CAMBRIDGE
International Education

Cambridge O Level

ENVIRONMENTAL MANAGEMENT **5014/12**

Paper 1 Theory **May/June 2026**

MARK SCHEME

Maximum Mark: 80

Published

This mark scheme contains the instructions and marking guidance that our examiners used to mark candidate responses for this component.

Before they start marking, examiners complete a standardisation process. They review a range of candidate responses and discuss the mark scheme in detail to agree which answers can and cannot be accepted. Examiners award marks where it is clear that candidate responses have met the requirements of the mark scheme. These requirements may vary between different components or different versions of the same component, depending on the exact requirements of the question and the candidate responses seen during the standardisation process.

Sometimes, our mark schemes may allow marks to be awarded to responses which contain elements that are factually incorrect or for content not covered by the syllabus. We do this in response to the demands of a specific question to support candidates and make sure that our assessments are fair. However, these allowances should not be used as a guide for teaching and learning.

We cannot discuss the mark scheme with schools, and we recommend that schools read the mark scheme together with the assessment material and the Principal Examiner Report for Teachers.

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General marking principles

All examiners must apply these marking principles when marking candidate responses.

1	Examiners must award marks for each response in line with: • the specific **content** defined in the mark scheme • the specific **skills** defined in the mark scheme or in the level descriptions • the **standard of response** required as exemplified by the standardisation scripts.
2	Examiners must award **whole marks** (not half marks, or other fractions).
3	Examiners must award marks **positively**. This means that: • marks are not deducted for errors or omissions • marks are awarded for correct/valid answers as defined in the mark scheme and also for **other valid answers** which go beyond the scope of the syllabus and mark scheme referring to your team leader as appropriate • the quality of spelling, punctuation and grammar are judged **only** when the mark scheme indicates that these features are **specifically assessed** in the question. However, the meaning of all responses must be unambiguous.
4	Examiners must **consistently** apply the requirements of the mark scheme and any rules for what to do when candidates have not followed instructions correctly.
5	Examiners must use the **full range of marks** defined in the mark scheme, unless limited by the quality of the candidate responses seen.
6	Examiners must award marks according to the mark scheme and **must not** award marks with grade thresholds or grade descriptions in mind.

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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	<u>'List rule' guidance</u> 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.

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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.

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Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
✓	correct point or mark awarded
✗	incorrect point or mark not awarded
^	information missing or insufficient for credit
I	incorrect or insufficient point ignored while marking the rest of the response
CON	contradiction in response, mark not awarded
BOD	benefit of the doubt given
ECF	error carried forward applied
FA	First answer
NAQ	response has not answered question
POT	power of ten error

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Annotation	Meaning
SEEN	point has been noted, but no credit has been given or blank page seen
TV	response is too vague or there is insufficient detail in response
REP	repetition in response
●	to show a correct point but where the number of points does not relate to the number of marks i.e. 3 correct = 2 marks
✓ 1	correct awarding one mark from marking point or marking group 1. similar numbered ticks are used for marking point or marking groups 2, 3, 4 etc.
Highlighter	Highlight

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Mark Scheme Abbreviations

Abbreviation	**Meaning**
;	separates marking points
/	alternative responses for the same marking point
R	reject the response
A	accept the response
I	ignore the response
ecf	error carried forward
AVP	any valid point
ora	or reverse argument
AW	alternative wording
underline	actual word given must be used by candidate (grammatical variants excepted)
( )	the word / phrase in brackets is not required but sets the context
max	indicates the maximum number of marks that can be given
M1, **M2**….	marking point reference

