Cambridge International AS Level

ENVIRONMENTAL MANAGEMENT **8291/21**

Paper 2 **October/November 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 October/November 2021 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

This document consists of **14** printed pages.

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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)	<u>fish</u>;	1
1(a)(ii)	<u>birds</u>;	1
1(a)(iii)	thrown / fallen from boats; thrown / lost by fishermen; blown from land; lost from landfill; carried by streams and rivers;	2
1(a)(iv)	26 / 26.1 / 26.09;	1
1(b)(i)	(the) transfer / flow / movement of energy;	1
1(b)(ii)	less food for top predators; numbers decrease; less feeding on seagrass; seagrass increases; less predation on squid / jellyfish; increased numbers of squid / jellyfish; long term effect – populations stabilise;	4
1(b)(iii)	education; to use plastic bags more ecologically / about their effects on sea life; charging for bags at shops; to reduce use; change to paper bags; to reduce number of bags used; legislation to reduce single-use bags; to force consumers and shops to change habits; improved recycling / re-use; to prevent them getting in the sea;	4

Question	Answer	Marks
1(c)(i)	correct plot + correct width + shading;	**1**
1(c)(ii)	organic material sinks to bottom of ocean floor; sunlight cannot penetrate into ocean; so no photosynthesis; cold restricts enzymes / photosynthesis (RHS);	**2**
1(c)(iii)	river flows from land to sea; collects nutrients as it crosses the land; named example; minerals from eroding rocks; excess fertilisers; sewage spilt into rivers / septic tanks leak / waste from cattle; tides mix seawater and freshwater; churning by tidal waters;	**3**

Question	Answer	Marks
2(a)(i)	<u>succession</u>;	**1**
2(a)(ii)	sedimentation; (of) soil / minerals; dead / decaying leaves; build-up in the water; shallow water evaporates; due to temperature / wind; land begins to dry; plants colonise swampy area; soil fertility increases; shrubs and trees appear; plants attract herbivores; herbivores attract carnivores;	**6**
2(a)(iii)	abiotic: non-living parts of the environment; valid example; biotic: living part of the environment; valid example;	**4**

Question	Answer	Marks
2(b)(i)	large amounts of produce; requires large amount of land; transport / power; damages environment; overuse of fertilisers; causes eutrophication in aquatic environment; overuse of pesticides / herbicides; damage food webs / disrupt habitats;	**4**
2(b)(ii)	deforestation / removal of plants; leads to loss of soil fertility / erosion; loss of food / shelter; causes loss of animals / emigration; disrupts food web; planting crops / monoculture reduces biodiversity;	**3**
2(b)(iii)	education; encourage people to respect the environment; legislation; fines for deforestation; encourage ecotourism; to earn a living from the biodiversity;	**2**

Question	Answer	Marks
3(a)	*Advantages:* Rare species can be monitored closely, encouraged to breed and mature offspring can be released into the wild. Genetic profiling is used to ensure vigour. Potential for commercial activity. International cooperation. Prevent extinction. Education. *Disadvantages:* Animals affected by capture and captivity, leading to health and behavioural problems. Zoos rarely able to match the wild conditions. Animals become too used to humans and are at risk in the wild, released animals seek humans causing problems. Hunting. Activism. **please use level descriptors 1**	**10**
3(b)	*The question requirements are:* • describe methods of conservation • for a range of ecosystems • assess the relative success of the methods. *Indicative content:* Candidates should demonstrate understanding of a range of conservation strategies for biodiversity, including local conservation areas, ecological islands and ecotourism and provide detailed descriptions of named examples. The role of legislation and the provision of environmental protection services (rangers), control of public access, provision of services and facilities. An assessment of the success or otherwise is required. Some reference to part (a) is likely but should not be extensive. **please use level descriptors 2**	**30**

