Cambridge Assessment International Education

# Cambridge IGCSE™

**ENVIRONMENTAL MANAGEMENT** **0680/12**

Paper 1 Theory **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.



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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:<br><br>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:<br><br>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<br><br>For questions that require ***n*** responses (e.g. State **two** reasons …):<br><br>• The response should be read as continuous prose, even when numbered answer spaces are provided.<br>• Any response marked *ignore* in the mark scheme should not count towards ***n***.<br>• Incorrect responses should not be awarded credit but will still count towards ***n***.<br>• 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.<br>• 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) | *clockwise, from top:*<br>carbon dioxide, sunlight, oxygen, water<br><br>2 correct;<br>4 correct; | **2** |
| 1(b) | chlorophyll; | **1** |
| 1(c) | respiration; | **1** |
| 1(d) | *one mark for named factor, one mark for linked explanation:*<br>controlled environment;<br>so optimum conditions (can be provided);<br>higher temperatures;<br>so the rate of photosynthesis will be higher;<br>adding carbon dioxide;<br>for optimum concentration to favour photosynthesis;<br>managed water (supply);<br>so the correct amount is available for plant processes;<br>control of pests;<br>so energy is retained by the producer / not lost to the consumer / less competition;<br>supply of nutrients;<br>so plants have access to optimum levels; | **2** |

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| Question | Answer | Marks |
|---|---|---|
| 2(a) | commercial arable; | **1** |
| 2(b) | *any two from:*<br>crop rotation;<br>fertilisers;<br>insect control; (insecticide);<br>weed control (herbicide);<br>fungi control (fungicide);<br>genetically modified organisms / better varieties / higher yielding varieties;<br>mechanisation; | **2** |
| 2(c) | *any two from:*<br>waterlogging;<br>dries out / compaction / capping;<br>soil erosion;<br>salinisation;<br>leaching; | **2** |

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| Question | Answer | Marks |
|---|---|---|
| 3(a) | *any three from:*<br>drink safe water;<br>cholera is a water-borne disease;<br>wash your hands with soap;<br>spread by touch / contaminate food or people / prevent transmission / eq;<br>have a vaccination;<br>prevent infection / reduces spread / allows humans to fight the infection / lead to eradication / provides immunity;<br>keep cooking areas clean;<br>prevents (cross) contamination; | **3** |
| 3(b) | *any two from:*<br>LEDC / ora:<br>less effective sanitation;<br>fewer sources of clean water;<br>less access to, medical care / vaccinations;<br>different economic priorities;<br>less awareness;<br>larger number of informal settlements;<br>AVP; | **2** |

| Question | Answer | Marks |
|---|---|---|
| 4(a) | *any two from:*<br>large population and limited land;<br>economic;<br>employment;<br>safer;<br>better access to medical facilities / education;<br>better infrastructure;<br>AVP; | **2** |

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| Question | Answer | Marks |
|---|---|---|
| 4(b) | *any two from:*<br>availability of contraception;<br>access to health care;<br>improved education on family planning;<br>education of women / careers;<br>examples of pronatalist or antinatalist policies, e.g. taxation / legislation ; | **2** |

| Question | Answer | Marks |
|---|---|---|
| 5(a)(i) | surface / opencast / open-pit / open-cut; | **1** |
| 5(a)(ii) | *any three from:*<br>air pollution due to transport;<br>noise pollution due to transport / blasting;<br>habitat loss due to land clearance;<br>loss of biodiversity due to land clearance;<br>dust pollution due to extraction;<br>water pollution due to leaching / run-off; | **3** |
| 5(a)(iii) | limestone is a sedimentary rock / formed by sedimentation;<br>formed by the accumulation of shell (material);<br>by compaction / weight of overlying sediment;<br>over a long time period; | **2** |
| 5(a)(iv) | *any three from:*<br>availability / ease of extraction / cost of extraction;<br>accessibility / ease of transportation;<br>environmental impact assessment / away from settlements / protected areas / local opinion;<br>supply and demand / profitability / economic factors;<br>supply of labour;<br>AVP; | **3** |
| 5(b)(i) | 2016; | **1** |
| 5(b)(ii) | consumption is increasing;<br>relevant quoted data, e.g. from 244 to 296 million tonnes / 21% increase; | **2** |
| 5(b)(iii) | 4.5% of 298 / 13.41;<br>(298 + 13.41 =) 311.41 / 311 / 311.4; | **2** |

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| Question | Answer | Marks |
|---|---|---|
| 6(a)(i) | correct plotting of 3.5; | **1** |
| 6(a)(ii) | (19 + 11 =) 30 (g); | **1** |
| 6(b)(i) | *any three from:*<br>along the equator / between tropics;<br>mainly coastal;<br>west coast of Africa;<br>west coast of South America;<br>east coast of Asia;<br>east coast of North America;<br>west coast of North America<br>AVP; | **3** |
| 6(b)(ii) | *one mark for strategy AND one mark for associated description:*<br>*any two strategies from:*<br>net types / mesh size;<br>reduces by-catch / allows juveniles to mature;<br>quotas;<br>prevention of overfishing;<br>closed seasons;<br>allows breeding;<br>protected areas / reserves;<br>protects specific species / endangered species / allows population recovery;<br>conservation laws;<br>forces people to comply with rules;<br>international agreements;<br>aims to ensure fairness between countries; | **4** |