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Question	Answer	Marks	Guidance
1(a)(i)	sector labels match pie chart in order: other cooling homes heating water lighting homes cold storage of food heating homes	**1**	
1(a)(ii)	45 ;	**1**	**note**: no ecf here as obtained from table
1(b)(i)	*any one from:* M1 to go below, ground water / igneous rock ; M2 to reach the sedimentary / shale rock ; M3 shale gas is found in sedimentary rock / ora ;	**1**	M3 **allow:** natural gas / oil allow reference to igneous layer being a cap (to gas)
1(b)(ii)	open up cracks / create cracks (in sedimentary rock) ;	**1**	**allow** fractures rocks
1(b)(iii)	keeps the cracks open ;	**1**	**allow** sand acts as a proppant
1(b)(iv)	*any two from:* M1 methane / shale gas / natural gas ; M2 water ; M3 waste products ;	**2**	**ignore** rock M1 **ignore** gas unspecified M3 **allow** sediments / sand / <u>used</u> chemicals M4 **allow** oil
1(b)(v)	shale ;	**1**	**allow** sandstone / limestone **allow** calcium carbonate / chalk **allow** coal seams / beds **reject** slate

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Question	Answer	Marks	Guidance
2(a)	*any three from:* M1 wind break ; M2 roots, bind or hold soil / improves soil structure ; M3 (roots) reduce run-off / reduces water erosion ; M4 (trees) reduces wind erosion or described e.g. reduction in wind speed ; M5 increases interception ;	**3**	M1 **allow** shelter belt M5 **allow** a description of interception
2(b)	*any two from:* M1 terracing ; M2 contour ploughing ; M3 bunds ; M4 maintain vegetation or ground cover ; M5 addition of organic matter / named example ;	**2**	**ignore** wind breaks M4 cover crops / managed grazing M5 mulching M5 **reject** fertiliser unqualified. **allow** trickle drip irrigation **allow** mixed cropping / intercropping / crop rotation
2(c)	M1 land becomes dry ; M2 loss of vegetation ;	**2**	M1 **allow** lack of rain / droughts M2 **allow** barren land / plants can't grow **ignore** fertility

Question	Answer	Marks	Guidance
3(a)	M1 large wall ; M2 holds back river / water ; M3 to create reservoir ;	**3**	**ignore** dam (as in question) M1 **allow** barricade M2 **allow** alternate wording e.g. controls flow M3 **allow** water store / collects water

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Question	Answer	Marks	Guidance
3(b)	*any two from:* M1 HEP / electricity generation ; M2 recreation / tourism ; M3 fishing / food source ; M4 reduced flooding ; M5 provides jobs / economic benefit ; M6 improved infrastructure ;	**2**	**ignore** fresh water M1 **accept** a source of energy / energy resource

Question	Answer	Marks	Guidance
4(a)(i)	Nigeria ;	**1**	
4(a)(ii)	M1 source 1 estimates are higher ; M2 different sources have different estimates ;	**1**	**allow** positive, correlation / relationship **ignore** estimated numbers from the two sources are similar / the same
4(b)	*any two from:* M1 automated ; M2 large areas can be covered ; M3 inaccessible areas can be covered ; M4 prevents larvae hatching / controls the vector ;	**2**	**Note** question states killing larvae **ignore** cost M1 **ignore** time unqualified M1 **allow** less labour needed. M4 **allow** stops mosquitoes reproducing M5 **allow** idea of even dosing of areas
4(c)	M1 field assigned a, number / letter / grid reference / coordinates ; M2 method for random selection e.g. number generator / pulled from hat / phone book / rolling dice ;	**2**	
4(d)(i)	110 ;	**1**	**accept** values from 109–111

