (km) / 187 (km) / 188 (km) = 2 marks **M2 ecf** from **M1** × 75
2(a)(ii)	NW ;	**1**	
2(b)	*any five from:* • *select the area to sample* **M1** grid the map of Florida / use GPS coordinates ; **M2** use a random number generator / AW, to choose sites ; • *collect and record your data* **M3** use a quadrat **and** count the number of snails in the quadrat ; **M4** in a table / using a tally system ; • *estimate the population* **M5** repeat for, named number of quadrats / larger sample ; **M6** calculate / estimate, using area of sample areas and area of Florida ; **M7** replicate on consecutive days to take mean ;	**5**	must have one from each bullet for [5]
2(c)	*max three from:* *max two benefits from:* **M1** samples taken evenly over whole sample area ; **M2** simple to replicate investigation (to check data) ; *max two limitations from:* **M3** can miss snails if they are clustered / snails need to be randomly distributed ; **M4** not representative ; **M5** difficult to sample such a large area ; **M6** risk of bias (from choosing sample intervals) ;	**3**	

Question	Answer	Marks	Guidance
2(d)	*any two from:* **M1** they destroy crops ; **M2** they consume native plants / change habitats / habitat destruction ; **M3** they out-compete other snails / reduce population of other snails ; **M4** they may have no natural predator ; **M5** they may reproduce rapidly ; **M6** they may spread across whole of, Florida / USA ; **M7** they may introduce disease ;	**2**	

Question	Answer	Marks	Guidance
3(a)(i)	organic content ;	**1**	
3(a)(ii)	45(%) ;	**1**	
3(a)(iii)	50(%) ;	**1**	
3(a)(iv)	*any three from:* **M1** gases include oxygen ; **M2** oxygen required for (aerobic) respiration ; **M3** plant roots respire ; **M4** respiration releases energy ; **M5** energy used for growth / named energy use ;	**3**	
3(b)(i)	**M1** nitrate: NO_3^- ; **M2** phosphate: PO_4^{3-} ;	**2**	
3(b)(ii)	to see the growth without fertiliser / so the effects of fertiliser can be compared ;	**1**	
3(b)(iii)	*supports the conclusion:* **M1** potassium ions and nitrate ions result in less days than the control ; *does **not** support the conclusion:* **M2** no significant difference to the control / phosphate ions result in more days than the control ;	**2**	

Question	Answer	Marks	Guidance
3(b)(iv)	*conclusion:* **M1** fertilisers increase crop yield ; *justification:* **M2** all yields are higher with fertiliser ; **or** *conclusion:* **M3** nitrate ions have the greatest effect on crop yield ; *justification:* **M4** nitrate ions give greatest increase in yield ;	**2**	**M3 ora**
3(b)(v)	type of fertiliser ;	**1**	
3(b)(vi)	days to harvest / crop yield ;	**1**	
3(b)(vii)	*any two from:* **M1** mass / concentration, of fertiliser; **M2** number of maize plants ; **M3** area of field ; **M4** planting density ; **M5** volume of water given ; **M6** type / variety / species / source / age of, maize seeds / plants ;	**2**	
3(c)	*any four from:* **M1** reduces weed growth / reduces competition with weeds ; **M2** reduces evaporation / traps moisture ; **M3** reduces run-off ; **M4** reduces soil erosion ; **M5** adds organic nutrients to the soil ; **M6** stated way soil is improved, e.g. drainage ; **M7** reduces risk of pest damage ; **M8** protects roots from, extreme weather / heat / cold ;	**4**	

Question	Answer	Marks	Guidance
4(a)(i)	**X** marked anywhere on, Mid-Atlantic Ridge / shaded area ;	**1**	**reject X** outside of shaded area
4(a)(ii)	constructive ;	**1**	**accept** divergent
4(a)(iii)	*any two from:* **M1** mainly on the (Mid-Atlantic) Ridge ; **M2** one, on ridge of south coast / in sea / on a (separate) island ; **M3** three not on ridge / seven on ridge ; **M4** larger number in southern half of island ;	**2**	
4(b)(i)	*any two from:* **M1** more low VEI than high VEI / as VEI increases frequency decreases ; **M2** many low VEI eruptions ; **M3** quoted data, e.g. VEI 7 has least number of eruptions ;	**2**	**M1 ora**
4(b)(ii)	*any five from:* **M1** more people live in Indonesia / more densely populated areas ; **M2** (eruption occurred at) different time of day ; **M3** Indonesia or MIC, has less money to spend on, disaster preparation / infrastructure ; **M4** Indonesian eruption lasted longer ; **M5** harder to reach victims ; *in Iceland (more) efficient:* **M6** monitoring / prediction ; **M7** early warning (systems) ; **M8** land use zoning / buildings can withstand eruptions ; *Iceland disaster preparation:* **M9** disaster plan ; **M10** drills ; **M11** emergency supplies / provision of, water / shelter / food / medical supplies ; **M12** emergency rescue teams ; **M13** evacuation (procedure) ;	**5**	**M1**, **M3** and **M4 ora**

Question	Answer	Marks	Guidance
4(c)	*any two from:* **M1** volcanic bombs ; **M2** ash ; **M3** water vapour ; **M4** carbon dioxide ; **M5** sulfur dioxide ; **M6** pyroclastic flows ;	**2**	
4(d)	*any three from:* **M1** fertile soils ; **M2** extraction of minerals ; **M3** building materials ; **M4** geothermal power ; **M5** tourism ;	**3**	

Question	Answer	Marks	Guidance
5(a)(i)	*any one from environmental:* **M1** loss of habitats / large area of land cleared ; **M2** loss of biodiversity / few plant species visible ; **M3** air / land / water / noise / visual, pollution ; *any one from economic:* **M4** employment opportunities ; **M5** increased local economy ; **M6** improved, facilities / infrastructure ;	**2**	**ignore** carbon dioxide produced
5(a)(ii)	<table><tr><th>statement</th><th>true</th></tr><tr><td>Calcium carbonate is the raw material for manufacturing cement.</td><td>✓</td></tr><tr><td>Calcium carbonate is also known as lime.</td><td></td></tr><tr><td>Calcium oxide is also a product of manufacturing cement.</td><td>✓</td></tr><tr><td>Calcium oxide is also known as limestone.</td><td></td></tr></table> ;;;	**3**	4 correct = 3 marks 3 correct = 2 marks 2 correct = 1 mark 0–1 correct = 0 marks

Question	Answer	Marks	Guidance
5(b)(i)	*line graph with:* **M1** both axes labelled including year and unit for carbon dioxide production ; **M2** linear scale on both axes with data occupying at least half of the grid ; **M3** and **M4** data points plotted with crosses or encircled dots to within ± half of a small square ;; **M5** point-to-point straight lines drawn with no extrapolation ;	**5**	**M3** 4 correct plots **M4** 5 correct plots **M5** reject line or curve of best fit
5(b)(ii)	*any two from:* **M1** population may change ; **M2** rate of cement production may change ; **M3** other building materials may be developed ; **M4** new technologies may develop ;	**2**	
5(c)(i)	altering, behaviour / practices / infrastructure ;	**1**	
5(c)(ii)	*any two from:* **M1** grow crops, that resist warmer / drier / wetter conditions ; **M2** understand local risks ; **M3** improve flood defences ; **M4** legislation about building, near coasts / on floodplains ; **M5** change building design and materials / new laws restricting carbon dioxide emissions may be introduced ; **M6** AVP ;	**2**	