Question	Answer	Marks
4(a)	Over time there is a general decrease in Arctic sea ice in March from 64 / million km^2 to 14.5 / million km^2 making a loss of approximately 50 / million km^2. Representing a percentage loss of approximately 78%. The readings fluctuate from year to year with some significant variations (falls and rises) especially in 2004. Increasing temperatures as a result of human enhanced greenhouse effect lead to the melting of the sea ice. Gases such as carbon dioxide and methane accumulate in the atmosphere and contribute to rising temperature. Ocean temperatures are also increasing. Loss of sea ice affects the albedo further contributing to climate change. Generally decreasing. From 16.4 to 14.6 million km^2. Fluctuations each year. Global warming explained. Fluctuations due to seasonal variations. **please use level descriptors 1**	10
4(b)	*The question requirements are:* • demonstrate knowledge of the international protocols • show understanding of the difficulty in achieving and monitoring the protocols • assess the relative success of chosen examples. *Indicative content:* Candidates should use a range of examples which could include Montreal (ozone and CFCs), Kyoto (carbon dioxide emissions) and Paris (climate change). More recent declarations are also valid. Understanding the need to reduce carbon dioxide and methane releases as well as other related policies. The difficulties in getting agreement between countries of differing levels of income, with different environmental policies and priorities, and different political ideologies as well as the problems of monitoring and enforcing these between borders and countries. Assessment of the relative success should be made. **please use level descriptors 2**	30

Question	Answer	Marks
5(a)	According to the graph, from 1800 to 1920, the global population was less than 2 billion with a slight increase. But after 1940, this population boomed and reached to 7 billion in the year 2017. The graph shows that this rapid growth / exponential shape of population would continue till 2050 when the population would reach to 9 billion. After that, the global population will plateau / level off and could fall / decline to around 8.5 billion in the year 2100. The rapid growth in population is a result of better diets, hygiene and health care leading to a reduced death rate and increased birth rate. Pressure of increasing population on the use of resources e.g. water, land, food, fuel etc. **please use level descriptors 1**	**10**
5(b)	*The question requirements are:* • demonstrate an understanding of the population growth and its impact on resources • understand the problems of countries with lower economic development • be able to describe the approaches to provision and preservation of resources • make comparison between different levels of economic development. *Indicative content:* Cost, lack of resources and even political will to solve the issues. Lower income countries often rely on NGO for support and input. Infrastructure to protect resources are all expensive. Lack of infrastructure makes difficulties in transporting items needed. Sometimes produce is exported and not available to local population. Increasing severe weather events also affect resources. Growing populations put stress on demand and supply of resources, whereas stable populations are more able to manage the resources. Example of resources include water, land, food, medicines etc. In higher income countries the infrastructure is present and the population is usually stable or marginally rising which allows for efficient planning. Political will is directed to planning provision of resources for the population. Balance between the two types of economy. **please use level descriptors 2**	**30**

Question	Answer	Marks
	Section B descriptor levels: | **Descriptor**	**Award Mark** | |---|---| | Consistently meets the level criteria | Mark at top of level | | Meets the criteria, but with some inconsistency | Middle, mark to just below top mark | | Meets most of level criteria, but not all convincingly | Just below middle, mark to just above bottom mark | | On the borderline of this level and the one below | Mark at bottom of level | **Section B (part a**), **Level descriptors 1** **8–10 marks** The response: • contains few errors • shows a very good understanding of the question • shows a good use of data or the information provided, where appropriate • provides a balanced answer **5–7 marks** The response: • may contain some errors • shows an adequate understanding of the question • shows some use of data or the information provided, where appropriate • may lack balance **1–4 marks** The response: • may contains errors • shows limited understanding of the question • shows little or no use of data or the information, where appropriate • lacks balance	

Question	Answer	Marks
	Section B (part b), Level descriptors 2 Responses: **Level one, 25–30 marks** • fulfil all the requirements of the question • contain a very good understanding of the content required • contain a very good balance of content • contain substantial critical and supportive evaluations • make accurate use of relevant vocabulary **Level two, 19–24 marks** • fulfil most of the requirements of the question • contain a good understanding of the content required • contain a good balance of content • contain some critical and supportive evaluations • make good use of relevant vocabulary **Level three, 13–18 marks** • fulfil some requirements of the question • contain some understanding of the content required • may contain some limited balance of content • may contain brief evaluations • make some use of relevant vocabulary **Level four, 6–12 marks** • fulfil limited requirements of the question • contain limited understanding of the content required • may contain poorly balanced of content • may not contain evaluations • make limited use of relevant vocabulary	

Question	Answer	Marks
	Level five, 1–5 marks • fulfil a few of the requirements of the question • contain a very limited understanding of the content required • are likely to be unbalanced and undeveloped • evaluative statements are likely to be missing • make no use of relevant vocabulary	