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Question	Answer	Marks	Guidance
4(d)(ii)	*any three from:* (effective because) M1 number of larvae overall decrease ; M2 number (of larvae) with insecticide is lower than using water or control ; M3 faster (rate of) decrease for insecticide ; M4 fewer larvae means fewer (adult) mosquitoes ; M5 relevant quoted comparative data e.g. final number is 64 with water and 10 with insecticide ;	**3**	**Note** to markers **M1** and **M2** may be combined in the same statement. M3 **allow** reference to gradient M5 tolerance of ± 1 in data quoted M5 **allow** ECF from value in **4(d)(i)** if quoted **Note 4(d)(i)** clipped to bottom of question in RM for reference)
4(e)	*any five from:* M1 improved sanitation ; M2 toilets provided / open defecation discouraged ; M3 handwashing encouraged ; M4 treatment of sewage ; M5 drinking water treated / potable water provided ; M6 boiling (of water) ; M7 chlorination (or water) ;	**5**	**ignore** education / awareness unqualified M3 **allow** hand sanitisers M5 **allow** water purification M5 **ignore** filtering water M6 **allow** distillation **ignore** healthcare M8 **allow** vaccination

Question	Answer	Marks	Guidance
5(a)(i)	igneous ;	**1**	
5(a)(ii)	weathering ;	**1**	
5(a)(iii)	(surface) run-off / through-flow ;	**1**	**allow** groundwater flow

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Question	Answer	Marks	Guidance
5(b)	148 ;	1	(4 × 37)
5(c)	*total max [4]:* *max [3] benefits:* M1 no specialist equipment needed ; M2 increases crop yield ; M3 no cost to farmers ; M4 CO_2 trapped under water / in the sea ; *max [3] limitations:* M5 does not reduce **emissions** of CO_2 ; M6 stated example of source of emissions e.g. fossil fuel combustion M7 very large quantities of basalt are needed ; M8 increased mining (of basalt) required ; M9 stated impact of increased mining ; M10 impact of storing carbon not fully known ;	4	 M2 **allow** improve crops M2 **ignore** fertiliser M4 **allow** carbon **allow** stored **ignore** cost (as a limitation) M6 **allow** fossil fuels used to transport basalt. M11 only occurs when there is rainfall; **ignore** references to reserve size / depletion of basalt
5(d)	**D** ;	1	

Question	Answer	Marks	Guidance
6(a)	*any three from:* M1 identifying impacts ; M2 (methods for) reducing impacts ; M3 (methods for) restoration ; M4 (methods for) regular monitoring ; M5 public consultation ; M6 review / approval from authorities ;	3	**Note** : question relates to environmental impact assessment responses may not consider this context in this question. **ignore**: cost.
6(b)(i)	idea of taking up less space ;	1	

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Question	Answer	Marks	Guidance
6(b)(ii)	*any three from:* M1 plastic layer **AND** prevents soil pollution or (ground) water pollution ; M2 clay layer **AND** prevents soil pollution or (ground) water pollution ; M3 methane removal or gas vent **AND** greenhouse gas ; M4 cover **AND** prevents waste blowing away / reduces risk of disease spreading / reduces visual pollution / prevents animals or flies / prevents odours / allows methane to be collected / recovered ; M5 monitoring (wells) **AND** tests to see if soil / water is contaminated ; M6 liquid removed **AND** reduces chance of leaching or run-off or contamination of soil or water ;	**3**	**allow** max [1] for list of three features with no reasons **allow** max [1] mark for **M1** and **M2** if simply described as 2 layers M3 **allow** prevents explosion
6(c)	*any four from:* *roads less likely to crack:* M1 less repair / construction (costs) ; M2 less resources used to repair / make roads ; M3 link to less air pollution due to less resources used ; M4 stated air pollution reduction e.g. global warming / CO_2 emissions ; M5 resources are finite ; M6 safety comment re. cracked roads ; *use of waste tyres / waste building materials:* M7 recycling / reuses the tyres / reuses the waste rock ; M8 large number of tyres used per km of road ; M9 sustainable process ;	**4**	no credit for **direct lifting of text** without adding extra info e.g. **ignore** uses 500 tyres unqualified e.g. **ignore** roads less likely to crack **e.g. ignore** waste tyres and waste rock used - if unqualified **ignore** landfill; **allow** less resources used once **allow** cost once **allow** recycling once M2 **allow** reduces need for non-renewable materials e.g. stone M6: **allow** skid resistant