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| Question | Answer | Marks |
|---|---|---|
| 7(a)(i) | *any two from*:<br>lack of rainfall / high rate of evaporation;<br>lack of rivers / lakes / water sources;<br>overpopulation;<br>water pollution;<br>(geographically) inaccessible / frozen / permeable rock / lack of ability to extract;<br>agriculture;<br>climate change;<br>poor management / water wastage; | **2** |
| 7(a)(ii) | *any two from*:<br>no research yet been done;<br>very low population;<br>inaccessible;<br>not a priority; | **2** |
| 7(b) | *any one from:*<br>death of organisms;<br>decline in crop yields;<br>starvation;<br>(increased) soil erosion;<br>desertification;<br>decrease in air quality;<br>increased risk of wildfires; | **1** |

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| Question | Answer | Marks |
|---|---|---|
| 7(c) | *desalination:*<br>*benefit:*<br>unlimited supply;<br>no further treatment needed / safe water supply;<br><br>*limitation:*<br>need to be by the sea / not suitable for landlocked areas;<br>expensive (to build / run);<br>large amount of electricity needed;<br>disposal of waste / salt;<br><br>*reservoirs:*<br>*benefit:*<br>can be large or small;<br>low technology;<br>low cost;<br>rainfall can be stored;<br>multipurpose uses;<br><br>*limitation:*<br>dry up / weather dependent;<br>can be polluted;<br>can cause earthquakes;<br>displaces people / animals;<br>loss of habitat / land lost;<br>may silt up;<br><br>*plastic bottle water:*<br>*benefit:*<br>plastic is light;<br>easily transported;<br>available in different sizes;<br>source of potable water;<br>can be used in times of disaster; | **5** |

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| Question | Answer | Marks |
|---|---|---|
| 7(c) | *limitation:*<br>plastic pollution / waste disposal;<br>not suitable for large scale use / farming / industry;<br>short term solution;<br>expensive method; | |

| Question | Answer | Marks |
|---|---|---|
| 8(a)(i) | 45; | **1** |
| 8(a)(ii) | diesel; | **1** |
| 8(a)(iii) | *y*-axis: $CO_2$ in arbitrary units;<br>*x*-axis: engine type AND four labels;<br>sensible linear scale for *y*-axis using at least half the graph paper;<br>4 bars plotted; | **4** |
| 8(b) | *any three from:*<br>transport policies e.g. congestion charge;<br>taxation (of other vehicle types);<br>subsidies / incentives to purchase electric vehicles;<br>subsidies / incentives to use electric vehicles;<br>preferential right of way or access;<br>increase availability of electricity charging points;<br>raise awareness;<br>AVP; | **3** |
| 8(c) | *any four from:*<br>emissions cause climate change / global warming;<br>which affects <u>all</u> countries / populations;<br>idea that carbon dioxide crosses international boundaries;<br>example of climate change effect e.g. melting of ice sheets, glaciers and permafrost, rise of sea level, flooding;<br>causes loss of land / forced migration;<br>requires international cooperation to address;<br>climate change causing changes in biodiversity; | **4** |

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| Question | Answer | Marks |
|---|---|---|
| 9(a) | *any two comparisons from:*<br>fuel: uranium vs coal / oil / gas;<br>process: fission vs combustion;<br>mass of fuel: small vs large(r); | **2** |
| 9(b) | column or row headings: country, percentage and mass;<br>unit for mass / tonnes in heading;<br>3 sets of data recorded correctly; | **4** |
| 9(c) | *any two from:*<br>demand increase / more power stations being built;<br>resulting in limited supply;<br>potential price fixing / cartel;<br>political instability;<br>AVP; | **2** |

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| Question | Answer | Marks |
|---|---|---|
| 9(d) | *Level of response marked question:*<br><br>Level 3 [5–6 marks]<br>**A coherent response is given that develops and supports the candidate's conclusion using relevant details and examples.**<br>Indicative content and subject-specific vocabulary are generally used precisely and accurately.<br>Good responses are likely to present a balanced evaluation of the statement.<br><br>Level 2 [3–4 marks]<br>**Development and support of the conclusion is evident, though the response may lack some coherence and/or detail.**<br>Irrelevant detail may be present.<br>Indicative content and subject-specific vocabulary are used but may lack some precision and / or accuracy.<br>Responses contain evaluation of the statement, but this may not be balanced.<br><br>Level 1 [1–2 marks]<br>**The response may be limited in development and/or support.**<br>Contradictions and / or irrelevant detail may be present.<br>Indicative content and subject-specific vocabulary may be limited or absent.<br>Responses may lack structure or be in the form of a list. Evaluation may be limited or absent.<br><br>No response or no creditable response [0 marks] | **6** |

| Question | Answer | Marks |
|---|---|---|
| 9(d) | *Indicative content for:*<br>To meet world demand and combat climate change, all power stations built in the future should be nuclear power stations.<br><br>*agree / advantages of nuclear power generation:*<br>does not produce $CO_2$ or other greenhouse gases;<br>does not produce smoke;<br>a lot of energy from a small amount of fuel;<br>reliable;<br>small volume of waste;<br>low maintenance;<br>can meet increasing world demand;<br>existing technology;<br><br>*disagree / disadvantages of nuclear power generation:*<br>expensive to build;<br>expensive to decommission;<br>danger of terrorism;<br>danger of explosion;<br>radioactive waste;<br>limited availability of uranium;<br>technically difficult to build / expertise needed;<br>international regulation;<br>other alternative sources available (solar, wind, hydroelectric, geothermal, etc.);<br>variety of power stations more reliable;<br>some countries have other resources naturally available;<br>too dependent on Kazakhstan / Australia / Canada; | |

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