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Question	Answer	Marks	Guidance
6(d)	*any three from:* M1 microorganisms / microbes / bacteria / fungi / plants ; M2 added to soil ; M3 degrade or break down pollutants ; M4 by using them as energy source ; M5 process improves soil / increases fertility / adds nutrients ; M6 promotes / allows plant growth ; M7 increases top soil layer ;	**3**	M1 **allow** decomposers M3 **allow** removes allow toxins / heavy metals / chemicals
6(e)(i)	83 ;	**1**	**allow** 83.3 **ignore** negative sign
6(e)(ii)	M1 idea of money raised used for research or investment in less polluting strategies ; M2 encourages reusing or recycling ;	**1**	idea of making polluting technologies less cost effective;

Question	Answer	Marks	Guidance
7(a)	to obtain representative data ;	**1**	**allow** to avoid bias **ignore** accuracy **allow** reliability
7(b)(i)	July ;	**1**	
7(b)(ii)	M1 correct values selected / –30 **AND** –37.5 ; M2 7.5 ;	**2**	M2 ecf on their temperatures from **M1** M2 **ignore** minus sign
7(c)(i)	138.5;	**1**	
7(c)(ii)	M1 axes labelled with unit: precipitation / mm **AND** month ; M2 sensible linear scale such that the data occupies at least half the grid ; M3 10–12 data plotted correctly ; M4 bars of equal width ;	**4**	M3 **allow** ± half a small square M4 **ignore** touching bars

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Question	Answer	Marks	Guidance
7(d)	30% circled ;	**1**	
7(e)(i)	*any two from:* M1 replace area of sea ice lost ; M2 sea ice will thicken ; M3 sea ice will take longer to melt ; M4 sustainable practice / large quantity of sea water available ;	**2**	allow increasing, albedo / reflection of sunlight M1 **allow** increase area / amount of sea ice M2 **allow** increase depth of sea ice
7(e)(ii)	*any two from:* M1 energy needed to power pump ; M2 energy comes from fossil fuels (which increases climate change) ; M3 cost ; M4 labour intensive / skilled labour needed ; M5 remote location / difficult to access / difficult to transport equipment ; M6 idea of difficult to work in cold temperatures (for humans and machinery) ; M7 many holes needed to cover all of Arctic / small area covered at one time ; M8 unknown effects on ocean ecosystem ;	**2**	**ignore** time consuming **ignore** sea ice would break M8 **ignore** kills wildlife

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Question	Answer	Marks	Guidance
7(f)	*Level of response marked question:* Level 3 [5–6 marks] **A coherent response is given that develops and supports the candidate's conclusion using relevant details and examples.** Indicative content and subject-specific vocabulary are generally used precisely and accurately. Good responses are likely to present a balanced evaluation of the statement. Level 2 [3–4 marks] **Development and support of the conclusion is evident, though the response may lack some coherence and/or detail.** Irrelevant detail may be present. Indicative content and subject-specific vocabulary are used but may lack some precision and / or accuracy. Responses contain evaluation of the statement, but this may not be balanced. Level 1 [1–2 marks] **The response may be limited in development and / or support.** Contradictions and / or irrelevant detail may be present. Indicative content and subject-specific vocabulary may be limited or absent. Responses may lack structure or be in the form of a list. Evaluation may be limited or absent.	**6**	

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Question	Answer	Marks	Guidance
7(f)	No response or no creditable response [0 marks] *indicative content for:* The biggest impact of climate change is ice sheet melting. *reasons why ice sheet melting is biggest impact:* sea level rise flooding loss of land silting of land salinisation ground water contamination loss of life loss of income / homes / employment lead to crop failure livestock drowning increase in water related diseases happening at fast rate potentially irreversible migration *reasons why ice sheet melting is NOT biggest impact:* examples of other impacts extreme weather increase in temperatures crop failures forced migration increase in invasive species loss of biodiversity loss of habitat idea that other impacts have similar effects as ice sheet melting		

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